

Did Anthony Fauci, the FDA, and the CDC Cause the Deaths of 3.4 Million People?
Supplementary material

1. [Studies and other documents on ivermectin](https://c19ivm.org/) (page 2) courtesy <https://c19ivm.org/>
2. [Studies and other documents on vitamin C](https://c19early.org/c/) (page 49) courtesy <https://c19early.org/c/>
3. [Studies and other documents on vitamin D3](https://c19early.org/d/) (page 81) courtesy <https://c19early.org/d/>
4. [Studies and other documents on zinc](https://c19early.org/z/) (page 193) courtesy <https://c19early.org/z/>
5. [Studies and other documents on quercetin](https://c19early.org/q/) (page 237) courtesy <https://c19early.org/q/>
6. [Studies and other documents hydroxychloroquine](https://c19hcq.org/) (page 249) courtesy <https://c19hcq.org/>
7. [Appendix with more detailed information and analysis about the issues mentioned in this report](#) (page 368)

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Peer-reviewed and other studies on Ivermectin

Chart courtesy c19ivm.org. For more charts, full analysis and more information, visit their website.

Sep 13	Liu et al., Stem Cell Research & Therapy, doi:10.1186/s13287-023-03485-3	SARS-CoV-2 viral genes Nsp6, Nsp8, and M compromise cellular ATP levels to impair survival and function of human pluripotent stem cell-derived cardiomyocytes
	In Vitro study showing that ivermectin and meclizine mitigated cardiac cell death and dysfunction caused by SARS-CoV-2 viral genes. Authors found that SARS-CoV-2 viral genes Nsp6, Nsp8, and M had harmful effects on human cardiomyocytes (h..	
Aug 17	Redação MPV	Greg Tucker-Kellogg publishes fraudulent study to attack ivermectin
	Discussion of errors in [medrxiv.org]. This paper is highly flawed. For example, authors claim that there were "499 reported deaths - a citywide post-hospitalisation COVID death rate of 30.1% during the study period", whi..	
Aug 10	Covid Analysis	Ivermectin for COVID-19: real-time meta analysis of 99 studies (ivmmeta)
	Statistically significant lower risk is seen for mortality, ventilation, ICU admission, hospitalization, recovery, cases, and viral clearance. All remain significant for higher quality studies. 60 studies from 54 independent teams in 24..	
Aug 8	Chamie et al., Cureus, doi:10.7759/cureus.43168	COVID-19 Excess Deaths in Peru's 25 States in 2020: Nationwide Trends, Confounding Factors, and Correlations With the Extent of Ivermectin Treatment by State
	Ecological analysis showing that ivermectin distribution correlated significantly ($p < 0.002$) with the reduction in excess deaths across 25 states in Peru. Ivermectin was authorized for COVID-19 treatment in Peru in May 2020 and distributed..	
Jul 16	Osati et al., medRxiv, doi:10.1101/2023.07.13.23292643	Clinical manifestations and mortality among hospitalized COVID-19 patients in Tanzania, 2021-2022.
	32% lower mortality ($p=0.02$) . Retrospective 1,387 hospitalized PCR confirmed COVID-19 patients in Tanzania, showing lower mortality with ivermectin treatment and with steroid treatment in multivariable analysis.	
Jul 14	Vottero et al., Molecular Sciences, doi:10.3390/ijms241411449	Computational Prediction of the Interaction of Ivermectin with Fibrinogen
	In Silico study showing that ivermectin may bind with high affinity to multiple sites on fibrinogen and may interfere with SARS-CoV-2 spike protein – fibrinogen binding, potentially inhibiting the formation of fibrin clots resistant to de..	
Jul 8	Breitinger et al., Virology Journal, doi:10.1186/s12985-023-02095-y	Patch-clamp studies and cell viability assays suggest a distinct site for viroporin inhibitors on the E protein of SARS-CoV-2

		In Vitro analysis of inhibitors against the SARS-CoV-2 E ion channel. - The E protein of SARS-CoV-2 is a viroporin that forms ion channels important for viral replication. The E proteins from SARS-CoV and SARS-CoV-2 are highly similar. - ..
Jul 1	Abd-Elmawla et al., Journal of Zhejiang University-SCIENCE B, doi:10.1631/jzus.B2200385	Suppression of NLRP3 inflammasome by ivermectin ameliorates bleomycin-induced pulmonary fibrosis
		Animal study showing that ivermectin alleviated pulmonary inflammation and fibrosis induced by bleomycin in a rat model. Authors note this may add to the clinical usefulness of ivermectin for patients with pulmonary fibrosis from COVID-19..
Jun 12	Choi et al., Journal of Korean Medical Science, doi:10.3346/jkms.2023.38.e195	Two Years of Experience and Methodology of Korean COVID-19 Living Clinical Practice Guideline Development
		Review of the development of COVID-19 treatment guidelines in Korea. Authors claim "continuous evidence updates" and "living recommendations", however the ivermectin recommendation has not been updated si..
Jun 10	Wade et al., Value in Health, doi:10.1016/j.jval.2023.03.2056	Variation in Demographic Characteristics, Socioeconomic Status, Clinical Presentation and Selected Treatments in Mortality Among Patients with a Diagnosis of COVID-19 in the United States
		Retrospective analysis of mortality for COVID-19 patients in the USA. Authors do not provide adjusted results, preventing any strong evidence. However it is notable that, despite comparable treatment frequencies, the mortality for patient..
Jun 8	Yemeke et al., BMJ Open, doi:10.1136/bmjopen-2022-068923	Impact of the COVID-19 pandemic on the quality of medical products in Zimbabwe: a qualitative study based on key informant interviews with health system stakeholders
		Review of the quality of medical products in Zimbabwe during the pandemic, noting reports of inauthentic ivermectin in South Africa that was tested and found to have low or no active ingredient.
May 29	El-Tanani et al., Pharmaceuticals, doi:10.3390/ph16060799	Phase II, Double-Blinded, Randomized, Placebo-Controlled Clinical Trial Investigating the Efficacy of Mebendazole in the Management of Symptomatic COVID-19 Patients
		RCT 69 outpatients in Jordan, showing improved viral clearance and CRP with mebendazole. Authors note that mebendazole, like ivermectin, has been shown to have antiviral activity against multiple viruses.
May 27	Sheldrick, K., This Scattdr Corn	Schedule A: Statement
		Dr. Kyle Sheldrick, part of a group of researchers known for false and highly influential claims about ivermectin research, posted a schedule A statement admitting to false claims regarding one of the world's most highly published and res..
May 24	Requejo Domínguez et al., BMJ Global Health, doi:10.1136/bmjgh-2022-010962	Quality of clinical evidence and political justifications of ivermectin mass distribution of COVID-19 kits in eight Latin American countries

		Authors' claim the first RCT was in August 2020 and did not show a benefit, however the first two RCTs were actually: in July 2020, showing 46% improved recovery with statistical significance. , showing over 90% lower cases with very high..
May 23	Scheim et al., Journal of Clinical Medicine, doi:10.3390/jcm12113625	When Characteristics of Clinical Trials Require Per-Protocol as Well as Intention-to-Treat Outcomes to Draw Reliable Conclusions: Three Examples
		Analysis of PP vs. ITT results in three RCTs, including discussion of multiple critical issues with the ivermectin arm of the TOGETHER trial [Reis]: - conflicting and inconsistent decreases in PP vs. ITT groups between different tables an..
May 22	Wada et al., Frontiers in Medicine, doi:10.3389/fmed.2023.1139046	Efficacy and safety of single-dose ivermectin in mild-to-moderate COVID-19: the double-blind, randomized, placebo-controlled CORVETTE-01 trial
		19% lower progression (p=0.46), 14% higher need for oxygen therapy (p=0.46), 23% worse improvement (p=0.61), and 60% improved recovery (p=0.17). Late treatment (6.6 days after onset/PCR+) RCT with 221 low risk (no deaths) COVID-19 patients in Japan, showing no significant difference in viral clearance with a single dose of ivermectin under fasting. Authors note that a single 200 µ..
May 10	Llenas-García et al., Viruses, doi:10.3390/v15051138	Ivermectin Effect on In-Hospital Mortality and Need for Respiratory Support in COVID-19 Pneumonia: Propensity Score-Matched Retrospective Study
		17% lower mortality (p=0.82), 18% lower need for oxygen therapy (p=0.37), 23% lower progression (p=0.52), and 4% higher ICU admission (p=0.92). Retrospective 96 late stage patients receiving a single dose of 200 µg/kg ivermectin for strongyloides and 96 matched controls, showing no significant difference in outcomes. Authors note that this may be due to the low dose used.
May 3	Kory, P., International Covid Summit III, European Parliament, Brussels	The Global War on Ivermectin
		Review of the clinical evidence for ivermectin for COVID-19 and the methods used in many countries to hide the efficacy, covering: extreme financial conflicts of interest, coordinated censorship, refusal of Merck to run a trial requested ..
Apr 25	Babalola et al., Medical Research Archives, doi:10.18103/mra.v11i4.3778	The Place of Ivermectin in the Management of Covid-19: State of the Evidence
		Review of the clinical and epidemiological evidence of efficacy, in vitro and animal studies, and the mechanisms of action of ivermectin for COVID-19.
Apr 25	Loo et al., Pharmaceutical Research, doi:10.1007/s11095-023-03520-1	Recent Advances in Inhaled Nanoformulations of Vaccines and Therapeutics Targeting Respiratory Viral Infections
		Review of nanoformulations for inhaled therapeutics for respiratory viral infections including COVID-19. Inhaled formulations can deliver treatment directly to the respiratory tract, enabling higher concentrations while minimising systemi..

Apr 21	Munir et al., Healthcare, doi:10.3390/healthcare11081192	Clinical Disease Characteristics and Treatment Trajectories Associated with Mortality among COVID-19 Patients in Punjab, Pakistan
	48% lower mortality (p=0.13). Retrospective 1,000 hospitalized COVID-19 patients in Pakistan, showing lower mortality with ivermectin without statistical significance.	
Mar 7	Ragó et al., GeroScience, doi:10.1007/s11357-023-00756-y	Results of a systematic review and meta-analysis of early studies on ivermectin in SARS-CoV-2 infection
	Systematic review and meta analysis of trials within the first year of the pandemic, showing significantly faster viral clearance with ivermectin.	
Feb 20	Naggie et al., JAMA, doi:10.1001/jama.2023.1650	Effect of Higher-Dose Ivermectin for 6 Days vs Placebo on Time to Sustained Recovery in Outpatients With COVID-19: A Randomized Clinical Trial
	600µg/kg arm of ACTIV-6. Results of this trial are unreliable, with multiple critical anomalies, and no response from the authors. For details see [c19early].	
Feb 15	Ceballos et al., Biomedicine & Pharmacotherapy, doi:10.1016/j.biopha.2023.114391	Ivermectin systemic availability in adult volunteers treated with different oral pharmaceutical formulations
	Comparison of ivermectin as an oral solution, tablets, or capsules, showing >50% higher systemic exposure for the oral solution compared to tablets or capsules. Authors note that the oral solution improved absorption without risk of excess.	
Jan 16	Viglione et al., The Gazette of Medical Sciences, doi:10.46766/thejms.pubheal.22120905	Intravenous high dose vitamin C and ozonated saline effective treatment for Covid -19: The Evolution of Local Standard of Care
	Retrospective 479 high risk outpatients in the USA treated with a protocol including intravenous vitamin C, vitamin D, zinc, quercetin, bromelain, lactoferrin, HCQ, ivermectin, ozonated saline, azithromycin, ceftriaxone, methylprednisolone.	
Jan 5	Desort-Henin et al., ECCMID 2023 (results released 1/5/2023)	The SAIVE Trial, Post-Exposure use of ivermectin in Covid-19 prevention: Efficacy and Safety Results
	96% fewer cases (p<0.0001). PEP RCT 399 patients in Bulgaria showing significantly lower COVID-19 cases with ivermectin prophylaxis, and significantly lower cases with high viral load. No participant had severe symptoms, required oxygen, or was hospitalized. All pat..	
Dec 12 2022	Sarajvisut et al., Infection & Chemotherapy, doi:10.3947/ic.2022.0127	An Open Label Randomized Controlled Trial of Ivermectin Plus Favipiravir-Based Standard of Care versus Favipiravir-Based Standard of Care for Treatment of Moderate COVID-19 in Thailand

		<p>104% higher ICU admission (p=0.62), 104% worse improvement (p=0.62), and 4% faster recovery (p=0.63). RCT low risk hospitalized patients in Thailand showing no significant difference with the addition of ivermectin to favipiravir based SOC. Only the abstract is currently available. The trial was registered retrospectively [thaiclinicaltri..</p>
Dec 10 2022	Galal et al., Advances in Virology, doi:10.1155/2022/3014686	<p>The Use of Mebendazole in COVID-19 Patients: An Observational Retrospective Single Center Study</p> <p>Retrospective 157 inpatients and 185 outpatients in Egypt, showing improved recovery with mebendazole. For outpatients, the treatment group was younger (40 vs. 48). Mebendazole was offered to patients when ivermectin/HCQ were unavailable.</p>
Nov 28 2022	Boschi et al., bioRxiv, doi:10.1101/2022.11.24.517882	<p>SARS-CoV-2 Spike Protein Induces Hemagglutination: Implications for COVID-19 Morbidities and Therapeutics and for Vaccine Adverse Effects</p> <p>In Vitro study showing that ivermectin blocked hemagglutination (clumping of red blood cells) when added to red blood cells prior to SARS-CoV-2 spike protein, and reversed hemagglutination when added afterwards. Spike protein from four li..</p>
Nov 10 2022	De Forni et al., PLoS ONE, doi:10.1371/journal.pone.0276751	<p>Synergistic drug combinations designed to fully suppress SARS-CoV-2 in the lung of COVID-19 patients</p> <p>Vero E6 In Vitro study showing ivermectin and remdesivir to be highly synergistic with 6-13 times lower concentration required for 100% inhibition.</p>
Oct 21 2022	Naggie et al., JAMA, doi:10.1001/jama.2022.18590	<p>Effect of Ivermectin vs Placebo on Time to Sustained Recovery in Outpatients With Mild to Moderate COVID-19: A Randomized Clinical Trial</p> <p>The ACTIV-6 trial can be found under the original release date [Naggie].</p>
Oct 21 2022	Ochoa-Jaramillo et al., Revista Infectio	<p>Clinical efficacy and safety of ivermectin (400 µg/kg, single dose) in patients with severe COVID-19: a randomized clinical trial</p> <p>57% lower mortality (p=0.35), 34% higher ventilation (p=0.62), and 37% higher ICU admission (p=0.52). RCT 75 very late stage patients in Colombia, showing no significant difference in outcomes with a single dose of 400µg/kg ivermectin.</p>
Oct 10 2022	PRINCIPLE	<p>PRINCIPLE Trial Ivermectin arm: unexplained delay and extension</p> <p>Critical issues, mid-trial changes, unexplained supply problem, and delay in the ivermectin arm of the PRINCIPLE trial. Molnupiravir Ivermectin Trial PANORAMIC PRINCIPLE Chief investigator Prof. Chris Butler Prof. Chris Butler Randomization delay Median 2 days, ≤5 days from onset ≤14 days from onset (median unknown) Population 50+ or 18+ w/comorbidities 18..</p>
Sep 27 2022	Marinos, A., Do Your Own Research	<p>Did Use Of Ivermectin In Latin America Sabotage Clinical Trials and Confuse The World Of Medicine?</p>

		Meta analysis of ivermectin trials showing community use of ivermectin in Latin America associated with lower observed efficacy in trials, consistent with the side effect profiles, Google Trends analysis, and investigator statements. Auth..
Sep 26 2022	Kowa Press Release	興和/新型コロナウイルス感染症患者を対象とした「K-237」（イベルメクチン）の第III相臨床試験結果に関するお知らせ
		Kowa reports no significant differences in their trial, with no mortality, almost no severe cases, and recovery within ~4 days, leaving minimal room for statistically significant improvement.
Sep 22 2022	Sobrinho et al., Medicina Clínica Práctica, doi:10.1016/j.mcpsp.2022.100346	Clinical protocol for early treatment of COVID-19 in a real-world scenario: Results of a series of patients
		Retrospective 116 patients between May and September 2020 in Brazil receiving an early treatment protocol including ivermectin and azithromycin, showing no mortality compared to up to 5.7% CFR in Brazil during the study period.
Sep 19 2022	Aref et al., Infection and Drug Resistance, doi:10.2147/IDR.S381715	Possible Role of Ivermectin Mucoadhesive Nanosuspension Nasal Spray in Recovery of Post-COVID-19 Anosmia
		74% faster recovery (p=0.0005). 96 patient RCT showing faster resolution of post-COVID anosmia with an ivermectin nanosuspension nasal spray.
Sep 16 2022	Kory, P., Pierre Kory's Medical Musings	The Criminal Censorship of Ivermectin's Efficacy By The High-Impact Medical Journals - Part 1
		Review of censorship and negative publication bias for ivermectin research.
Sep 15 2022	Uematsu et al., The Journal of Antibiotics, doi:10.1038/s41429-023-00623-0 (date from preprint)	Prophylactic administration of ivermectin attenuates SARS-CoV-2 induced disease in a Syrian Hamster Model
		Hamster study showing that prophylactic ivermectin inhibited COVID-19 weight loss, reduced lung viral titer by a factor of 10, inhibited pulmonary inflammatory cytokine expression, and reduced the severity of pathological changes with a s..
Sep 1 2022	Akhtar et al., The Professional Medical Journal, doi:10.29309/TPMJ/2022.29.09.6634	Does ivermectin reduce COVID-19 mortality and progression of disease severity? – A retrospective study
		90% lower mortality (p<0.0001), 72% lower ICU admission (p=0.0006), 80% higher hospital discharge (p<0.0001), and 59% faster viral clearance (p<0.0001). Retrospective 423 patients in Pakistan, 216 receiving 6 day treatment, showing lower mortality, lower ICU admission, and faster viral clearance with treatment. Limited baseline information per group is provided. There were more severe pat..

Aug 31 2022	Qadeer et al., Pakistan Journal of Medical and Health Sciences, doi:10.53350/pjmhs2216824	Ivermectin A Potential Treatment In Covid-19, Related to Critical Illness
	58% improved viral clearance (p<0.0001). Prospective convenience sampling study of 210 hospitalized age-matched COVID-19 patients, showing faster viral clearance with ivermectin. Baseline information per group is not provided.	
Aug 18 2022	Bramante et al., NEJM, doi:10.1056/NEJMoA2201662	Randomized Trial of Metformin, Ivermectin, and Fluvoxamine for Covid-19
	COVID-OUT remote RCT, showing no significant differences compared to a combined metformin/placebo "control" group. Results for other treatments are listed separately - metformin , fluvoxamine . Authors include metformin patients in the co..	
Aug 12 2022	Kory, P., Pierre Kory's Medical Musings	The Miracle Not-Heard Around The World: The Success of Uttar Pradesh
	Detailed review of Uttar Pradesh's use of ivermectin, the dramatically better results compared to states declining ivermectin, and the censorship of ivermectin use. If Uttar Pradesh was a country, it would be the 6th largest in the world.	
Aug 10 2022	Chellasamy et al., Journal of King Saud University - Science, doi:10.1016/j.jksus.2022.102277	Docking and molecular dynamics studies of human ezrin protein with a modelled SARS-CoV-2 endodomain and their interaction with potential invasion inhibitors
	In Silico study of SARS-CoV-1&2 endodomains and ezrin docking, identifying ivermectin, quercetin, calcifediol, calcitriol, selamectin, and minocycline as potential therapeutic drugs with strong ezrin binding which may restrict viral endod..	
Aug 10 2022	Al-kuraishy et al., Current Drug Targets, doi:10.2174/1389450123666220810102406	Central effects of Ivermectin in alleviation of Covid-19-induced dysautonomia
	Review of the potential benefits of ivermectin for mitigating SARS-CoV-2 infection-induced dysautonomia.	
Jul 23 2022	Marcolino et al., BMC Infectious Diseases, doi:10.1186/s12879-022-07589-8	Systematic review and meta-analysis of ivermectin for treatment of COVID-19: evidence beyond the hype
	Meta analysis including 25 of studies (RCTs), with only 10 and 8 reporting mortality and mechanical ventilation results, finding lower mortality and mechanical ventilation without statistical significance. The conclusion is incorrect, d..	
Jul 19 2022	Schilling et al., eLife, doi:10.7554/eLife.83201 (date from preprint)	Pharmacometrics of high dose ivermectin in early COVID-19: an open label, randomized, controlled adaptive platform trial (PLATCOV)

		86% lower progression (p=0.24) and 9% worse viral clearance (p=0.36). Very high conflict of interest RCT with design optimized for a null result: very low risk patients, high existing immunity, post-hoc change to exclude patients more likely to benefit. There was no significant difference in viral clearance..
Jul 11 2022	Hazan, S., <i>Frontiers in Microbiology</i> , doi:10.3389/fmicb.2022.952321	Microbiome-Based Hypothesis on Ivermectin's Mechanism in COVID-19: Ivermectin Feeds Bifidobacteria to Boost Immunity
		Hypothesis for an additional mechanism of action for ivermectin: inhibition of pro-inflammatory cytokines due to enhanced replication of Bifidobacterium. This article was censored by the journal stating concerns "regarding the scient..
Jul 8 2022	Saha et al., <i>Pharmaceutics</i> , doi:10.3390/pharmaceutics14071432	Manipulation of Spray-Drying Conditions to Develop an Inhalable Ivermectin Dry Powder
		Development and analysis of an inhalable dry powder formulation of ivermectin. Authors optimized the formulation to have good aerosolization properties for lung delivery. The powder maintained ivermectin's ability to inhibit SARS-CoV-2 re..
Jun 30 2022	Umar et al., <i>Jurnal Teknologi Laboratorium</i> , doi:10.29238/teknolabjournal.v11i1.344	Inhibitory potentials of ivermectin, nafamostat, and camostat on spike protein and some nonstructural proteins of SARS-CoV-2: Virtual screening approach
		In Silico study of ivermectin, camostat, and nafamostat, showing that ivermectin had the best inhibitory action on the SARS-CoV-2 spike protein and Nsp10, while nafamostat had the best results for the other non-structural proteins. Author..
Jun 29 2022	Nimitvilai et al., <i>Journal of Global Infectious Diseases</i> , doi:10.4103/jgid.jgid_281_21	A randomized controlled trial of combined ivermectin and zinc sulfate versus combined hydroxychloroquine, darunavir/ritonavir, and zinc sulfate among adult patients with asymptomatic or mild coronavirus-19 infection
		33% improved viral clearance (p=0.12). RCT low-risk patients in Thailand comparing HCQ, darunavir/ritonavir, and zinc, with ivermectin and zinc, showing no significant differences. All patients recovered. 65% of patients were asymptomatic at baseline, 26% were PCR- at baseline..
Jun 23 2022	Mirahmadizadeh et al., <i>Respirology</i> , doi:10.1111/resp.14318	Efficacy of single-dose and double-dose ivermectin early treatment in preventing progression to hospitalization in mild COVID-19: A multi-arm, parallel-group randomized, double-blind, placebo-controlled trial
		67% lower ventilation (p=0.37), 46% lower hospitalization (p=0.22), and 39% improved recovery (p=0.27). RCT with 131 24mg ivermectin, 130 12mg ivermectin, and 130 placebo patients, showing no significant differences in outcomes. Lower ventilation and hospitalization was seen with treatment, in a dose-dependent manner, but not reaching stati..
Jun 21 2022	Popp et al., <i>Cochrane Database of Systematic Reviews</i> , doi:10.1002/14651858.CD015017.pub3	Ivermectin for preventing and treating COVID-19

	Highly biased meta analysis. Authors originally wrote a highly biased meta analysis that avoided statistical significance on individual outcomes with extreme exclusions [Popp], although efficacy was still seen when looking across all o..	
Jun 18 2022	Jitobaom et al., BMC Pharmacology and Toxicology, doi:10.1186/s40360-022-00580-8 (date from preprint)	Synergistic anti-SARS-CoV-2 activity of repurposed anti-parasitic drug combinations
	In Vitro study showing a strong synergistic effect of combinations of ivermectin, niclosamide, and chloroquine, with >10x reduction in IC50 compared to individual drugs.	
Jun 16 2022	Rezai et al., Frontiers in Medicine, doi:10.3389/fmed.2022.919708	Non-effectiveness of Ivermectin on Inpatients and Outpatients With COVID-19; Results of Two Randomized, Double-Blinded, Placebo-Controlled Clinical Trials
	9% higher ICU admission (p=0.95), 36% higher hospitalization (p=0.41), 2% worse recovery (p=0.49), and 23% worse viral clearance (p=0.16). RCT 549 low risk outpatients in Iran. Reported outcomes are very different from the pre-specified outcomes [irct.ir]. The inpatient trial is listed separately. The pre-specified primary clinical outcome was not reported. The reported comp..	
Jun 16 2022	Rezai et al., Frontiers in Medicine, doi:10.3389/fmed.2022.919708	Non-effectiveness of Ivermectin on Inpatients and Outpatients With COVID-19; Results of Two Randomized, Double-Blinded, Placebo-Controlled Clinical Trials
	31% lower mortality (p=0.36), 50% lower ventilation (p=0.07), 16% lower ICU admission (p=0.47), and 11% longer hospitalization (p=0.009). RCT 609 inpatients in Iran. Reported outcomes are very different from the pre-specified outcomes [irct.ir]. The outpatient trial is listed separately. From the pre-specified outcomes, all are either positive or not reported. Pre-specified..	
Jun 14 2022	Williams, T., Do Your Own Research	Not All Ivermectin Is Created Equal: Comparing The Quality of 11 Different Ivermectin Sources
	In Vitro analysis of ivermectin from 11 different sources showing highly variable antiparasitic efficacy. Multiple sources and brands were more effective than the US mass produced Edenbridge brand.	
Jun 13 2022	Shafiee et al., Virology Journal, doi:10.1186/s12985-022-01829-8	Ivermectin under scrutiny: a systematic review and meta-analysis of efficacy and possible sources of controversies in COVID-19 patients
	Meta analysis including 17 of studies (RCTs), finding significantly lower mortality with ivermectin. All seven outcomes favor ivermectin, while statistical significance is reached only for mortality. The conclusion is incorrect, authors..	
Jun 12 2022	Naggie et al., JAMA, doi:10.1001/jama.2022.18590	Effect of Ivermectin vs Placebo on Time to Sustained Recovery in Outpatients With Mild to Moderate COVID-19: A Randomized Clinical Trial
	152% higher combined mortality/hospitalization (p=0.29), 5% higher hospitalization (p=1), 68% lower progression (p=0.36), and 2% faster recovery (p=0.72). RCT low-risk outpatients with very late treatment (median 6 days, 25% ≥8 days) in the USA, showing 98% probability of efficacy for clinical progression at day 14, a treatment delay-response relationship, and significant efficacy for patie..	

Jun 12 2022	Angkasekwina et al., Antibiotics, doi:10.3390/ antibiotics11060796	Safety and Efficacy of Ivermectin for the Prevention and Treatment of COVID-19: A Double-Blinded Randomized Placebo-Controlled Study
Low-risk RCT in Thailand with zero mortality, reporting no significant differences with the addition of ivermectin to favipiravir treatment, however the study as reported does not make sense as detailed below. All participants were suscep..		
May 27 2022	George et al., Indian Journal of Hematology and Blood Transfusion, doi:10.1007/ s12288-022-01546-w	Single Dose of Ivermectin is not Useful in Patients with Hematological Disorders and COVID-19 Illness: A Phase II B Open Labelled Randomized Controlled Trial
30% lower mortality (p=0.55), 19% faster recovery (p=0.37), 33% lower progression (p=0.41), and 33% worse viral clearance (p=0.5). RCT with 35 single dose 24mg, 38 single dose 12mg, and 39 SOC hospitalized patients with hematological illnesses in India, showing no significant differences. Results were better for 24mg vs. 12mg for all symptomatic outcomes. Viral clear..		
May 27 2022	Schwartz, E., New Microbes and New Infections, doi:10.1016/ j.nmni.2022.100989	Does ivermectin have a place in the treatment of mild Covid-19?
Discussion of ivermectin research compared to paxlovid and molnupiravir. Author includes a meta analysis of low-risk-of-bias studies showing significantly lower hospitalization for outpatient treatment with ivermectin. This efficacy is se..		
May 23 2022	de la Rocha et al., BMC Infectious Diseases, doi:10.1186/ s12879-022-07890-6 (date from preprint)	Ivermectin compared with placebo in the clinical course in Mexican patients with asymptomatic and mild COVID-19: a randomized clinical trial
15% worse recovery (p=0.58) and 2% improved viral clearance (p=0.64). Small low-risk patient RCT with 30 low-dose ivermectin and 26 control patients, with no primary outcome events in either arm. Viral load was significantly better with ivermectin on day 5, while there was no significant difference on day 1..		
May 20 2022	Valerio Pascua et al., Epidemiology International Journal, doi:10.23880/ ej-16000234	Repurposing Drugs for Covid-19 by a Developing Country
Review of a multiphasic multidrug early treatment protocol for COVID-19 in Honduras, showing one death from 415 patients, which was for a patient not receiving early treatment (presenting on the 5th day in need of hospitalization and supp..		
May 20 2022	Silva et al., Frontiers in Cellular and Infection Microbiology, doi:10.3389/ fcimb.2022.899702	Clinical-Epidemiology Aspect of Inpatients With Moderate or Severe COVID-19 in a Brazilian Macroregion: Disease and Countermeasures
32% lower mortality (p=0.57). Retrospective 395 hospitalized patients in Brazil, showing mortality HR 0.59 for antiparasitic use, however there were only 8 patients treated and authors do not distinguish between albendazole and ivermectin.		

May 14 2022	Alvarado et al., Computational Biology and Chemistry, doi:10.1016/ j.compbiolchem.2022.10 7692	Interaction of the New Inhibitor Paxlovid (PF-07321332) and Ivermectin With the Monomer of the Main Protease SARS-CoV-2: A Volumetric Study Based on Molecular Dynamics, Elastic Networks, Classical Thermodynamics and SPT
	In Silico study comparing ivermectin and paxlovid Mpro interaction, showing similar interaction for paxlovid and the ivermectin B1a homologue, a different mechanism for ivermectin B1b, and interaction at different sites for paxlovid.	
May 8 2022	Croci et al., International Journal of Biomaterials, doi:10.1155/2016/804398 3	Liposomal Systems as Nanocarriers for the Antiviral Agent Ivermectin
	In Vitro study of liposomal formulations of ivermectin showing up to 5 times lower cytotoxicity and increased antiviral activity in Dengue strains.	
Apr 27 2022	Babalola et al., Research Square, doi:10.21203/ rs.3.rs-1576399/v1	Ivermectin is associated with increase in SPO2 in hypoxemic SARS-CoV-2 patients: pharmacodynamic profile and correlates
	Extended analysis of [Thairu], showing significantly faster and greater improvement in SpO2 with ivermectin treatment.	
Apr 13 2022	Marinos, A.	The Problem With The TOGETHER Trial
	Analysis of serious problems with the Together Trial. Also see [Marinos].	
Apr 11 2022	Zheng et al., International Journal of Pharmaceutics, doi:10.1016/ j.ijpharm.2022.121719	Red blood cell-hitchhiking mediated pulmonary delivery of ivermectin: Effects of nanoparticle properties
	In Vitro and mouse study proposing a method for improving ivermectin pharmacokinetics and bioavailability using delivery via red blood cells.	
Apr 6 2022	Ravikirti et al., Research Square, doi:10.21203/ rs.3.rs-1522422/v1	Association between Ivermectin treatment and mortality in Covid-19: A hospital-based case-control study
	3% lower mortality (p=0.82) . Retrospective 965 late stage (44% severe, 27% ICU) hospitalized patients in India, showing no significant difference with ivermectin treatment. Overall mortality was very high, suggesting very late treatment. The low non-weight-adjusted d..	
Apr 2 2022	Delandre et al., Pharmaceutics, doi:10.3390/ph15040445	Antiviral Activity of Repurposing Ivermectin against a Panel of 30 Clinical SARS-CoV-2 Strains Belonging to 14 Variants
	In Vitro study with 30 COVID-19 strains from 14 variants, showing stronger efficacy with ivermectin compared to CQ and remdesivir, and relatively homogeneous efficacy with ivermectin regardless of strain/variant, in contrast to results fo..	

Mar 25 2022	Aminpour et al., Computation, doi:10.3390/ computation10040051	In Silico Analysis of the Multi-Targeted Mode of Action of Ivermectin and Related Compounds
	In Silico analysis identifying strong or moderate affinity bindings for ivermectin to multiple sites on the spike protein, CD147 and $\alpha 7nAChR$, which may provide effective competitive binding for all variants of SARS-CoV-2. Ivermectin had t..	
Mar 21 2022	Bitterman et al., JAMA Network Open, doi:10.1001/ jamanetworkopen.2022.3 079	Comparison of Trials Using Ivermectin for COVID-19 Between Regions With High and Low Prevalence of Strongyloidiasis
	Analysis of a small subset of 12 ivermectin trials showing a relationship with efficacy and strongyloides prevalence. This analysis is confounded by treatment delay, dose, conflicts of interest, and other factors, and the effect disappear..	
Mar 18 2022	Albariqi et al., International Journal of Pharmaceutics, doi:10.1016/ j.ijpharm.2022.121688	Pharmacokinetics and Safety of Inhaled Ivermectin in Mice as a Potential COVID-19 Treatment
	Mouse study of an inhaled ivermectin formulation, showing high concentrations in the lung and bronchoalveolar lavage fluid, exceeding the required concentration for efficacy based on in vitro studies.	
Mar 15 2022	Uniyal et al., International Journal of Health Sciences, doi:10.53730/ ijhs.v6nS1.4792	Effect of Ivermectin mass drug administration on the COVID-19 Pandemic
	Analysis of mass administration of ivermectin for COVID-19 in Uttarakhand compared to four other states not adopting ivermectin, showing a sharp fall in cases compared to the other states at the time of maximum coverage of ivermectin dist..	
Mar 11 2022	Albariqi et al., Journal of Aerosol Medicine and Pulmonary Drug Delivery, doi:10.1089/ jamp.2021.0059	Preparation and Characterization of Inhalable Ivermectin Powders as a Potential COVID-19 Therapy
	Creation and analysis of an inhalable dry powder formulation of ivermectin for COVID-19.	
Mar 7 2022	Harper, P.	Professor tied to altered Andrew Hill paper also prepared 'Ivermectin Evidence' for World Health Organisation
	Forensic analysis of the Hill meta analysis discovering an unlisted author potentially connected to changes and also related to the WHO ivermectin analysis. Author notes that "the person who allegedly edited the Andrew Hill paper ..	
Mar 4 2022	Lawrie, T.	A Letter to Dr. Andrew Hill
	Documentary about the external forces changing the conclusions of the Hill et al. meta analysis, and the subsequent negative impact around the world.	

Mar 2 2022	Soto et al., PLOS ONE, doi:10.1371/ journal.pone.0264789	Mortality and associated risk factors in patients hospitalized due to COVID-19 in a Peruvian reference hospital
		41% higher mortality (p=0.001) . Retrospective 1,418 very late stage (46% mortality) patients in Peru, showing higher mortality with ivermectin. There is strong confounding by indication, for example 48% of patients with baseline SpO2 <70% were treated compared with 22% ..
Feb 28 2022	Efimenko et al., International Journal of Infectious Diseases, doi:10.1016/ j.ijid.2021.12.096	Treatment with Ivermectin Is Associated with Decreased Mortality in COVID-19 Patients: Analysis of a National Federated Database
		69% lower mortality (p<0.0001) . PSM retrospective 41,608 patients in the USA, 1,072 treated with ivermectin and 40,536 treated with remdesivir, showing lower mortality with ivermectin treatment. This study was presented at a conference (IMED 2021). Submissions were peer..
Feb 25 2022	Thairu et al., Journal of Pharmaceutical Research International, doi:10.9734/jpri/2022/ v34i44A36328 (date from preprint)	A Comparison of Ivermectin and Non Ivermectin Based Regimen for COVID-19 in Abuja: Effects on Virus Clearance, Days-to-discharge and Mortality
		88% lower mortality (p=0.12) , 55% higher hospital discharge (p=0.0001) , and 95% improved viral clearance (p=0.001) . PSM retrospective 87 patients in Nigeria, 61 treated with ivermectin, showing lower mortality, faster recovery, and faster viral clearance with ivermectin treatment. All patients received zinc and vitamin C. A synergistic effect was seen ..
Feb 18 2022	Lim et al., JAMA, doi:10.1001/ jamainternmed.2022.018 9 (data 11/3/21)	Efficacy of Ivermectin Treatment on Disease Progression Among Adults With Mild to Moderate COVID-19 and Comorbidities: The I-TECH Randomized Clinical Trial
		The I-TECH RCT can be found at [c19ivm.org]. Studies are listed under the date they first became available (November 3, 2021 for this study).
Feb 6 2022	Kerr et al., Cureus, doi:10.7759/ cureus.28624 (date from preprint)	Regular Use of Ivermectin as Prophylaxis for COVID-19 Led Up to a 92% Reduction in COVID-19 Mortality Rate in a Dose-Response Manner: Results of a Prospective Observational Study of a Strictly Controlled Population of 88,012 Subjects
		92% lower mortality (p=0.0008) . PSM multivariable analysis of the Itajaí trial showing significantly lower mortality with regular use of ivermectin prophylaxis. Immortal time bias may significantly affect these results. See regarding [medrxiv.org].
Feb 2 2022	Manomaipiboon et al., Trials, doi:10.1186/ s13063-022-06649-3 (date from preprint)	Efficacy and safety of ivermectin in the treatment of mild-to-moderate COVID-19 infection: A randomized, double blind, placebo, controlled trial
		43% improved recovery (p=0.26) and 5% improved viral clearance (p=1) . Small RCT with 72 low-risk patients in Thailand, showing improved recovery with ivermectin, without statistical significance. All patients recovered and there was no escalation of care in either group. There were no adverse events.
Jan 31 2022	Kowa News Release	Antiviral effect of ivermectin confirmed for omicron

		Kowa reports that ivermectin is effective for omicron in In Vitro research.
Jan 25 2022	Malektojari et al., Asian Pacific Journal of Tropical Medicine, doi:10.4103/1995-7645.364007	Efficacy and safety of ivermectin in patients with mild and moderate COVID-19: A randomized controlled trial
		Small trial with 50% of patients missing without explanation. The protocol and registration show both outpatient and inpatient inclusion, with 60 patients in each group, a total of 120 patients, and enrollment completed as of July 11, 2022..
Jan 24 2022	de Jesús Ascencio-Montiel et al., Archives of Medical Research, doi:10.1016/j.arcmed.2022.01.002	A Multimodal Strategy to Reduce the Risk of Hospitalization/death in Ambulatory Patients with COVID-19
		59% lower combined mortality/hospitalization (p<0.0001), 15% lower mortality (p=0.16), 9% lower ventilation (p=0.51), and 48% lower hospitalization (p<0.0001). Retrospective 28,048 COVID+ patients in Mexico, 7,898 receiving a treatment kit including low dose ivermectin, AZ, aspirin, and acetaminophen, show lower mortality/hospitalization for those receiving the kit. Delivery of the treatment k..
Jan 23 2022	Liu et al., Stem Cell Reports, doi:10.1016/j.stemcr.2022.01.014 (date from preprint)	Genome-wide analyses reveal the detrimental impacts of SARS-CoV-2 viral gene Orf9c on human pluripotent stem cell-derived cardiomyocytes
		In Vitro study showing that ivermectin and meclizine treatment may minimize SARS-CoV-2-induced cardiac damage by reducing Orf9c-induced apoptosis and dysfunction. Using human pluripotent stem cell-derived cardiomyocytes, authors show that..
Jan 20 2022	Parvez et al., Immunity, Inflammation and Disease, doi:10.1002/iid3.639 (date from preprint)	Insights from a computational analysis of the SARS-CoV-2 Omicron variant: Host–pathogen interaction, pathogenicity, and possible drug therapeutics
		In Silico analysis of the omicron variant and 10 treatments reported effective for previous variants, predicting that all will be effective for omicron, with ivermectin showing the best results.
Jan 18 2022	Zubair et al., Monaldi Archives for Chest Disease, doi:10.4081/monaldi.2022.2062	The effect of ivermectin on non-severe and severe COVID-19 disease and gender-based difference of its effectiveness
		9% higher mortality (p=1) and 8% longer hospitalization (p=0.4). Retrospective 188 hospitalized patients in Pakistan, 90 treated with ivermectin, showing no significant differences with treatment. The ivermectin group had more severe disease (66% vs 58%, with 6x higher risk for severe disease patients)..
Jan 13 2022	Tyson et al., Preprint	Low Rates of Hospitalization and Death in 4,376 COVID-19 Patients Given Early Ambulatory Medical and Supportive Care. A Case Series and Observational Study.
		100% lower mortality (p<0.0001) and 100% lower hospitalization (p<0.0001). Retrospective 4,376 patients with mild/moderate COVID-19 in the USA treated with multiple medications including HCQ/ivermectin, favipiravir, vitamin C, D, quercetin, zinc, mAbs, budesonide, dexamethasone, prednisone, and colchicine (exact..

Dec 31 2021	Abbas et al., Indian Journal of Pharmaceutical Sciences, doi:10.36468/pharmaceutical-sciences.spl.416	The Effect of Ivermectin on Reducing Viral Symptoms in Patients with Mild COVID-19
	41% lower progression (p=0.54) and 36% improved recovery (p=0.04). RCT 99 ivermectin and 103 control low risk patients in China, up to 7 days from symptom onset, showing statistically significant improvement in recovery with treatment, and non-statistically significant improvements in recovery time and..	
Dec 31 2021	Kerr et al., Research Gate, doi:10.13140/RG.2.2.26793.52327	COVID-19 In-Hospital Mortality Rate is Reduced by Prophylactic Use of Ivermectin: Findings From a City-Wide, Prospective Observational Study Using Propensity Score Matching (PSM)
	45% lower mortality (p=0.05). PSM retrospective 378 hospitalized patients in Brazil, showing lower mortality for patients that were on ivermectin prophylaxis before admission (not taking into account the lower risk of being hospitalized shown in the related larger stu..	
Dec 31 2021	Shimizu et al., Journal of Infection and Chemotherapy, doi:10.1016/j.jiac.2021.12.024	Ivermectin administration is associated with lower gastrointestinal complications and greater ventilator-free days in ventilated patients with COVID-19: A propensity score analysis
	100% lower mortality (p=0.001), 48% lower ventilation (p=0.03), 43% lower ICU admission (p=0.06), and 78% lower progression (p=0.03). Retrospective 88 ventilated COVID-19 patients in Japan, 39 treated with ivermectin within 3 days of admission, showing significantly reduced incidence of GI complications and mortality, and increased ventilator-free days with treatment.	
Dec 30 2021	Semiz, S., Biomolecular Concepts, doi:10.1515/bmc-2021-0017	SIT1 transporter as a potential novel target in treatment of COVID-19
	Review of the potential connections between SLC6A20/SIT1, ACE2, Type 2 Diabetes, and COVID-19 severity. This provides another potential mechanism of action for ivermectin as a partial agonist of glycine-gated chloride channels, interferin..	
Dec 29 2021	Mustafa et al., Exploratory Research in Clinical and Social Pharmacy, doi:10.1016/j.rcsop.2021.100101	Pattern of medication utilization in hospitalized patients with COVID-19 in three District Headquarters Hospitals in the Punjab province of Pakistan
	64% lower mortality (p=0.09). Retrospective 444 hospitalized patients in Pakistan, showing lower mortality with ivermectin treatment in unadjusted results, not reaching statistical significance. Ivermectin was mostly used with patients in severe condition. Dose ranged..	
Dec 28 2021	Baguma et al., Research Square, doi:10.21203/rs.3.rs-1193578/v1	Characteristics of the COVID-19 patients treated at Gulu Regional Referral Hospital, Northern Uganda: A cross-sectional study
	97% lower mortality (p=0.31). Retrospective COVID+ hospitalized patients in Uganda, showing no statistically significant difference in mortality with ivermectin, however there were only 7 patients receiving ivermectin.	

Dec 21 2021	Zaidi et al., The Journal of Antibiotics, doi:10.1038/s41429-021-00491-6	The mechanisms of action of ivermectin against SARS-CoV-2—an extensive review
	Extensive review of 20 mechanisms of action of ivermectin for SARS-CoV-2.	
Dec 13 2021	Jamir et al., Cureus, doi:10.7759/cureus.20394	Determinants of Outcome Among Critically Ill Police Personnel With COVID-19: A Retrospective Observational Study From Andhra Pradesh, India
	53% higher mortality (p=0.13). Retrospective 266 COVID-19 ICU patients in India, showing significantly lower mortality with PVP-I oral gargling and topical nasal use, and non-statistically significant higher mortality with ivermectin and lower mortality with remdesivir.	
Dec 11 2021	Kerr et al., Cureus, doi:10.7759/cureus.21272 (date from preprint)	Ivermectin Prophylaxis Used for COVID-19: A Citywide, Prospective, Observational Study of 223,128 Subjects Using Propensity Score Matching
	70% lower mortality (p<0.0001), 67% lower hospitalization (p<0.0001), and 44% fewer cases (p<0.0001). PSM retrospective 220,517 patients in Brazil, 133,051 taking ivermectin as part of a citywide prophylaxis program, showing significantly lower hospitalization and mortality with treatment. Additional results are presented here: [odysee.com..	
Dec 4 2021	Wentzel et al., Open Forum Infectious Diseases, doi:10.1093/ofid/ofab466.728	Systematic Review and Meta-Analysis of Ivermectin Safety Profile in COVID-19 Trials
	Systematic review and meta-analysis of safety in ivermectin COVID-19 trials, showing no significant difference in adverse events between treatment and control arms. Authors conclude that ivermectin is safe and well-tolerated.	
Dec 1 2021	Behl et al., Science of The Total Environment, doi:10.1016/j.scitotenv.2021.152072	CD147-spike protein interaction in COVID-19: Get the ball rolling with a novel receptor and therapeutic target
	Review of the cluster of differentiation 147 (CD147) transmembrane protein as an entry route for SARS-CoV-2, correlation with observed characteristics of COVID-19, and relevant potential therapeutics including azithromycin, melatonin, sta..	
Nov 26 2021	Ferreira et al., Revista da Associação Médica Brasileira, doi:10.1590/1806-9282.20210661	Outcomes associated with Hydroxychloroquine and Ivermectin in hospitalized patients with COVID-19: a single-center experience
	54% higher combined mortality/intubation (p=0.37). Retrospective 230 hospitalized patients in Brazil showing no significant difference with ivermectin treatment. Authors note that the treatments were more likely to be offered to sicker patients. Authors note that they do not know if treat..	
Nov 23 2021	Ozer et al., Journal of Medical Virology, doi:10.1002/jmv.27469	Effectiveness and Safety of Ivermectin in COVID-19 Patients: A Prospective Study at A Safety-Net Hospital

		75% lower mortality (p=0.09), 13% lower ventilation (p=0.2), and 9% longer hospitalization (p=0.09). Small prospective PSM study in the USA, showing 75% lower mortality with ivermectin treatment, without reaching statistical significance, significantly shorter ventilation and ICU time, and longer hospitalization time. Authors leave the s..
Nov 17 2021	Samajdar et al., Journal of the Association of Physicians India, 69:11	Ivermectin and Hydroxychloroquine for Chemo-Prophylaxis of COVID-19: A Questionnaire Survey of Perception and Prescribing Practice of Physicians vis-a-vis Outcomes
		80% fewer cases (p<0.0001). Physician survey in India with 164 ivermectin prophylaxis, 129 HCQ prophylaxis, and 81 control patients, showing significantly lower COVID-19 cases with treatment. Details of the treatment and control groups and the definition of cases ar..
Nov 9 2021	Stone et al., Biologics, doi:10.3390/biologics2030015 (date from preprint)	Changes in SpO2 on Room Air for 34 Severe COVID-19 Patients after Ivermectin-Based Combination Treatment: 62% Normalization within 24 Hours
		Retrospective severe COVID-19 patients in Zimbabwe treated with ivermectin, doxycycline, and zinc. For 34 with SpO2 tracking, there was rapid improvement in SpO2, with 55% recovery towards SpO2=97 within 12 hours. The preprint shows furth..
Nov 3 2021	Lim et al., JAMA, doi:10.1001/jamainternmed.2022.0189 (data 11/3/21)	Efficacy of Ivermectin Treatment on Disease Progression Among Adults With Mild to Moderate COVID-19 and Comorbidities: The I-TECH Randomized Clinical Trial
		69% lower mortality (p=0.09), 59% lower ventilation (p=0.17), 22% lower ICU admission (p=0.79), and 31% lower progression (p=0.29). RCT 490 late stage (>65% lung change chest radiography at baseline) hospitalized patients in Malaysia, showing no significant differences. Mortality was 1.2% for ivermectin vs. 4% for control. If the same event rates continue, the trial w..
Oct 30 2021	Rezk et al., Zagazig University Medical Journal, doi:10.21608/zumj.2021.92746.2329	miRNA-223-3p, miRNA- 2909 and Cytokines Expression in COVID-19 Patients Treated with Ivermectin
		56% lower progression (p=0.06), 33% improved recovery (p=0.27), and 27% faster viral clearance (p=0.01). Prospective 320 hospitalized moderate COVID-19+ patients in Egypt, 160 treated with ivermectin, showing lower mortality, improved recovery, and decreased cytokine expression with treatment. All patients were treated with HCQ. 7890/26-8-20..
Oct 28 2021	Verma et al., Indian Journal of Community Health, 33:3	Assessing Knowledge, Attitude, and Practices towards Ivermectin Pre-exposure Prophylaxis for COVID-19 among Health Care Workers
		Survey of 306 healthcare workers involved in the medication of COVID-19 patients in India. 71% indicated that ivermectin had a protective effect for COVID-19.
Oct 20 2021	Low et al., Biochimica et Biophysica Acta (BBA) - Molecular Basis of Disease, doi:10.1016/j.bbadis.2021.166294	Repositioning Ivermectin for Covid-19 treatment: Molecular mechanisms of action against SARS-CoV-2 replication

	Review of the antiviral characteristics of ivermectin and mechanisms of action. Authors note that ivermectin has proven effective for HIV-1, Adenovirus, flu, SARS-CoV, and more; due to genomic similarity between SARS-CoV-2 and SARS-CoV, t..	
Oct 19 2021	Borody et al., TrialSite News	Combination Therapy For COVID-19 Based on Ivermectin in an Australian Population
	92% lower mortality (p=0.03) and 93% lower hospitalization (p<0.0001). Retrospective 600 PCR+ outpatients in Australia treated with ivermectin, zinc, and doxycycline, showing significantly lower mortality and hospitalization with treatment. This trial uses a synthetic control group, and the preliminary repor..	
Oct 15 2021	Segatori et al., Viruses, doi:10.3390/v13102084	Effect of Ivermectin and Atorvastatin on Nuclear Localization of Importin Alpha and Drug Target Expression Profiling in Host Cells from Nasopharyngeal Swabs of SARS-CoV-2- Positive Patients
	Gene expression analysis of nasopharyngeal swabs of COVID-19 positive and negative patients, and in vitro study supporting the use of ivermectin and atorvastatin for COVID-19, and the efficacy of ivermectin at clinically relevant dosages...	
Oct 14 2021	Jitobaom et al., Research Square, doi:10.21203/rs.3.rs-941811/v1	Favipiravir and Ivermectin Showed in Vitro Synergistic Antiviral Activity against SARS-CoV-2
	In Vitro study showing a strong synergistic effect of ivermectin and favipiravir. Combining multiple antiviral drugs with different mechanisms of action helps to minimize drug resistance and toxicity. For ivermectin alone, IC50 for Calu-3..	
Oct 14 2021	Goodkin, M.	Are Major Ivermectin Studies Designed for Failure?
	Discussion of flaws in ivermectin trials creating a bias towards not finding an effect.	
Oct 7 2021	Fordham et al., OSF Preprints, doi:10.31219/osf.io/mp4f2	The uses and abuses of systematic reviews
	Analysis of defects in the Popp et al. meta analysis.	
Oct 5 2021	Francés-Monerris et al., Physical Chemistry Chemical Physics, doi:10.1039/D1CP02967C	Microscopic interactions between ivermectin and key human and viral proteins involved in SARS-CoV-2 infection
	In Silico molecular dynamics study showing that ACE2 and ACE2/RBD aggregates form persistent interactions with ivermectin.	
Oct 2 2021	TrialSite News	Committed to Medical Evidence, a Prominent Ivermectin Group is Eradicated from the Memories of Cyberspace
	Report on Twitter's censorship of the British Ivermectin Recommendation Development group.	

<p>Oct 1 2021</p>	<p>Babalola et al., Journal of Infectious Diseases and Epidemiology, doi:10.23937/2474-3658/1510233 (date from preprint)</p>	<p>A Randomized Controlled Trial of Ivermectin Monotherapy versus Hydroxychloroquine, Ivermectin, and Azithromycin Combination Therapy in COVID-19 Patients in Nigeria</p> <p>Small RCT with 61 patients in Nigeria, all patients treated with ivermectin, zinc, and vitamin C, showing no significant improvements in recovery with the addition of HCQ+AZ.</p>
<p>Sep 23 2021</p>	<p>Mayer et al., Frontiers in Public Health, doi:10.3389/fpubh.2022.813378 (date from preprint)</p>	<p>Safety and Efficacy of a MEURI Program for the Use of High Dose Ivermectin in COVID-19 Patients</p> <p>55% lower mortality (p<0.0001) and 66% lower ICU admission (p<0.0001). Retrospective 21,232 patients in Argentina, 3,266 assigned to ivermectin treatment, showing lower mortality with treatment. Greater benefits were seen for patients >40, and a dose dependent response was found. For more discussion see [twi..</p>
<p>Sep 7 2021</p>	<p>Schein, D., TrialsSite News</p>	<p>Merck's deadly Vioxx playbook, redux: a debunked smear campaign against its competing drug—the FDA-approved, Nobel prize-honored ivermectin</p> <p>Discussion of Merck's ivermectin statements and past actions related to Vioxx raising significant concerns.</p>
<p>Sep 6 2021</p>	<p>Buonfrate et al., International Journal of Antimicrobial Agents, doi:10.1016/j.ijantimicag.2021.106516 (date from preprint)</p>	<p>High dose ivermectin for the early treatment of COVID-19 (COVER study): a randomised, double-blind, multicentre, phase II, dose-finding, proof of concept trial</p> <p>20% improved viral clearance (p=0.59). Early terminated 89 patient RCT with 29 high dose and 32 very high dose ivermectin patients, showing dose dependent viral load reduction, although not reaching statistical significance due to early termination. Since most patients have lo..</p>
<p>Sep 3 2021</p>	<p>Okogbenin et al., Nigerian Postgraduate Medical Journal, doi:10.4103/npmj.npmj_532_21</p>	<p>Clinical characteristics, treatment modalities and outcome of coronavirus disease 2019 patients treated at thisday dome isolation and treatment centre, federal capital territory Abuja, Nigeria</p> <p>Retrospective 300 COVID-19 patients in Nigeria treated with ivermectin, zinc, vitamin C, and azithromycin, reporting no deaths. Authors conclude that early treatment is critical.</p>
<p>Sep 2 2021</p>	<p>Marik et al., American Journal of Therapeutics, doi:10.1097/MJT.0000000000001443</p>	<p>Ivermectin, A Reanalysis of the Data</p> <p>Updated meta analysis showing no significant change if Elgazzar et al. is excluded.</p>
<p>Sep 2 2021</p>	<p>Neil et al., American Journal of Therapeutics, doi:10.1097/MJT.0000000000001450</p>	<p>Bayesian Hypothesis Testing and Hierarchical Modeling of Ivermectin Effectiveness</p>

	Updated Bayesian analysis of a subset of ivermectin trials showing that there is strong evidence to support a causal link between ivermectin and COVID-19 severity and mortality, and that the result is robust in sensitivity analysis, inclu..	
Aug 19 2021	González-Paz et al., Biophysical Chemistry, doi:10.1016/j.bpc.2021.106677	Comparative study of the interaction of ivermectin with proteins of interest associated with SARS-CoV-2: A computational and biophysical approach
	In Silico analysis of the components of ivermectin (avermectin-B1a and avermectin-B1b), suggesting different and complementary inhibitory activity of each component, with an affinity of avermectin-B1b for viral structures, and of avermect..	
Aug 17 2021	González-Paz et al., Journal of Molecular Liquids, doi:10.1016/j.molliq.2021.117284	Structural Deformability Induced in Proteins of Potential Interest Associated with COVID-19 by binding of Homologues present in Ivermectin: Comparative Study Based in Elastic Networks Models
	In Silico elastic network model analysis of ivermectin components (avermectin-B1a and avermectin-B1b) providing a biophysical and computational perspective of proposed multi-target activity of ivermectin for COVID-19.	
Aug 16 2021	Kory, P., Substack	Summary of the Evidence for Ivermectin in COVID-19
	Summary of the evidence base for ivermectin and COVID-19 including in vitro and in silico studies, animal studies, pharmacologic studies, clinical observation and experience, observational controlled trials, randomized controlled trials, ..	
Aug 12 2021	Elavarasi et al., medRxiv, doi:10.1101/2021.08.10.21261855	Clinical features, demography and predictors of outcomes of SARS-CoV-2 infection in a tertiary care hospital in India - a cohort study
	20% lower mortality (p=0.12) . Retrospective 2017 hospitalized patients in India, showing lower mortality with ivermectin treatment in unadjusted results. No group details are provided and this result is subject to confounding by indication.	
Aug 12 2021	Pedroso et al., The Brazilian Journal of Infectious Diseases, doi:10.1016/j.bjid.2021.101603	Self-prescribed Ivermectin use is associated with a lower rate of seroconversion in health care workers diagnosed with COVID, in a dose-dependent response
	Retrospective 45 healthcare workers in Brazil, showing lower creation of antibodies with multiple doses of ivermectin, which may be expected due to the antiviral activity as demonstrated in multiple studies. Authors appear unaware of these..	
Aug 10 2021	La Pampa, Argentina	La Pampa expondrá a la comunidad científica los resultados del Programa de Intervención Monitoreado de Ivermectina
	27% lower mortality and 38% lower combined mortality/ICU admission . News report on the use of ivermectin in La Pampa, Argentina, showing lower mortality with treatment.	
Aug 6 2021	Kow et al., American Journal of Therapeutics, doi:10.1097/MJT.0000000000001441	Pitfalls in Reporting Sample Size Calculation Across Randomized Controlled Trials Involving Ivermectin for the treatment of COVID-19

		Review of sample size calculations in ivermectin RCTs, showing that existing RCTs are very underpowered.
Aug 6 2021	Reis et al., New England Journal of Medicine, doi:10.1056/NEJMoa2115869 (results released 8/6/2021)	Effect of Early Treatment with Ivermectin among Patients with Covid-19
		12% lower mortality (p=0.68), 23% lower ventilation (p=0.38), 17% lower hospitalization (p=0.19), and 10% fewer combined hospitalization/ER visits (p=0.42). Many major issues including multiple impossible numbers, blinding failure, randomization failure, and many protocol violations , as detailed below. We provide more detailed analysis of this study due to widespread incorrect press. Submit ..
Aug 5 2021	Rana et al., Research Square, doi:10.21203/rs.3.rs-755838/v1	A Computational Study of Ivermectin and Doxycycline Combination Drug Against SARS-CoV-2 Infection
		In silico study showing strong binding affinity of ivermectin and doxycycline for SARS-CoV-2 main protease 3CLpro, and increased binding affinity for the combination of both.
Aug 3 2021	Santin et al., New Microbes and New Infections, doi:10.1016/j.nmni.2021.100924	Ivermectin: a multifaceted drug of Nobel prize-honored distinction with indicated efficacy against a new global scourge, COVID-19
		Review concluding that the evidence supports worldwide use of ivermectin for COVID-19, complementary to immunization. Authors note that it is likely non-epitope specific, possibly retaining efficacy with new viral strains. They note that ..
Jul 31 2021	Zein et al., Diabetes & Metabolic Syndrome: Clinical Research & Reviews, doi:10.1016/j.dsx.2021.102186	Ivermectin and mortality in patients with COVID-19: A systematic review, meta-analysis, and meta-regression of randomized controlled trials
		61% lower mortality (p=0.005). Systematic review and meta analysis showing lower mortality with ivermectin.
Jul 31 2021	Sathi et al., Journal of Cardiovascular Disease Research, doi:10.31838/jcdr.2021.12.05.11	Clinical Effect of the Combination Therapy of Hydroxychloroquine, Azithromycin and Ivermectin in Patients with COVID-19
		Prospective study of 85 COVID-19 patients including 8 ICU patients treated with ivermectin, HCQ, and AZ, showing all patients improving except for one patient that died 3 days after admission. Authors recommend early treatment. There was ..
Jul 28 2021	Popp et al., Cochrane Database of Systematic Reviews, doi:10.1002/14651858.CD015017.pub2	Ivermectin for preventing and treating COVID-19
		This meta analysis is designed to exclude most studies. Authors select a small subset of studies, with a majority of results based on only 1 or 2 studies. Authors split up studies which dilutes the effects and results in a lack of statist..

Jul 25 2021	Ontai et al., Epidemiology International Journal, doi:10.23880/ eij-16000217	Early multidrug treatment of SARS-CoV-2 (COVID-19) and decreased case fatality rates in Honduras
	Report on the nationwide implementation of multi-drug COVID-19 inpatient and outpatient treatment protocols in Honduras, showing a case fatality rate decrease from 9.33% to 2.97%. No decrease was seen in Mexico, a similar Latin American c..	
Jul 24 2021	World Ivermectin Day	World Ivermectin Day
	Joint event by 22 worldwide organizations.	
Jul 23 2021	Mansour et al., International Immunopharmacology, doi:10.1016/ j.intimp.2021.108004	Safety of inhaled ivermectin as a repurposed direct drug for treatment of COVID-19: A preclinical tolerance study
	Safety analysis of an inhaled lyophilized ivermectin formulation, showing 127-fold increase in drug solubility, and identifying safe dosage levels in rats.	
Jul 16 2021	FLCCC Alliance and British Ivermectin Recommendation Development Group	Joint Statement of the FLCCC Alliance and British Ivermectin Recommendation Development Group on Retraction of Early Research on Ivermectin
	News release noting that ivermectin remains effective after excluding Elgazzar et al. Given the large magnitude effects and 61 studies, excluding one study with ~3% of patients does not significantly change the evidence base.	
Jul 12 2021	Neil et al., ResearchGate, doi:0.13140/ RG.2.2.31800.88323	Bayesian Meta Analysis of Ivermectin Effectiveness in Treating Covid-19 Disease
	Bayesian analysis of a subset of ivermectin trial data concluding that there is overwhelming evidence to support a causal link between ivermectin, COVID-19 severity, and mortality.	
Jul 8 2021	Muthusamy et al., Journal of Virology & Antiviral Research	Virtual Screening Reveals Potential Anti-Parasitic Drugs Inhibiting the Receptor Binding Domain of SARS-CoV-2 Spike protein
	In Silico study identifying 32 anti-parasitic compounds effectively inhibiting the RBD of the SARS-CoV-2 spike protein, with ivermectin being one of the top compounds.	
Jul 8 2021	Together Trial	Together Trial removes sublingual administration mid-trial
	Together Trial removes sublingual administration mid-trial.	

Jul 7 2021	Hazan et al., Future Microbiology, doi:10.2217/fmb-2022-0014 (date from preprint)	Effectiveness of ivermectin-based multidrug therapy in severely hypoxic, ambulatory COVID-19 patients 86% lower mortality (p=0.04) and 93% lower hospitalization (p=0.001). Small study of 24 consecutive patients in serious condition (9 days post symptoms, mean SpO2 87.4) using combined treatment with ivermectin, doxycycline, zinc, vitamin D, and vitamin C, showing no mortality or hospitalization with treatme..
Jul 3 2021	Open Letter, Statement of Concern and Request for Retraction, re: Roman et al.	Open Letter, Statement of Concern and Request for Retraction Open letter signed by 40 physicians detailing errors and flaws in the Roman et al. meta analysis, and requesting retraction.
Jul 2 2021	Adegboro et al., African Journal of Clinical and Experimental Microbiology, doi:10.4314/ajcem.v22i3.2	A review of the anti-viral effects of ivermectin Review of the antiviral effects of ivermectin.
Jul 2 2021	Vallejos et al., BMC Infectious Diseases, doi:10.1186/s12879-021-06348-5	Ivermectin to prevent hospitalizations in patients with COVID-19 (IVERCOR-COVID19) a randomized, double-blind, placebo-controlled trial 33% lower hospitalization (p=0.23) and 5% worse viral clearance (p=0.55). RCT with 501 relatively low-risk outpatients in Argentina showing hospitalization OR 0.65 [0.32-1.31]. With only 7% hospitalization, this trial is underpowered. The trial primarily includes low-risk patients that recover quickly without t..
Jun 30 2021	Turkia, M., ResearchGate, doi:10.13140/RG.2.2.16973.36326	A Continuation of a Timeline of Ivermectin-Related Events in the COVID-19 Pandemic [June 30, 2021] An extension of the ivermectin timeline covering April - June 2021, including WHO's role and funding, Gavi, COVAX, Trusted News Initiative, International Fact-Checking Network, the role of private philanthropy, Frontiers, comparison to th..
Jun 28 2021	Roman et al., Clinical Infectious Diseases, doi:10.1093/cid/ciab591 (date from preprint)	Ivermectin for the treatment of COVID-19: A systematic review and meta-analysis of randomized controlled trials This is a severely flawed meta analysis. An open letter signed by 40 physicians detailing errors and flaws, and requesting retraction, can be found at [trialsitenews.com] . See also [bird-group.org] . Authors cherry-pick to include on..

Jun 25 2021	Jagiassi et al., The International Journal of Clinical Practice, doi:10.1111/ijcp.14574	Variation in therapeutic strategies for the management of severe COVID-19 in India- A nationwide cross-sectional survey
	Survey of medication use for severe COVID-19 in India, showing 33% adoption of ivermectin as of January 2021.	
Jun 22 2021	Misiones Ministry of Public Health	Results from ivermectin use from the Misiones Ministry of Public Health
	News report on ivermectin use in Misiones, Argentina, showing significantly lower hospitalization and mortality, and a dose-dependent effect with improved results for those taking 0.6mg/kg.	
Jun 18 2021	Lind et al., Journal of General Internal Medicine, doi:10.1007/s11606-021-06948-6	Increase in Outpatient Ivermectin Dispensing in the US During the COVID-19 Pandemic: A Cross-Sectional Analysis
	CDC analysis of ivermectin prescriptions in the US suggesting that, while national health authority recognition is delayed in that country, many physicians are aware of the efficacy demonstrated in clinical trials.	
Jun 18 2021	Krolewiecki et al., EClinicalMedicine, doi:10.1016/j.eclinm.2021.100959	Antiviral effect of high-dose ivermectin in adults with COVID-19: A proof-of-concept randomized trial
	66% improved viral load (p=0.09). Proof of concept RCT with 30 ivermectin patients and 15 control patients, showing a concentration dependent antiviral activity, but no significant difference in clinical outcomes. There was no significant difference in viral load reductio..	
Jun 17 2021	Bryant et al., American Journal of Therapeutics, doi:10.1097/MJT.0000000000001402 (date from preprint)	Ivermectin for Prevention and Treatment of COVID-19 Infection: A Systematic Review, Meta-analysis, and Trial Sequential Analysis to Inform Clinical Guidelines
	62% lower mortality (p=0.005). Systematic review, meta analysis, and trial sequential analysis of 24 RCTs finding mortality RR 0.38 [0.19-0.73]. An update notes potentially inaccurate data collection and/or reporting in some sources [journals.lww.com].	
Jun 16 2021	Munson et al., British Society For Nanomedicine Early Career Researcher Summer Meeting, 2021	Niclosamide and ivermectin modulate caspase-1 activity and proinflammatory cytokine secretion in a monocytic cell line
	In Vitro study showing potential therapeutic effects of ivermectin and niclosamide on the immune system by reducing inflammation and modulating key proteins involved in the inflammatory response. Ivermectin and niclosamide reduced proinfl..	
Jun 15 2021	Aref et al., International Journal of Nanomedicine, doi:10.2147/IJN.S313093	Clinical, Biochemical and Molecular Evaluations of Ivermectin Mucoadhesive Nanosuspension Nasal Spray in Reducing Upper Respiratory Symptoms of Mild COVID-19

		63% improved recovery (p=0.0001) and 79% improved viral clearance (p=0.004). RCT 114 patients in Egypt, 57 treated with ivermectin mucoadhesive nanosuspension intranasal spray, showing faster recovery and viral clearance with treatment. NCT04716569.
Jun 6 2021	Hariyanto et al., Reviews In Medical Virology, doi:10.1002/rmv.2265	Ivermectin and outcomes from Covid-19 pneumonia: A systematic review and meta-analysis of randomized clinical trial studies
		69% lower mortality (p=0.001). Systematic review and meta analysis of 19 RCTs showing mortality RR 0.31 [0.15-0.62].
Jun 3 2021	Wang et al., medRxiv, doi:10.1101/2021.06.01.21258147	Minimum manufacturing costs, national prices and estimated global availability of new repurposed therapies for COVID-19
		Analysis of the manufacturing cost of several COVID-19 medications, showing a cost of \$0.55 per course of ivermectin, including excipients, formulation, tax, and profit.
Jun 2 2021	Abd-Elsalam et al., Journal of Medical Virology, doi:10.1002/jmv.27122	Clinical Study Evaluating the Efficacy of Ivermectin in COVID-19 Treatment: A Randomized Controlled Study
		20% shorter hospitalization (p=0.09). RCT 164 hospitalized patients in Egypt showing lower mortality and shorter hospitalization, but without statistical significance. There were no serious adverse effects. Authors suggest the low dosage may have resulted in lower efficacy th..
May 31 2021	Mondal et al., Journal of the Indian Medical Association, 119:5	Prevalence of COVID-19 Infection and Identification of Risk Factors among Asymptomatic Healthcare Workers: A Serosurvey Involving Multiple Hospitals in West Bengal
		88% fewer symptomatic cases (p=0.006). Retrospective 1,470 healthcare workers in India, showing significantly lower risk of symptomatic COVID-19 with ivermectin prophylaxis.
May 18 2021	Mountain Valley MD	Mountain Valley MD Receives Successful Results From BSL-4 COVID-19 Clearance Trial on Three Variants Tested With Ivectosol™
		In Vitro and mouse study with human ACE2 cells, using solubilized ivermectin with Ivectosol™, showing antiviral effect with B.1.1.7, B.1.351, and P.1 variants of SARS-CoV-2. The ability to inject ivermectin potentially reduces the onset o..
May 12 2021	FLCCC Public Statement	FLCCC Alliance Statement on the Irregular Actions of Public Health Agencies and the Widespread Disinformation Campaign Against Ivermectin
		Analysis of the ivermectin recommendations from WHO and others, and a call to action for all citizens, scientists, and media to counter false information. Whistleblowers can submit anonymous reports and images at the bottom of this page.
May 10 2021	Faisal et al., The Professional Medical Journal, doi:10.29309/TPMJ/2021.28.05.5867	Potential use of azithromycin alone and in combination with ivermectin in fighting against the symptoms of COVID-19

			68% improved recovery (p=0.005) . RCT 100 outpatients in Pakistan, 50 treated with ivermectin, showing faster recovery with ivermectin. All patients received AZ, zinc, vitamin C, vitamin D, and paracetamol. Details of randomization were not provided. No mortality or hospi..
May 5 2021	Zatloukal et al.	News report on In Vitro results from the research institute of Prof. Zatloukal	News report on In Vitro results from the research institute of Prof. Zatloukal, showing that "ivermectin was able to reduce virus replication by a factor of 1,000 even at low concentrations".
May 5 2021	Qureshi et al., Journal of Biomolecular Structure and Dynamics, doi:10.1080/07391102.2021.1906750	Mechanistic insights into the inhibitory activity of FDA approved ivermectin against SARS-CoV-2: old drug with new implications	In Silico study showing inhibition of importin-α1 by ivermectin, which disrupts SARS-CoV-2 replication.
May 4 2021	Karale et al., medRxiv, doi:10.1101/2021.04.30.21256415	A Meta-analysis of Mortality, Need for ICU admission, Use of Mechanical Ventilation and Adverse Effects with Ivermectin Use in COVID-19 Patients	Systematic review and meta analysis with 30 studies included in quantitative analysis, showing mortality OR 0.39 [0.22-0.70]. Subgroup analysis of trials with severity data showed mortality OR 0.10 [0.03-0.33] for mild/moderate cases.
May 3 2021	Merino et al., Preprint	Ivermectin and the odds of hospitalization due to COVID-19: evidence from a quasi-experimental analysis based on a public intervention in Mexico City	74% lower hospitalization (p=0.001) . Analysis of Mexico City's use of an ivermectin-based medical kit, showing significantly lower hospitalization with use. Authors use logistic-regression models with matched observations, including adjustments for age, sex, COVID severity, ..
Apr 30 2021	Moraes et al., NCT04384458	Comparative Study of Hydroxychloroquine and Ivermectin in COVID-19 Prophylaxis	Estimated 400 participant ivermectin vs. HCQ prophylaxis RCT with results not reported over 2 years after estimated completion.
Apr 30 2021	Kory et al., American Journal of Therapeutics, doi:10.1097/MJT.0000000000001377	Review of the Emerging Evidence Demonstrating the Efficacy of Ivermectin in the Prophylaxis and Treatment of COVID-19	Review of ivermectin trials and epidemiological data, concluding that ivermectin is effective for prophylaxis and treatment, and should be globally and systematically deployed in the prevention and treatment of COVID-19. An update notes p..
Apr 29 2021	Ahsan et al., Cureus, doi:10.7759/cureus.14761	Clinical Variants, Characteristics, and Outcomes Among COVID-19 Patients: A Case Series Analysis at a Tertiary Care Hospital in Karachi, Pakistan	50% lower mortality (p=0.03) . Retrospective 165 hospitalized patients in Pakistan showing unadjusted lower mortality with combined ivermectin and doxycycline treatment. Details of the ivermectin group compared to other patients are not provided, however ivermectin was..

Apr 19 2021	DiNicolantonio et al., Open Heart, doi:10.1136/ openhrt-2021-001655	Anti-inflammatory activity of ivermectin in late-stage COVID-19 may reflect activation of systemic glycine receptors
	Review suggesting that the effectiveness of ivermectin in the cytokine storm phase of COVID-19 may be, at least in part, an anti-inflammatory effect mediated by increased activation of glycine receptors on leukocytes and possibly vascular..	
Apr 17 2021	Loue et al., J. Infectious Diseases and Epidemiology, doi:10.23937/2474-3658/ 1510202	Ivermectin and COVID-19 in Care Home: Case Report
	70% lower mortality (p=0.34) and 55% lower severe cases (p=0.11). Small quasi-randomized (patient choice) study with 25 PCR+ patients in a nursing home offered ivermectin, of which 10 chose to be treated. The mean age was 83.5 in the treatment group and 81.8 in the control group. There was lower mortality..	
Apr 16 2021	Morgenstern et al., Cureus, doi:10.7759/ cureus.17455 (date from preprint)	Ivermectin as a SARS-CoV-2 Pre-Exposure Prophylaxis Method in Healthcare Workers: A Propensity Score-Matched Retrospective Cohort Study
	74% fewer cases (p=0.008). Propensity matched retrospective prophylaxis study of healthcare workers in the Dominican Republic showing significantly lower cases with treatment, and no hospitalization with treatment (versus 2 in the PSM matched control group). The ca..	
Apr 15 2021	Schöning et al., Research Square, doi:10.21203/ rs.3.rs-379291/v1	Highly-transmissible Variants of SARS-CoV-2 May Be More Susceptible to Drug Therapy Than Wild Type Strains
	In Silico study of ivermectin treatment predicting greater efficacy for variants with higher R0.	
Apr 14 2021	Seet et al., International Journal of Infectious Diseases, doi:10.1016/ j.ijid.2021.04.035	Positive impact of oral hydroxychloroquine and povidone-iodine throat spray for COVID-19 prophylaxis: an open-label randomized trial
	50% fewer symptomatic cases (p=0.0009) and 6% fewer cases (p=0.61). Prophylaxis RCT in Singapore with 3,037 low risk patients, showing lower serious cases, lower symptomatic cases, and lower confirmed cases of COVID-19 with all treatments (ivermectin, HCQ, PVP-I, and Zinc + vitamin C) compared to vitamin ..	
Apr 10 2021	Bello et al., Journal of Biomolecular Structure and Dynamics, doi:10.1080/07391102.20 21.1911857	Elucidation of the inhibitory activity of ivermectin with host nuclear importin α and several SARS-CoV-2 targets
	In Silico analysis finding that the in vitro activity of ivermectin may explained by acting as an inhibitor of importin- α , dimeric 3CLpro, and Nsp9.	
Apr 3 2021	Turkia, M., Research Gate	A timeline of ivermectin-related events in the COVID-19 pandemic

	An extensive timeline of ivermectin-related events from April 2020 to March 2021 including studies, news, health authority decisions, biased news coverage, and censorship. The author concludes that in a broader historical perspective, the..	
Apr 1 2021	Mourya et al., Int. J. Health and Clinical Research	Comparative Analytical Study of Two Different Drug Regimens in Treatment of Covid 19 Positive Patients in Index Medical College Hospital and Research Center, Indore, India
	89% improved viral clearance (p<0.0001) . Retrospective 100 patients in India with 50 treated with ivermectin, and SOC for all patients including HCQ+AZ, showing much higher viral clearance with ivermectin. Baseline clinical status was worse in the control group. Time of testing ..	
Mar 30 2021	Wehbe et al., Front. Immunol., doi:10.3389/fimmu.2021.663586	Repurposing Ivermectin for COVID-19: Molecular Aspects and Therapeutic Possibilities
	Review of how ivermectin was identified for use in COVID-19, mechanisms of action, and selected clinical trials.	
Mar 30 2021	Chahla et al., Research, Society and Development, doi:10.33448/rsd-v11i8.30844 (date from preprint)	Randomized trials - Ivermectin repurposing for COVID-19 treatment of outpatients with mild disease in primary health care centers
	87% higher hospital discharge (p=0.004) . Cluster RCT outpatients in Argentina showing significantly faster recovery with ivermectin. There were no deaths. Cluster RCT where outpatients in Tucumán were assigned to the ivermectin group and outpatients from San Miguel de Tucumán an..	
Mar 29 2021	Kow et al., Pharmacological Reports, doi:10.1007/s43440-021-00245-z	The association between the use of ivermectin and mortality in patients with COVID-19: a meta-analysis
	Small meta analysis of 6 RCTs showing mortality OR 0.21 [0.11-0.42]. Authors do not include two more recent RCTs with mortality results, 10 other studies with mortality results, and a total of 42 other studies including other outcomes. Au..	
Mar 26 2021	Tanioka et al., medRxiv, doi:10.1101/2021.03.26.21254377	Why COVID-19 is not so spread in Africa: How does Ivermectin affect it?
	88% lower mortality (p=0.002) . Retrospective study of the 31 onchocerciasis-endemic countries using the community-directed treatment with ivermectin (CDTI) and the 22 non-endemic countries in Africa, showing significantly lower mortality per capita in the countries us..	
Mar 25 2021	Udofia et al., Network Modeling Analysis in Health Informatics and Bioinformatics, doi:10.1007/s13721-021-00299-2	In silico studies of selected multi-drug targeting against 3CLpro and nsp12 RNA-dependent RNA-polymerase proteins of SARS-CoV-2 and SARS-CoV
	In Silico analysis finding that ivermectin had the highest binding energy against the 3CLpro of SARS-CoV-2 and RdRps of both SARS-CoV and SARS-CoV-2.	

Mar 25 2021	Choudhury et al., Future Medicine, doi:10.2217/fvl-2020-0342	Exploring the binding efficacy of ivermectin against the key proteins of SARS-CoV-2 pathogenesis: an in silico approach
	In Silico analysis finding that ivermectin has high binding affinity for the SARS-CoV-2 viral spike protein, main protease, replicase, and human TMPRSS2 receptors.	
Mar 25 2021	Huvemek Press Release	Kovid-19 - Huvemek® Phase 2 clinical trial
	32% greater improvement (p=0.28) . Multicenter double-blind RCT with 100 hospitalized patients in Bulgaria showing faster viral clearance, greater clinical improvement, and improved biomarkers with treatment. Limited data has been reported currently. No serious adverse eve..	
Mar 24 2021	Yagisawa et al., The Japanese Journal of Antibiotics, 74-1, Mar 2021	Global trends in clinical studies of ivermectin in COVID-19
	Review of ivermectin for COVID-19. Authors note that Kitasato University's project was expanded in response to the results of Caly et al. which had left questions regarding in vivo therapeutic levels, and the results of those studies were..	
Mar 21 2021	Emmerich et al., Int. J. Environ. Res. Public Health, doi:10.3390/ijerph18073371	Comparisons between the Neighboring States of Amazonas and Pará in Brazil in the Second Wave of COVID-19 Outbreak and a Possible Role of Early Ambulatory Treatment
	Comparison between the two largest neighboring states in Brazil, Amazonas and Pará, showing more than 5 times lower mortality in Pará during the second wave when the Pará government supported early treatment and Amazonas did not, compared..	
Mar 18 2021	Del Franco et al., Journal of Biomedical Research and Clinical Investigation, doi:10.31546/2633-8653.1008	Ivermectin in Long-Covid Patients: A Retrospective Study
	Retrospective 856 patients previously admitted to hospital for COVID-19 in Argentina, finding that ivermectin improved recovery from "long covid" symptoms.	
Mar 17 2021	Dinesh Kumar et al., Antimicrobial Agents and Chemotherapy, doi:10.1128/AAC.01543-21 (date from preprint)	Moxidectin and ivermectin inhibit SARS-CoV-2 replication in Vero E6 cells but not in human primary airway epithelium cells
	In Vitro study showing moxidectin and ivermectin exhibited antiviral activity in Vero E6 cells. Authors indicate that no statistically significant effect was seen in Calu-3/PBEC cells, however Figure 3 shows a dose dependent reduction wit..	
Mar 12 2021	Roy et al., medRxiv, doi:10.1101/2021.03.08.21252883	Outcome of Different Therapeutic Interventions in Mild COVID-19 Patients in a Single OPD Clinic of West Bengal: A Retrospective study

		<p>6% faster recovery (p=0.87). Retrospective database analysis of 56 mild COVID-19 patients, all treated with vitamin C, vitamin D, and zinc, comparing ivermectin + doxycycline (n=14), AZ (n=13), HCQ (n=14), and SOC (n=15), finding that all groups recover quickly, and ..</p>
Mar 11 2021	Nardelli et al., Signa Vitae, doi:10.22514/sv.2021.043	<p>Crying wolf in time of Corona: the strange case of ivermectin and hydroxychloroquine. Is the fear of failure withholding potential life-saving treatment from clinical use?</p>
		<p>79% lower mortality (p<0.0001). Meta analysis of RCT mortality results showing RR 0.19, p < 0.00001.</p>
Mar 11 2021	Scheim et al., OSF Preprints	<p>Ivermectin sales in Valle del Cauca, Colombia, patterns of AEs, and other background re López-Medina et al. 2021</p>
		<p>Analysis of several issues with López-Medina et al. including the atypical adverse effects in the control arm and population use of ivermectin.</p>
Mar 11 2021	Scheim et al., OSF Preprints	<p>Protocol violations in López-Medina et al.: 38 switched ivermectin (IVM) and placebo doses, failure of blinding, widespread IVM sales OTC in Cali, and nearly identical AEs for the IVM and control groups</p>
		<p>Report on protocol violations in López-Medina et al.</p>
Mar 10 2021	Kern et al., Frontiers in Pharmacology, doi:10.3389/fphar.2021.625678	<p>Modeling of SARS-CoV-2 Treatment Effects for Informed Drug Repurposing</p>
		<p>Modeling study analyzing timing and dosing regimens of hydroxychloroquine, lopinavir/ritonavir, ivermectin, artemisinin, and nitazoxanide. The greatest benefits were seen when treatments were given immediately at the time of diagnosis. Au..</p>
Mar 10 2021	Yesilbag et al., Virus Research, doi:10.1016/j.virusres.2021.198384	<p>Ivermectin also inhibits the replication of bovine respiratory viruses (BRSV, BPIV-3, BoHV-1, BCoV and BVDV) in vitro</p>
		<p>In Vitro study showing that ivermectin can inhibit infection of bovine respiratory disease viral agents BCoV, BPIV-3, BVDV, BRSV and BoHV-1 at the concentrations of 2.5 and 5 µM and in a dose-dependent manner.</p>
Mar 9 2021	Pott-Junior et al., Toxicology Reports, doi:10.1016/j.toxrep.2021.03.003	<p>Use of ivermectin in the treatment of Covid-19: a pilot trial</p>
		<p>85% lower ventilation (p=0.25), 85% lower ICU admission (p=0.25), and 1% improved viral clearance (p=1). Very small RCT with 4 control patients and 28 ivermectin patients split across 3 different dosage levels, showing lower (non-statistically significant) ICU admission with treatment. Authors suggest that ivermectin for SARS-CoV-2 is safe a..</p>
Mar 8 2021	Chamie-Quintero et al., OSF Preprints	<p>Ivermectin for COVID-19 in Peru: 14-fold reduction in nationwide excess deaths, p=.002 for effect by state, then 13-fold increase after ivermectin use restricted</p>
		<p>Analysis of ivermectin use in Peru concluding that ivermectin most likely caused a 14 times reduction in excess deaths in Peru, prior to a 13 times increase after reversal of ivermectin use. Authors conclude that the results strongly sugg..</p>

Mar 8 2021	Guzman et al., medRxiv, doi:10.1101/2021.03.04.21252084	Factors associated with increased mortality in critically ill COVID-19 patients in a Mexican public hospital: the other faces of health system oversaturation
	19% lower mortality (p=0.35). Retrospective 196 critically ill patients in Mexico. Patients overlap with the existing RCT by Beltran-Gonzalez (NCT04391127). This preprint shows a larger treated population and greater (non-statistically significant) improvement with iv..	
Mar 8 2021	Galan et al., Pathogens and Global Health, doi:10.1080/20477724.2021.1890887	Phase 2 randomized study on chloroquine, hydroxychloroquine or ivermectin in hospitalized patients with severe manifestations of SARS-CoV-2 infection
	RCT 168 very late stage severe condition hospitalized patients comparing CQ, HCQ, and ivermectin not showing significant differences. Authors were unable to add a control arm due to ethical issues. Authors claim that "the mortality r..	
Mar 5 2021	Descotes, J., ImmunoSafe Consultance	Medical Safety of Ivermectin
	Safety analysis of >350 articles showing that ivermectin has an excellent safety profile. The author notes that "no severe adverse event has been reported in dozens of completed or ongoing studies involving thousands of participants..	
Mar 4 2021	López-Medina et al., JAMA, doi:10.1001/jama.2021.3071	Effect of Ivermectin on Time to Resolution of Symptoms Among Adults With Mild COVID-19: A Randomized Clinical Trial
	61% lower progression (p=0.11) and 15% improved recovery (p=0.53). Phone survey based RCT with low risk patients, 200 ivermectin and 198 control, showing lower mortality, lower disease progression, lower treatment escalation, and faster resolution of symptoms with treatment, without reaching statistical ..	
Mar 1 2021	Saha et al., Structural Chemistry, doi:10.1007/s11224-021-01776-0 (date from preprint)	The Binding mechanism of ivermectin and levosalbutamol with spike protein of SARS-CoV-2
	In Silico analysis predicting that ivermectin has a large binding affinity for the SARS-CoV-2 spike protein. Three different computer modeling techniques show that ivermectin can inhibit SARS-CoV-2 entrance via hACE2.	
Feb 23 2021	Beltran Gonzalez et al., Infectious Disease Reports, doi:10.3390/idr14020020 (date from preprint)	Efficacy and Safety of Ivermectin and Hydroxychloroquine in Patients with Severe COVID-19: A Randomized Controlled Trial
	14% lower mortality (p=1), 9% lower progression (p=1), 37% lower hospital discharge (p=0.71), and 20% longer hospitalization (p=0.43). RCT late stage severe condition (93% SOFA ≥ 2, 96% APACHE ≥ 8) high comorbidity hospitalized patients in Mexico with 36 low dose ivermectin and 37 control patients not finding significant differences. NCT04391127. Another study reports re..	
Feb 20 2021	BIRD Meeting 20th February 2021	BIRD Meeting 20th February 2021

	The British Ivermectin Recommendation Development (BIRD) panel, with dozens of multi-national scientists & doctors, issued sweeping recommendations for the immediate global use of ivermectin.	
Feb 16 2021	Elalfy et al., J. Med. Virol., doi:10.1002/jmv.26880	Effect of a combination of Nitazoxanide, Ribavirin and Ivermectin plus zinc supplement (MANS.NRIZ study) on the clearance of mild COVID-1
	87% improved viral clearance (p<0.0001) . Non-randomized controlled trial with 62 mild and early moderate patients with home treatment with ivermectin + nitazoxanide + ribavirin + zinc, showing significantly faster viral clearance.	
Feb 15 2021	Behera et al., Cureus 13:8, doi:10.7759/cureus.16897 (date from preprint)	Prophylactic Role of Ivermectin in Severe Acute Respiratory Syndrome Coronavirus 2 Infection Among Healthcare Workers
	83% fewer cases (p=0.001) . Prospective prophylaxis study with 3,532 healthcare workers, 2,199 receiving two-dose ivermectin prophylaxis, showing adjusted relative risk of confirmed COVID-19 with treatment 0.17 [0.12-0.23] p<0.001. 186 patients took only the first d..	
Feb 12 2021	Biber et al., International Journal of Infectious Diseases, doi:10.1016/j.ijid.2022.07.003 (results 2/12/21)	The effect of ivermectin on the viral load and culture viability in early treatment of non-hospitalized patients with mild COVID-19 – A double-blind, randomized placebo-controlled trial
	70% lower hospitalization (p=0.34) and 62% improved viral clearance (p=0.02) . Double blind RCT for mild-moderate COVID-19 outpatients in Israel showing significantly faster reduction in viral load with treatment, and lower hospitalization with treatment. The one treatment hospitalization was a few hours after treat..	
Feb 10 2021	Lima-Morales et al., International Journal of Infectious Diseases, doi:10.1016/j.ijid.2021.02.014	Effectiveness of a multidrug therapy consisting of ivermectin, azithromycin, montelukast and acetylsalicylic acid to prevent hospitalization and death among ambulatory COVID-19 cases in Tlaxcala, Mexico
	78% lower mortality (p=0.001), 52% lower ventilation (p=0.15), 67% lower hospitalization (p=0.001), and 59% improved recovery (p=0.001) . Prospective trial of 768 COVID-19 outpatients in Mexico, 481 treated with ivermectin, AZ, montelukast, and aspirin, and 287 control patients with various treatments, showing significantly lower mortality and hospitalization, and signfica..	
Feb 2 2021	Mohan et al., Journal of Infection and Chemotherapy, doi:10.1016/j.jiac.2021.08.021 (date from preprint)	Single-dose oral ivermectin in mild and moderate COVID-19 (RIVET-COV): a single-centre randomized, placebo-controlled trial
	62% improved recovery (p=0.27) and 24% improved viral clearance (p=0.18) . RCT in India with low risk patients, comparing 24mg ivermectin, 12mg ivermectin, and placebo showing non-statistically significant improvements in recovery and PCR+ status (day 5 both arms, day 7 24mg only) with treatment, and showing gre..	
Jan 29 2021	Cobos-Campos et al., Clin. Res. Trials, 2021, doi:10.15761/CRT.1000333	Potential use of ivermectin for the treatment and profilaxis of SARS-CoV-2 infection: Efficacy of ivermectin for SARS-CoV-2

		Review finding that there appears to be sufficient evidence to recommend ivermectin for the treatment of COVID-19, especially in the early stages of the disease.
Jan 27 2021	Castaneda-Sabogal et al., medRxiv, doi:10.1101/2021.01.26.21250420	Outcomes of Ivermectin in the treatment of COVID-19: a systematic review and meta-analysis
		Meta analysis of a very small subset of studies exhibiting very high bias and significant flaws. Some of the problems: - As of the publication date, there are 35 studies, authors include only 4. (They list 5, but two are the same study, p..
Jan 25 2021	Eweas et al., Frontiers in Microbiology, doi:10.3389/fmicb.2020.592908	Molecular Docking Reveals Ivermectin and Remdesivir as Potential Repurposed Drugs Against SARS-CoV-2
		Molecular docking analysis showing that ivermectin efficiently binds to the viral S protein as well as the human cell surface receptors ACE-2 and TMPRSS2; therefore, it might be involved in inhibiting the entry of the virus into the host ..
Jan 23 2021	Errecalde et al., Journal of Pharmaceutical Sciences, doi:10.1016/j.xphs.2021.01.017	Safety and Pharmacokinetic Assessments of a Novel Ivermectin Nasal Spray Formulation in a Pig Model
		Animal study of a novel spray formulation of ivermectin, showing an advantage of the spray formulation in terms of fast attainment of high and persistent ivermectin concentrations in nasopharyngeal tissue.
Jan 21 2021	Chamie-Quintero et al., Preprint, doi:10.2139/ssrn.3765018	Sharp Reductions in COVID-19 Case Fatalities and Excess Deaths in Peru in Close Time Conjunction, State-By-State, with Ivermectin Treatments
		Analysis of ivermectin usage within states in Peru showing sharp reductions in COVID-19 deaths corresponding to the usage of ivermectin treatment.
Jan 20 2021	Mody et al., Communications Biology, doi:10.1038/s42003-020-01577-x	Identification of 3-chymotrypsin like protease (3CLPro) inhibitors as potential anti-SARS-CoV-2 agents
		Computational molecular modeling screening and in vitro analysis for inhibitory effects on SARS-CoV-2 specific 3CLpro enzyme, showing that ivermectin blocked more than 85% of 3CLpro activity of SARS-CoV-2. Antiviral activity of ivermectin..
Jan 19 2021	Shahbaznejad et al., Clinical Therapeutics, doi:10.1016/j.clinthera.2021.04.007 (partial results available 1/19)	Effects of Ivermectin in Patients With COVID-19: A Multicenter, Double-blind, Randomized, Controlled Clinical Trial
		32% faster recovery (p=0.05) and 15% shorter hospitalization (p=0.02). RCT in Iran showing shorter time to recovery and shorter hospitalization time with ivermectin. There were no adverse effects. There was one death in the treatment group, the patient was in critical condition at baseline and died within 24..

Jan 19 2021	Hill et al., Research Square, doi:10.21203/rs.3.rs-148845/v1	Meta-analysis of randomized trials of ivermectin to treat SARS-CoV-2 infection
	75% lower mortality (p=0.0002). Meta analysis of 18 ivermectin RCTs with 2,282 patients showing faster viral clearance (dose and duration dependent), improved clinical recovery, and lower hospitalization and mortality. In six RCTs of moderate or severe infection, there ..	
Jan 16 2021	Samaha et al., Viruses, doi:10.3390/v13060989 (results 1/16)	Effects of a Single Dose of Ivermectin on Viral and Clinical Outcomes in Asymptomatic SARS-CoV-2 Infected Subjects: A Pilot Clinical Trial in Lebanon
	This study was retracted.	
Jan 16 2021	Bukhari et al., medRxiv, doi:10.1101/2021.02.02.21250840 (results 1/16)	Efficacy of Ivermectin in COVID-19 Patients with Mild to Moderate Disease
	82% improved viral clearance (p<0.0001). RCT of relatively low risk hospitalized patients with 50 ivermectin and 50 control patients showing significantly faster viral clearance with treatment. 9 patients in the treatment arm were lost to followup compared with 5 in the control ..	
Jan 13 2021	Kory et al., Frontiers in Pharmacology, doi:10.3389/fphar.2021.643369	Review of the Emerging Evidence Demonstrating the Efficacy of Ivermectin in the Prophylaxis and Treatment of COVID-19
	Meta analysis of ivermectin clinical studies and natural experiments where ivermectin has been widely used, showing efficacy of ivermectin in prophylaxis and treatment of COVID-19. This paper was censored by the journal after acceptance..	
Jan 12 2021	Okumuş et al., BMC Infectious Diseases, doi:10.1186/s12879-021-06104-9 (date from preprint)	Evaluation of the Effectiveness and Safety of Adding Ivermectin to Treatment in Severe COVID-19 Patients
	33% lower mortality (p=0.55), 43% greater improvement (p=0.18), and 80% improved viral clearance (p=0.02). Small RCT for severe COVID-19 comparing the addition of ivermectin to SOC (low dose HCQ+AZ+favipiravir), with 30 treatment and 30 control patients in Turkey, showing lower mortality and faster clinical recovery. Authors also investigate t..	
Jan 11 2021	Chahla et al., American Journal of Therapeutics, doi:10.1097/MJT.0000000000001433	Intensive Treatment With Ivermectin and Iota-Carrageenan as Pre-exposure Prophylaxis for COVID-19 in Health Care Workers From Tucuman, Argentina
	95% fewer moderate/severe cases (p=0.002) and 84% fewer cases (p=0.004). Prophylaxis RCT for ivermectin and iota-carrageenan in Argentina, 117 healthcare workers treated with ivermectin and iota-carrageenan, and 117 controls, showing significantly lower cases with treatment. There were no moderate/severe cases..	
Jan 11 2021	Bousquet-Mélou et al., Frontiers in Pharmacology, doi:10.3389/fphar.2021.666348 (date from preprint)	A Large Impact of Obesity on the Disposition of Ivermectin, Moxidectin and Eprinomectin in a Canine Model: Relevance for COVID-19 Patients

	Animal dosing study with an obese dog model concluding that ivermectin maintenance doses should be based on lean body weight and not the total body weight in obese subjects, while the loading dose should be based on the total body weight.	
Jan 10 2021	Formiga et al., J. Control Release, doi:10.1016/j.jconrel.2020.10.009	Ivermectin: an award-winning drug with expected antiviral activity against COVID-19
	Review hypothesizing that micro- and nanotechnology-based formulations of ivermectin for the pulmonary delivery of ivermectin may be beneficial for use with COVID-19.	
Jan 9 2021	Ravikirti et al., Journal of Pharmacy & Pharmaceutical Sciences, doi:10.18433/jpps32105	Ivermectin as a potential treatment for mild to moderate COVID-19: A double blind randomized placebo-controlled trial
	89% lower mortality (p=0.12), 79% lower ventilation (p=0.1), 14% lower ICU admission (p=0.8), and 89% higher hospital discharge (p=0.12). RCT with 112 mild and moderate COVID-19 patients in India, showing lower mortality, ventilation, and ICU admission, although not statistically significant due to the small number of events. There was no mortality in the treatment arm (55 ..	
Jan 8 2021	Chamie, J.	COVID-19 in Mexico
	Comparison of COVID-19 death rates in Mexico showing that the only state using ivermectin has a dramatically lower rate.	
Jan 6 2021	Babalola et al., QJM: An International Journal of Medicine, doi:10.1093/qjmed/hcab035 (date from preprint)	Ivermectin shows clinical benefits in mild to moderate COVID19: A randomised controlled double-blind, dose-response study in Lagos
	64% improved viral clearance (p=0.11) and 41% improved recovery (p=0.07). Small RCT comparing ivermectin 6mg & 12mg q84hr with lopinavir/ritonavir, showing a statistically significant and dose dependent effect of ivermectin on reducing the time to PCR-. The study does not report mortality, hospitalization, prog..	
Jan 6 2021	Hirsch et al., Microbiology & Infectious Diseases	Ivermectin as Prophylaxis Against COVID-19 Retrospective Cases Evaluation
	Report on ivermectin prophylaxis for healthcare workers in a hospital in Argentina, showing 0 cases in the 162 participants. Dosage was 0.2mg/kg weekly for eight weeks, followed by 4 months rest.	
Jan 3 2021	Lawrie et al., Preprint	Ivermectin reduces the risk of death from COVID-19 – a rapid review and meta-analysis in support of the recommendation of the Front Line COVID-19 Critical Care Alliance
	83% lower mortality (p<0.0001). Meta analysis confirming the effectiveness of ivermectin for COVID-19, showing ivermectin treatment mortality relative risk RR 0.17 [0.18-0.35] and prophylaxis cases RR 0.12 [0.08-0.18].	
Dec 31 2020	Wijaya et al., Cermin Dunia Kedokteran, 47:7	Ivermectin as a Potential Therapeutic Agent for COVID-19 – case studies

		Case report on 3 confirmed cases of COVID-19 with significant clinical and radiological improvement after a single dose of ivermectin.
Dec 31 2020	Madrid et al., Heliyon, doi:10.1016/j.heliyon.2020.e05820	Safety of oral administration of high doses of ivermectin by means of biocompatible polyelectrolytes formulation
		In vivo analysis of the safety of high dose ivermectin with a Corydoras fish animal model.
Dec 30 2020	McCullough et al., Reviews in Cardiovascular Medicine, doi:10.31083/j.rcm.2020.04.264	Multifaceted highly targeted sequential multidrug treatment of early ambulatory high-risk SARS-CoV-2 infection (COVID-19)
		Review urging early treatment of COVID-19 with sequential multidrug treatment that has been shown to be safe and effective. Proposed treatment includes zinc, vitamin D & C, quercetin, and depending on age, comorbidities, and symptoms may ..
Dec 30 2020	Procter et al., Reviews in Cardiovascular Medicine, doi:10.31083/j.rcm.2020.04.260	Clinical outcomes after early ambulatory multidrug therapy for high-risk SARS-CoV-2 (COVID-19) infection
		Retrospective 922 outpatients, with 320 treated early due to age>50 or comorbidities, showing 2.2% hospitalization and 0.3% death, which authors note is considerably lower than reported in other studies in their region. At least two of zi..
Dec 27 2020	Hill, A., Preprint	Meta-analysis of clinical trials of ivermectin to treat COVID-19 infection
		WHO-funded meta analysis showing ivermectin treatment mortality relative risk RR 0.17 [0.08-0.35] for RCTs and RR 0.28 [0.13-0.62] for RCTs and observational studies, and confirming a dose-response effect.
Dec 24 2020	Jeffreys et al., International Journal of Antimicrobial Agents, doi:10.1016/j.ijantimicag.2022.106542 (date from preprint)	Remdesivir-ivermectin combination displays synergistic interaction with improved in vitro activity against SARS-CoV-2
		In Vitro study showing enhanced antiviral activity of ivermectin and remdesivir in combination.
Dec 20 2020	IVERCOR PREP, Preliminary Results	Ivermectina en agentes de salud e IVERCOR COVID19
		73% fewer cases (p<0.0001). Report on ivermectin prophylaxis in a hospital in Argentina showing lower cases for healthcare workers taking ivermectin. Results have been published in the press [lanacion.com.ar] (interim results), and a presentation posted online:..
Dec 18 2020	Kory et al., FLCCC Alliance	Review of the Emerging Evidence Demonstrating the Efficacy of Ivermectin in the Prophylaxis and Treatment of COVID-19

		69% lower mortality (p<0.0001). Meta analysis of ivermectin clinical studies and natural experiments where ivermectin has been widely used, showing efficacy of ivermectin in prophylaxis and treatment of COVID-19. There is potentially inaccurate data collection and/or re..
Dec 15 2020	Alam et al., European Journal of Medical and Health Sciences, doi:10.24018/ejmed.2020.2.6.599	Ivermectin as Pre-exposure Prophylaxis for COVID-19 among Healthcare Providers in a Selected Tertiary Hospital in Dhaka – An Observational Study
		91% fewer cases (p<0.0001). 91% reduction in COVID-19 cases with ivermectin prophylaxis. 118 healthcare workers in Bangladesh, 58 receiving ivermectin 12mg monthly, showing RR 0.094, p < 0.0001.
Dec 15 2020	Ghuri et al., International Journal of Clinical Studies & Medical Case Reports, doi:10.46998/IJCMCR.2021.13.000320 (date from preprint)	Ivermectin Use Associated with Reduced Duration of Covid-19 Febrile Illness in a Community Setting
		92% improved recovery (p=0.04). Retrospective 95 outpatients in Pakistan with strong clinical suspicion of COVID-19 (testing was not widely available), with 40 patients treated with ivermectin, showing significantly shorter duration of febrile illness with treatment. Mo..
Dec 11 2020	Hussain et al., International Journal of Molecular and Immuno Oncology, doi:10.25259/IJMIO_30_2020	Outcome of ivermectin and doxycycline in cancer patients with COVID-19: A positive experience in Bangladesh
		Small case study of ivermectin + doxycycline with 8 cancer patients, with all patients becoming PCR- by day 6 when tested again.
Dec 7 2020	Chaccour et al., EClinicalMedicine, doi:10.1016/j.eclinm.2020.100720 (date from preprint)	The effect of early treatment with ivermectin on viral load, symptoms and humoral response in patients with non-severe COVID-19: A pilot, double-blind, placebo-controlled, randomized clinical trial
		96% improved symptoms (p=0.05), 95% improved viral load (p=0.01), and 8% improved viral clearance (p=1). Tiny RCT for early treatment of mild COVID-19 in low risk patients, with 12 400mcg/kg single dose ivermectin patients and 12 control patients, showing significantly faster viral load reduction and symptom improvement with ivermectin. Aver..
Dec 4 2020	Kalfas et al., medRxiv, doi:10.1101/2020.11.30.20236570	The therapeutic potential of ivermectin for COVID-19: a systematic review of mechanisms and evidence
		Review of ivermectin mechanisms and 8 trials, showing positive mortality benefit, reduced time to clinical recovery, reduced incidence of disease progression, and decreased duration of hospital admission in patients across all stages of c..
Dec 4 2020	Surnar et al., ACS Pharmacol. Transl. Sci., doi:10.1021/acspsci.0c00179	Clinically Approved Antiviral Drug in an Orally Administrable Nanoparticle for COVID-19

	In Vitro analysis of ivermectin with orally administrable nanoparticles showing efficacy for decreasing expression of the viral spike protein and ACE2. Inhibition of nuclear transport activities mediated through proteins such as importin ..	
Dec 2 2020	Ahmed et al., International Journal of Infectious Diseases, doi:10.1016/j.ijid.2020.11.191	A five day course of ivermectin for the treatment of COVID-19 may reduce the duration of illness
	85% improved symptoms (p=0.09), 76% improved viral clearance (p=0.03), and 1% shorter hospitalization. Small 72 patient RCT of ivermectin and ivermectin + doxycycline showing faster recovery with ivermectin. The ivermectin + doxycycline group uses only a single dose of ivermectin vs. 5 daily doses for the ivermectin group. PCR testing was ..	
Dec 2 2020	Chamie, J.	The effect of using ivermectin to control COVID-19 in Chiapas
	Report showing that after starting to distribute ivermectin in drug kits in July, the Mexican state of Chiapas has seen a dramatic divergence from other states with much lower mortality [sie7edechiapas.com, twitter.com].	
Dec 1 2020	Alonso et al.	COVID-19: Uso de ivermectina
	92% lower mortality (p=0.009). Observational study in Argentina showing significantly lower mortality in the 60 days after adopting ivermectin compared to the 60 days before, relative risk RR 0.082, p=0.003.	
Nov 30 2022	Ma et al., Biomedicine & Pharmacotherapy, doi:10.1016/j.biopha.2022.113706	Ivermectin contributes to attenuating the severity of acute lung injury in mice
	Animal study showing dose dependent inhibition of lung injury with ivermectin. In lipopolysaccharide and bleomycin-induced mouse models of acute lung injury, treatment with ivermectin improved survival rates, body weight loss, lung injury..	
Nov 28 2020	Bernigaud et al., Annals of Dermatology and Venereology, doi:10.1016/j.annder.2020.09.231	Ivermectin benefit: from scabies to COVID-19, an example of serendipity
	99% lower mortality (p=0.08) and 55% fewer cases (p=0.01). 69 residents of a French care home, median age 90, were treated with ivermectin for a scabies outbreak. 3,062 residents in 45 nearby comparable homes were used as controls. 7 of 69 treated patients had probable or certain COVID-19, with n..	
Nov 28 2020	Hellwig et al., International Journal of Antimicrobial Agents, doi:10.1016/j.ijantimicag.2020.106248	A COVID-19 Prophylaxis? Lower incidence associated with prophylactic administration of Ivermectin
	78% fewer cases (p=0.02). Analysis of COVID-19 cases vs. widespread prophylactic use of ivermectin for parasitic infections showing significantly lower incidence of COVID-19 cases.	

Nov 24 2020	Niaee et al., Asian Pacific Journal of Tropical Medicine, doi:10.4103/1995-7645.318304 (date from preprint)	Ivermectin as an adjunct treatment for hospitalized adult COVID-19 patients: A randomized multi-center clinical trial
	82% lower mortality (p=0.001). 82% lower mortality with ivermectin. RCT with 180 hospitalized patients showing reduced mortality and hospital stay with ivermectin, with a wide margin of safety. All patients received SOC including low dose HCQ. Analysis suggests randomi..	
Nov 22 2020	de Melo et al., EMBO Mol. Med., doi:10.15252/emmm.202114122 (date from preprint)	Attenuation of clinical and immunological outcomes during SARS-CoV-2 infection by ivermectin
	Animal study showing that standard doses of ivermectin prevented clinical deterioration, reduced olfactory deficit, and limited inflammation in the upper and lower respiratory tracts of SARS-CoV-2-infected hamsters.	
Nov 18 2020	Budhiraja et al., medRxiv, doi:10.1101/2020.11.16.20232223	Clinical Profile of First 1000 COVID-19 Cases Admitted at Tertiary Care Hospitals and the Correlates of their Mortality: An Indian Experience
	99% lower mortality (p=0.04). Retrospective 976 hospitalized patients with 34 treated with ivermectin showing lower mortality with ivermectin in unadjusted results.	
Nov 17 2020	Carvalho et al., Journal of Biomedical Research and Clinical Investigation, doi:10.31546/2633-8653.1007	Study of the Efficacy and Safety of Topical Ivermectin + Iota-Carrageenan in the Prophylaxis against COVID-19 in Health Personnel
	100% fewer cases (p<0.0001). Prophylaxis study using ivermectin and iota-carrageenan showing 0 of 788 cases from treated healthcare workers, compared to 237 of 407 control. See [doyourownresearch.substack.com] for discussion of issues with this trial.	
Nov 14 2020	Spoorthi et al., IAIM, 2020, 7:10, 177-182	Utility of Ivermectin and Doxycycline combination for the treatment of SARSCoV-2
	21% faster recovery (p=0.03) and 16% shorter hospitalization (p=0.01). 100 patient prospective trial of ivermectin + doxycycline showing reduced time to symptom resolution and shorter hospital stay with treatment.	
Nov 13 2020	Elgazzar et al., Research Square, doi:10.21203/rs.3.rs-100956/v2	Efficacy and Safety of Ivermectin for Treatment and prophylaxis of COVID-19 Pandemic
	This study was withdrawn.	
Nov 11 2020	Camprubí et al., PLoS ONE, 15:11, doi:10.1371/journal.pone.0242184	Lack of efficacy of standard doses of ivermectin in severe COVID-19 patients
	40% lower ventilation (p=0.67), 33% lower ICU admission (p=1), 33% worse improvement (p=1), and 25% worse viral clearance (p=1). Tiny 26 patient retrospective study of very late treatment with ivermectin 200 µg/kg, median 12 days after symptoms, not showing significant differences. Authors suggest the dose is too low and recommend evaluation of higher doses. All pa..	

Nov 10 2020	Turkia, M., ResearchGate	FLCCC Alliance MATH+ ascorbic acid and I-MASK+ ivermectin protocols for COVID-19 — a brief review
	Review suggesting that ivermectin should be used based on existing data suggesting significant benefits, and that waiting for additional data may result in significant harm.	
Nov 4 2020	Cadegiani et al., New Microbes and New Infections, doi:10.1016/ j.nmni.2021.100915 (date from preprint)	Early COVID-19 Therapy with azithromycin plus nitazoxanide, ivermectin or hydroxychloroquine in Outpatient Settings Significantly Improved COVID-19 outcomes compared to Known outcomes in untreated patients
	94% lower ventilation (p=0.005) and 98% lower hospitalization (p<0.0001). Comparison of HCQ, nitazoxanide, and ivermectin showing similar effectiveness for overall clinical outcomes in COVID-19 when used before seven days of symptoms, and overwhelmingly superior compared to the untreated COVID-19 population, ev..	
Nov 3 2020	Morgenstern et al., J. Clinical Trials (date from preprint)	The Use of Compassionate Ivermectin in the Management of Symptomatic Outpatients and Hospitalized Patients with Clinical Diagnosis of Covid-19 at the Centro Medico Bournigal and at the Centro Medico Punta Cana, Grupo Rescue, Dominican Republic, from May 1 to August 10, 2020
	Retrospective 3,099 outpatients treated with ivermectin in an ER. Of 2,706 treated on an outpatient basis, 18 were subsequently hospitalized, 2 in the ICU, and there was one death (0.04%). The average treatment delay for patients treated ..	
Nov 3 2020	Behera et al., PLoS ONE, doi:10.1371/ journal.pone.0247163 (date from preprint)	Role of ivermectin in the prevention of SARS-CoV-2 infection among healthcare workers in India: A matched case-control study
	54% fewer cases (p=0.0007). Retrospective matched case-control prophylaxis study for HCQ, ivermectin, and vitamin C with 372 healthcare workers, showing lower COVID-19 incidence for all treatments, with statistical significance reached for ivermectin. HCQ OR 0.56, p..	
Nov 2 2020	Arévalo et al., Scientific Reports, doi:10.1038/ s41598-021-86679-0 (date from preprint)	Ivermectin reduces in vivo coronavirus infection in a mouse experimental model
	Mouse study showing ivermectin reducing MHV viral load and disease. MHV is a type 2 family RNA coronavirus similar to SARS-CoV2.	
Oct 31 2020	Chang et al., ResearchGate	COVID-19: Effectiveness of pre-exposure prophylaxis with ivermectin in exposed persons
	Pre-exposure prophylaxis study with 129 people split into high/low exposure groups, with each group split into different dosing regimens, showing higher effectiveness with more frequent doses. High-exposure group: every 7 days dosing: 0 of ..	
Oct 31 2020	Szente Fonseca et al., Travel Medicine and Infectious Disease, doi:10.1016/ j.tmaid.2020.101906	Risk of Hospitalization for Covid-19 Outpatients Treated with Various Drug Regimens in Brazil: Comparative Analysis

		14% higher hospitalization (p=0.53) . Retrospective 717 patients in Brazil showing OR 1.17 [0.72-1.90] for ivermectin. This paper focuses on HCQ, event counts for ivermectin are not provided. With significant correlation between the variables used, including overlap in the pr..
Oct 26 2020	Hashim et al., Iraqi Journal of Medical Science, 19:1	Controlled randomized clinical trial on using Ivermectin with doxycycline for treating COVID-19 patients in Baghdad, Iraq
		92% lower mortality (p=0.03) , 83% lower progression (p=0.07) , and 41% faster recovery (p=0.0001) . RCT 70 ivermectin+doxycycline patients and 70 control patients showing reduced time to recovery and reduced mortality with treatment. Earlier treatment was more successful. For ethical reasons, critical patients were all in the treatment ..
Oct 22 2020	Guerrero et al., Colombia Médica, doi:10.25100/cm.v51i4.4613	COVID-19: The Ivermectin African Enigma
		Study of African Programme for Onchocerciasis Control (APOC) countries, which used ivermectin, with non-APOC countries in Africa, showing 28% lower mortality for APOC countries, relative risk RR = 0.72 [0.67-0.78]. See also..
Oct 19 2020	Carvalho et al., NCT04425850	Usefulness of Topic Ivermectin and Carrageenan to Prevent Contagion of Covid 19 (IVERCAR)
		96% fewer cases (p<0.0001) . Prophylaxis study using ivermectin and carrageenan showing 0 of 131 cases from treated healthcare workers, compared to 11 of 98 control. The effect is likely to be primarily due to ivermectin - the author has later reported that carrageen..
Oct 13 2020	Chaccour et al., Scientific Reports, doi:10.1038/s41598-020-74084-y	Nebulized ivermectin for COVID-19 and other respiratory diseases, a proof of concept, dose-ranging study in rats
		Study showing that nebulized ivermectin can reach pharmacodynamic concentrations in the lung tissue of rats. Authors note that additional experiments are required to assess the safety of this formulation in larger animals.
Oct 13 2020	Rajter et al., Chest, doi:10.1016/j.chest.2020.10.009	Use of Ivermectin is Associated with Lower Mortality in Hospitalized Patients with COVID-19 (ICON study)
		46% lower mortality (p=0.05) and 64% lower ventilation (p=0.1) . Retrospective 280 hospitalized patients showing lower mortality with ivermectin (13.3% vs 24.5%), propensity matched odds ratio OR 0.47 [0.22-0.99], p=0.045.
Oct 9 2020	Mahmud et al., Journal of International Medical Research, doi:10.5061/dryad.qjq2bvqf6 (date from preprint)	Ivermectin in combination with doxycycline for treating COVID-19 symptoms: a randomized trial
		86% lower mortality (p=0.25) , 57% lower progression (p=0.001) , 94% improved recovery (p<0.0001) , and 39% improved viral clearance (p=0.002) . RCT for ivermectin+doxycycline showing improvements in mortality, recovery, progression, and virological cure. 183 treatment and 183 control patients with no deaths in the treatment arm vs. 3 in the control arm (the 3 control deaths are n..
Oct 8 2020	Francés-Monerris et al., ChemRxiv, doi:10.26434/chemrxiv.12782258.v1	Has Ivermectin Virus-Directed Effects against SARS-CoV-2? Rationalizing the Action of a Potential Multitarget Antiviral Agent

		In silico study showing that ivermectin is capable of interfering in different key steps of the SARS-CoV-2 replication cycle.
Oct 8 2020	Soto-Becerra et al., medRxiv, doi:10.1101/2020.10.06.20208066	Real-World Effectiveness of hydroxychloroquine, azithromycin, and ivermectin among hospitalized COVID-19 patients: Results of a target trial emulation using observational data from a nationwide Healthcare System in Peru
		17% lower mortality (p=0.01). Retrospective database study of 5683 patients, 692 received HCQ/CQ+AZ, 200 received HCQ/CQ, 203 received ivermectin, 1600 received AZ, 358 received ivermectin+AZ, and 2630 received standard of care. This study includes anyone with ICD-10 ..
Sep 30 2020	Chachar et al., International Journal of Sciences, 9:31-35, doi:10.18483/ijSci.2378	Effectiveness of Ivermectin in SARS-CoV-2/COVID-19 Patients
		10% improved recovery (p=0.5). Small RCT with 25 ivermectin and 25 control patients, not finding a significant difference in recovery at day 7.
Sep 24 2020	Khan et al., Archivos de Bronconeumología, doi:10.1016/j.arbres.2020.08.007	Ivermectin treatment may improve the prognosis of patients with COVID-19
		87% lower mortality (p=0.02), 89% lower ICU admission (p=0.007), 83% lower progression (p=0.0004), and 87% improved recovery (p=0.02). Retrospective 115 ivermectin patients and 133 control patients showing significantly lower death and faster viral clearance. Some potential issues and the authors' response can be found in [sciencedirect.com, sciencedirect.com].
Sep 22 2020	Li et al., J. Cellular Physiology, doi:10.1002/jcp.30055	Quantitative proteomics reveals a broad-spectrum antiviral property of ivermectin, benefiting for COVID-19 treatment
		In Vitro study showing Ivermectin is a safe wide-spectrum antiviral against SARS-CoV-2, human papillomavirus (HPV), Epstein–Barr virus (EBV), and HIV. Authors note that the combination of ivermectin and other drugs might result in more fa..
Sep 15 2020	Carvalho et al., Journal of Clinical Trials, 11:459 (date from preprint)	Safety and Efficacy of the Combined Use of Ivermectin, Dexamethasone, Enoxaparin and Aspirina against COVID-19 the I.D.E.A. Protocol
		85% lower mortality (p=0.08). Prospective trial of ivermectin, dexamethasone, enoxaparin, and aspirin, showing no hospitalization for mild cases, and lower mortality for moderate/severe patients.
Sep 15 2020	Jans et al., Cells 2020, 9:9, 2100, doi:10.3390/cells9092100	Ivermectin as a Broad-Spectrum Host-Directed Antiviral: The Real Deal?
		Review of ivermectin as a host-directed broad-spectrum antiviral agent for a range of viruses, including SARS-CoV-2. Cell culture experiments show robust antiviral action towards HIV-1, dengue virus (DENV), Zika virus, West Nile virus, Ve..
Sep 11 2020	Elkholy et al., Cureus, doi:10.7759/cureus.10378	Ivermectin: A Closer Look at a Potential Remedy

		Proposal to use inhaled ivermectin for COVID-19. Author notes that ivermectin may have broad-spectrum antiviral properties and research in this area may also be beneficial for other emerging viral outbreaks in the future.
Sep 9 2020	Swargiary, A., Research Square, doi:10.21203/rs.3.rs-73308/v1	Ivermectin as a promising RNA-dependent RNA polymerase inhibitor and a therapeutic drug against SARS-CoV2: Evidence from in silico studies
		In Silico study showing high binding affinity of ivermectin with SARS-CoV-2 RNA-dependent RNA polymerase, suggesting ivermectin as an inhibitor of RdRp.
Sep 6 2020	DiNicolantonio et al., Open Heart, doi:10.1136/openhrt-2020-001350	Ivermectin may be a clinically useful anti-inflammatory agent for late-stage COVID-19
		Review suggesting that ivermectin may be useful for late stage COVID-19. Authors note that ivermectin, in doses at or modestly above the standard clinical dose, may have important clinical potential for managing disorders associated with..
Sep 3 2020	Podder et al., IMC J. Med. Science, 14:2	Outcome of ivermectin treated mild to moderate COVID-19 cases: a single-centre, open-label, randomised controlled study
		16% faster recovery (p=0.34) . Small RCT with 32 ivermectin patients and 30 control patients. The mean recovery time after enrolment in the intervention arm was 5.31 ± 2.48 days vs. 6.33 ± 4.23 days in the control arm, p > 0.05. Negative PCR results were not significant..
Sep 1 2020	Kamal et al., NCT04425707	Ivermectin In Treatment of COVID 19 Patients
		Estimated 100 patient ivermectin early treatment RCT with results not reported over 3 years after estimated completion.
Aug 31 2020	Kishoria et al., Paripex - Indian Journal of Research, doi:10.36106/paripex/4801859	Ivermectin as adjuvant to hydroxychloroquine in patients resistant to standard treatment for SARS-CoV-2: results of an open-label randomized clinical study
		8% lower hospital discharge (p=1) and 8% worse viral clearance (p=1) . Small RCT of hospitalized patients in India with 19 ivermectin patients and 13 control patients, with all receiving SOC including HCQ, showing no significant differences. The patient population is biased because the study recruited patients..
Aug 28 2020	Shouman et al., Journal of Clinical and Diagnostic Research, doi:10.7860/JCDR/2020/46795.0000	Use of Ivermectin as a Potential Chemoprophylaxis for COVID-19 in Egypt: A Randomised Clinical Trial
		91% fewer symptomatic cases (p=0.001) and 93% lower severe cases (p=0.002) . PEP trial for asymptomatic close contacts of COVID-19 patients, 203 ivermectin patients and 101 control patients. 7.4% of contacts developed COVID-19 in the ivermectin group vs. 58.4% in the control group. Efficacy for symptomatic cases a..
Aug 15 2020	Espitia-Hernandez et al., Biomedical Research, 31:5	Effects of Ivermectin-azithromycin-cholecalciferol combined therapy on COVID-19 infected patients: A proof of concept study

		70% faster recovery (p=0.0001) and 97% improved viral clearance (p<0.0001). Small study with 28 patients treated with ivermectin + AZ + cholecalciferol and 7 control patients. All treated patients were PCR- at day 10 while all control patients remained PCR+. The mean duration of symptoms was 3 days in the treatme..
Aug 14 2020	Bhattacharya et al., Int. J. Scientific Research, doi:10.36106/ijsr/7232245	Observational Study on Clinical Features, Treatment and Outcome of COVID 19 in a tertiary care Centre in India- a retrospective case series
		Retrospective 148 hospitalized patients showing triple therapy with ivermectin + atorvastatin + N-acetylcysteine resulted in a 1.35% case fatality rate which was well below the national average.
Jul 31 2020	Vora et al., Indian Journal of Tuberculosis, doi:10.1016/j.ijtb.2020.07.031	White paper on Ivermectin as a potential therapy for COVID-19
		Panel review of ivermectin reporting that "ivermectin in the dose of 12mg BD alone or in combination with other therapy for 5–7 days may be considered as safe therapeutic option for mild moderate or severe cases of Covid-19 infection..
Jul 31 2020	Chang et al., ResearchGate	Post-acute or prolonged COVID-19: ivermectin treatment for patients with persistent symptoms or post-acute symptoms
		Report on 33 patients with persistent or post-acute symptoms treated with ivermectin, showing a high rate of clinical improvement.
Jul 31 2020	Chang et al., ResearchGate, doi:10.13140/RG.2.2.34561.48483/2	COVID-19: Post-exposure prophylaxis with ivermectin in contacts. At Homes, Places of Work, Nursing Homes, Prisons, and Others
		Proposed PEP protocol based on ivermectin.
Jul 31 2020	Alam et al., Journal of Bangladesh College of Physicians and Surgeons, doi:10.3329/jbcps.v38i0.47512	A Case Series of 100 COVID-19 Positive Patients Treated with Combination of Ivermectin and Doxycycline
		Case study of 100 patients treated with ivermectin and doxycycline, with no ICU admission, deaths, or serious side effects reported.
Jul 31 2020	Rahman et al., J. Bangladesh Coll. Phys. Surg. 38, 5-9, doi:10.3329/jbcps.v38i0	Comparison of Viral Clearance between Ivermectin with Doxycycline and Hydroxychloroquine with Azithromycin in COVID-19 Patients
		Comparison of 200 patients treated with ivermectin + doxycycline and 200 treated with HCQ + AZ. The HCQ + AZ group had more severe cases at baseline. Viral clearance was faster with ivermectin + doxycycline, however ivermectin clearance r..
Jul 21 2020	Chang et al., Research Gate, doi:10.13140/RG.2.2.11985.35680/3	COVID-19: Ivermectin Prophylaxis in Adult Contacts: First Report on Health Personnel and Post-Exposure Prophylaxis

		Report on ivermectin post-exposure prophylaxis with 33 patients, showing no cases over 21 days followup.
Jul 14 2020	Chowdhury et al., Eurasian Journal of Medicine and Oncology, doi:10.14744/ejmo.2021.16263	A Comparative Study on Ivermectin-Doxycycline and Hydroxychloroquine-Azithromycin Therapy on COVID-19 Patients
		81% lower hospitalization (p=0.23), 46% improved recovery (p<0.0001), and 81% improved viral clearance (p=0.23). Small 116 patient RCT with low-risk patients comparing ivermectin+doxycycline and HCQ+AZ, showing lower hospitalization, higher viral clearance, and faster symptom resolution and viral clearance with ivermectin+doxycycline. Mid-recovery r..
Jul 8 2020	Gorial et al., medRxiv, doi:10.1101/2020.07.07.20145979	Effectiveness of Ivermectin as add-on Therapy in COVID-19 Management (Pilot Trial)
		42% shorter hospitalization (p<0.0001). Small trial of hospitalized patients with 16 of 87 patients being treated with ivermectin, showing a significantly lower mean hospital stay with ivermectin: 7.62 vs. 13.22 days, p=0.00005. 0 of 16 ivermectin patients died vs. 2 of 71 cont..
Jun 19 2020	Lehrer et al., In Vivo, 34:5, 3023-3026, doi:10.21873/invivo.12134	Ivermectin Docks to the SARS-CoV-2 Spike Receptor-binding Domain Attached to ACE2
		In silico analysis showing ivermectin may interfere with the attachment of the spike to the human cell membrane.
Jun 16 2020	Ramos et al., Preprint	Intervención de la Ivermectina Pre-Hospitalaria para la Modificación de la Evolución del Covid19. Estudio realizado en Perú
		Prospective study of 63 outpatients in Peru treated with ivermectin, reporting significant improvement within 24 hours.
Jun 12 2020	Heidary et al., The Journal of Antibiotics, 73, 593–602, doi:10.1038/s41429-020-0336-z	Ivermectin: a systematic review from antiviral effects to COVID-19 complementary regimen
		Review of the antimicrobial, antiviral, and anti-cancer properties of ivermectin. Antiviral effects have been reported for Zika, dengue, yellow fever, West Nile, Hendra, Newcastle, Venezuelan equine encephalitis, chikungunya, Semliki Fore..
Jun 7 2020	Suravajhala et al., MDPI AG, doi:10.20944/preprints202005.0439.v3	Comparative Docking Studies on Curcumin with COVID-19 Proteins
		In Silico study reporting that ivermectin had the best affinity towards all targeted proteins and showed efficient binding to non-structural proteins.
May 20 2020	Arshad et al., Clinical Pharmacology & Therapeutics, doi:10.1002/cpt.1909	Prioritization of Anti-SARS-Cov-2 Drug Repurposing Opportunities Based on Plasma and Target Site Concentrations Derived from their Established Human Pharmacokinetics

	Pharmacokinetic analysis predicting that ivermectin will achieve lung concentration over 10 times higher than the reported EC50.	
May 2 2020	Chang, G., Research Gate, doi:10.13140/RG.2.2.34689.48482/7	Inclusión de la ivermectina en la primera línea de acción terapéutica para COVID-19
	Peru observational case study of 7 patients treated with ivermectin, showing improvement and resolution of fever within 48 hours, and 100% recovery.	
Apr 21 2020	Bray et al., Antiviral Res., doi:10.1016/j.antiviral.2020.104805	Ivermectin and COVID-19: A report in Antiviral Research, widespread interest, an FDA warning, two letters to the editor and the authors' responses
	Responses to Caly et al., and the author's reply. The original authors note that "ivermectin's key direct target in mammalian cells is a not a viral component, but a host protein important in intracellular transport; the fact that it..	
Apr 3 2020	Caly et al., Antiviral Research, doi:10.1016/j.antiviral.2020.104787	The FDA-approved drug ivermectin inhibits the replication of SARS-CoV-2 in vitro
	In Vitro study showing that ivermectin is an inhibitor of SARS-CoV-2, with a single addition to Vero-hSLAM cells 2h post infection with SARS-CoV-2 able to effect ~5000-fold reduction in viral RNA at 48h. There are claims that this study s..	
Mar 31 2005	Lespine et al., Veterinary Parasitology, doi:10.1016/j.vetpar.2004.11.028	Influence of the route of administration on efficacy and tissue distribution of ivermectin in goat
	Pharmacokinetic analysis of ivermectin in goats, showing that tissue concentration can be several times higher than plasma concentration.	
Oct 1 2002	Guzzo et al., J. Clinical Pharmacology, doi:10.1177/009127002237994	Safety, Tolerability, and Pharmacokinetics of Escalating High Doses of Ivermectin in Healthy Adult Subjects
	Safety study concluding that ivermectin was generally well tolerated, with no indication of associated CNS toxicity for doses up to 10 times the highest FDA-approved dose. Adverse effects were similar between ivermectin and placebo and di..	
Feb 29 2000	Lifschitz et al., Veterinary Parasitology, doi:10.1016/S0304-4017(99)00175-2	Comparative distribution of ivermectin and doramectin to parasite location tissues in cattle
	Pharmacokinetic analysis of ivermectin in cattle, showing that tissue concentration can be several times higher than plasma concentration.	
Nov 1 1990	Chiu et al., J. Agric. Food Chem., doi:10.1021/jf00101a015	Absorption, tissue distribution, and excretion of tritium-labeled ivermectin in cattle, sheep, and rat

Animal study showing that lung tissue concentration of ivermectin may be ~20 times higher than plasma concentration.

Peer-reviewed and other studies on Vitamin C

Chart courtesy c19early.org/c. For more charts, full analysis and more information, visit their website.

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Oct 4	Covid Analysis	Vitamin C for COVID-19: real-time meta analysis of 66 studies (64 treatment studies and 2 sufficiency studies)
	Statistically significant lower risk is seen for mortality, ICU admission, hospitalization, and recovery. 22 studies from 22 independent teams in 12 countries show statistically significant improvements. • Meta analysis using the most s..	
Sep 22	Seely et al., BMJ Open, doi:10.1136/bmjopen-2023-073761	Dietary supplements to reduce symptom severity and duration in people with SARS-CoV-2: a double-blind randomised controlled trial
	14% improved recovery (p=0.41). Early terminated low-risk population (no hospitalization) very late treatment (mean 8 days) RCT with 44 patients treated with vitamin C, D, K, and zinc, and 46 control patients, showing no significant differences. Authors acknowledge that..	
Sep 13	Albóniga et al., Scientific Reports, doi:10.1038/s41598-023-40999-5	Differential abundance of lipids and metabolites related to SARS-CoV-2 infection and susceptibility
	Plasma metabolomic analysis showing significantly lower threonic acid levels for severe and mild COVID-19 cases compared with moderate cases. Threonic acid is a metabolite of vitamin C. The expected relationship in non-linear and depends ..	
Sep 8	Sun et al., Nutrition Reviews, doi:10.1093/nutrit/nuad105	Therapeutic effects of high-dose vitamin C supplementation in patients with COVID-19: a meta-analysis
	66% lower progression (p=0.03). Meta analysis of 14 studies showing lower COVID-19 progression with high-dose vitamin C treatment.	

Aug 20	Boerenkamp et al., Nutrients, doi:10.3390/ nu15163653	Low Levels of Serum and Intracellular Vitamin C in Hospitalized COVID-19 Patients
56% lower severe cases (p=0.1). Analysis of serum and intracellular vitamin C levels in hospitalized COVID-19 patients. Low vitamin C levels were common with 36% having serum levels <26 µmol/L and 15% <11 µmol/L. Intracellular vitamin C levels in peripheral blood mononu..		
Jul 15	Graydon et al., Current Research in Immunology, doi:10.1016/ j.crimmu.2023.100064	High baseline frequencies of natural killer cells are associated with asymptomatic SARS-CoV-2 infection
Analysis of 88 COVID+ patients in the USA showing that a higher frequency of natural killer (NK) cells was associated with asymptomatic infection. Improved NK cell numbers and functioning has been shown for exercise [Oh], better sleep [Ir..		
Jul 12	Porter et al., medRxiv, doi:10.1101/2023.07.06 .23292300	The ratio between SARS-CoV-2 RNA viral load and culturable viral titer differs depending on stage of infection
Analysis of viral load and infectious virus, showing that the ratio between viral load (measured by PCR) and infectious virus (measured by viral culture) changes dramatically over the course of infection. Early in infection, viral load is..		
Jun 28	Rana et al., Biological and Clinical Sciences Research Journal, doi:10.54112/ bcsrj.v2023i1.343	Effects of mega dose vitamin C in critically ill COVID-19 patients: a randomized control trial
55% lower mortality (p=0.2), 44% lower ventilation (p=0.41), and 37% shorter hospitalization (p=0.91). RCT 278 COVID-19 ICU patients in Pakistan, showing lower mortality and ventilation, and shorter length of stay with high dose vitamin C treatment, without statistical significance. 30 grams IV vitamin C for four days.		

Jun 20	Mahjoub et al., Explore, doi:10.1016/ j.explore.2023.06.009	Melatonin, vitamins and minerals supplements for the treatment of Covid-19 and Covid-like illness: a prospective, randomized, double-blind multicenter study.
	67% improved recovery (p=0.32). RCT 164 low-risk (no hospitalizations) patients in Tunisia, showing improved recovery with zinc, melatonin, and vitamins A-E. This study includes COVID-19 and COVID-like illness, with 49% of 128 patients receiving a PCR test being COVID-1..	
Jun 14	Orellana-Manzano et al., Frontiers in Pharmacology, doi:10.3389/ fphar.2023.1197973	A report on SARS-CoV-2 first wave in Ecuador: drug consumption dynamics
	Retrospective 10,175 people PCR tested in Ecuador, showing lower risk of PCR+ with multivitamin use and suggesting higher risk with acetaminophen use. The study analyzed drug consumption for COVID-19 symptoms during the 14 days before the..	
Jun 1	Liu et al., NCT05694975	Clinical Efficacy of Megadose Vitamin C in Severe and Critical Ill COVID-19 Patients (CEMVISCC): A Multicenter, Randomized, Single-blind, Placebo-controlled Clinical Trial
	Estimated 608 patient vitamin C late treatment RCT with results expected soon (estimated completion over 4 months ago).	
May 21	Chen et al., Nutrition, doi:10.1016/ j.nut.2023.112087	Early oral nutritional supplement improves COVID-19 outcomes among hospitalized older patients during the omicron wave
	PSM retrospective 1,181 COVID-19 patients ≥60 years old in China, showing significantly lower mortality with a nutritional supplement. Hospitalization time and viral clearance time was improved with earlier initiation of treatment. The su..	
May 11	Kyagambiddwa et al., Infection and Drug Resistance, doi:10.2147/idr.s405256	Thirty-Day Outcomes of Young and Middle-Aged Adults Admitted with Severe COVID-19 in Uganda: A Retrospective Cohort Study

		<p>50% lower mortality (p=0.06). Retrospective 246 severe COVID-19 patients in Uganda, showing lower mortality with vitamin C treatment, without statistical significance (p = 0.06).</p>
May 11	<p>Vaisi et al., The Clinical Respiratory Journal, doi:10.1111/crj.13632</p>	<p>The association between nutrients and occurrence of COVID-19 outcomes in the population of Western Iran: A cohort study</p>
		<p>38% lower hospitalization (p=0.17) and 10% fewer symptomatic cases (p=0.71). Analysis of nutrient intake and COVID-19 outcomes for 3,996 people in Iran, showing lower risk of COVID-19 hospitalization with sufficient vitamin A, vitamin C, and selenium intake, with statistical significance for vitamin A and selenium.</p>
Apr 28	<p>Pincemail et al., Biomedicines, doi:10.3390/ biomedicines11051308</p>	<p>A Pilot Study on Oxidative Stress during the Recovery Phase in Critical COVID-19 Patients in a Rehabilitation Facility: Potential Utility of the PAOT® Technology for Assessing Total Anti-Oxidative Capacity</p>
		<p>Analysis of 12 COVID-19 ICU patients showing vitamin C levels significantly below the reference range, and remaining low 2 months after discharge.</p>
Apr 18	<p>Kow et al., Inflammopharmacology, doi:10.1007/ s10787-023-01200-5</p>	<p>The effect of vitamin C on the risk of mortality in patients with COVID-19: a systematic review and meta-analysis of randomized controlled trials</p>
		<p>47% lower mortality (p=0.03). Meta analysis of 11 vitamin C RCTs showing significantly lower COVID-19 mortality with treatment. The effect size is larger than in our analysis due to the authors' inclusion of 2 trials that we exclude due to combined treatments being li..</p>
Apr 9	<p>Xu et al., Nutrients, doi:10.3390/ nu15081848</p>	<p>Association of Oral or Intravenous Vitamin C Supplementation with Mortality: A Systematic Review and Meta-Analysis</p>
		<p>Systematic review and meta analysis of vitamin C showing significantly lower mortality for COVID-19 and for sepsis.</p>

Mar 21	Madamombe et al., Pan African Medical Journal, doi:10.11604/pamj.2023.44.142.3785 8	Factors associated with COVID-19 fatality among patients admitted in Mashonaland West Province, Zimbabwe 2020-2022: a secondary data analysis
	53% lower mortality (p=0.0004). Retrospective 672 COVID-19 patients in Zimbabwe, showing lower mortality with vitamin C treatment.	
Mar 21	Coskun et al., SiSli Etfal Hastanesi Tip Bulteni / The Medical Bulletin of Sisli Hospital, doi:10.14744/SEMB.2022.66742	The Effect of High-dose Vitamin C Treatment for Acute Respiratory Failure due to Coronavirus Disease Pneumonia on Mortality and Length of Intensive Care Stay: A Retrospective Cohort Study
	25% lower mortality (p=0.26), 2% lower ventilation (p=1), no change in ICU admission, and 28% improved recovery (p=0.005). Retrospective 78 ICU patients in Turkey, showing lower mortality with high-dose vitamin C treatment, without statistical significance. The SOFA score was significantly better with treatment at day 4. Authors incorrectly state that "H..	
Mar 21	Asoudeh et al., Clinical Nutrition ESPEN, doi:10.1016/j.clnesp.2023.03.013	The association between dietary intakes of zinc, vitamin C and COVID-19 severity and related symptoms: A cross-sectional study
	69% lower severe cases (p=0.003). Retrospective 250 recovered COVID-19 patients, showing lower risk of severe cases with higher vitamin C intake.	
Mar 15	Schloss et al., Inflammopharmacology, doi:10.1007/s10787-023-01183-3	Nutritional deficiencies that may predispose to long COVID
	Review of 22 nutritional factors that have been linked to COVID-19 outcomes, the role of nutrients in COVID-19 infection, and the prevalence of multiple nutritional deficiencies in the population.	

Feb 28	Boukef et al., NCT05670444	Melatonin, Vitamins and Minerals Supplements for the Treatment of Covid-19 and Covid-like Illness: Results of a Prospective, Randomised, Double-blinded Multicentre Study
	150 patient vitamin C early treatment RCT with results not reported over 7 months after completion.	
Feb 13	Yilmaz et al., Acta Biomedica Atenei Parmensis, doi:10.23750/ abm.v94i1.13655	Baseline serum vitamin A and vitamin C levels and their association with disease severity in COVID-19 patients
	Analysis of 53 consecutive hospitalized COVID-19 patients and 26 matched controls, showing significantly lower vitamin A and vitamin C levels in COVID-19 patients, and a negative correlation between vitamin A and vitamin C levels and CT s..	
Feb 3	Yamasaki et al., Microorganisms, doi:10.3390/ microorganisms110203 97	Pleiotropic Functions of Nitric Oxide Produced by Ascorbate for the Prevention and Mitigation of COVID-19: A Reevaluation of Pauling's Vitamin C Therapy
	Extensive review of vitamin C and nitric oxide focusing on the potential antiviral activity of vitamin C for SARS-CoV-2 via the production of nitric oxide. Authors note that vegetables are a major dietary source of nitrate, and that dieta..	
Feb 2	Arora et al., Nutrients, doi:10.3390/ nu15030771	Global Dietary and Herbal Supplement Use during COVID-19—A Scoping Review
	Review of 14 global studies showing that the most frequently used dietary supplements during COVID-19 were vitamin C, vitamin D, zinc, and multivitamins. The most common reason was for improved immune system functioning or reduced COVID-1..	

Jan 30	Sallam et al., Journal of Food and Nutrition Research, doi:10.12691/jfnr-11-1-10	Dietary Supplement Use among Children Whose Parents Work at National Research Centre: A Pilot Study
	Survey of dietary supplementation showing high usage, and greater use by more highly educated people. The survey covered 200 children whose parents were employees of a research center in Egypt, showing 50% prevalence of supplementation du..	
Jan 25	Turobkulovich et al., Emergent: Journal of Educational Discoveries and Lifelong Learning	Applications of quercetin for the prevention of COVID-19 in healthcare workers
	73% lower mortality (p=0.11) and 33% fewer symptomatic cases (p=0.03). Prospective study of healthcare workers in Uzbekistan showing lower cases with vitamin C prophylaxis. Very minimal details are provided, there is no baseline information, and control mortality is very high.	
Jan 16	Viglione et al., The Gazette of Medical Sciences, doi:10.46766/the-gms.pubheal.22120905	Intravenous high dose vitamin C and ozonated saline effective treatment for Covid-19: The Evolution of Local Standard of Care
	Retrospective 479 high risk outpatients in the USA treated with a protocol including intravenous vitamin C, vitamin D, zinc, quercetin, bromelain, lactoferrin, HCQ, ivermectin, ozonated saline, azithromycin, ceftriaxone, methylprednisolon..	
Jan 13	Đukić et al., Frontiers in Bioscience-Landmark, doi:10.31083/j.fbl2801008	Inhibition of SARS-CoV-2 Mpro with Vitamin C, L-Arginine and a Vitamin C/L-Arginine Combination
	In Vitro study showing inhibition of SARS-CoV-2 Mpro with vitamin C, L-arginine, and improved inhibition with the combination of both.	

Dec 14 2022	Labbani-Motlagh et al., Journal of Research in Pharmacy Practice, doi:10.4103/ jrpp.jrpp_30_22	High-dose intravenous Vitamin C in early stages of severe acute respiratory syndrome coronavirus 2 infection: A double-blind, randomized, controlled clinical trial
	33% lower mortality (p=0.74), 13% longer hospitalization (p=0.49), and 16% lower progression (p=0.12). RCT 74 patients in Iran, showing no significant differences in outcomes with high dose vitamin C treatment. Tables 1b and 2a show conflicting baseline SOFA scores. The percentages of patients receiving antiviral treatments and corticoster..	
Dec 6 2022	Lamontagne et al., NCT04401150	Lessening Organ Dysfunction With VITamin C - COVID
	392 patient vitamin C late treatment RCT with results not reported over 9 months after completion. The companion non-COVID trial NCT03680274 has reported results.	
Nov 26 2022	Sharif et al., Nutrients, doi:10.3390/ nu14235029	Impact of Zinc, Vitamins C and D on Disease Prognosis among Patients with COVID-19 in Bangladesh: A Cross-Sectional Study
	46% lower severe cases (p=0.001). Retrospective 962 COVID-19 patients in Bangladesh, showing significantly lower severity with vitamin C, vitamin D, and zinc supplementation, and improved results from the combination of all three.	
Nov 23 2022	Tosato et al., Nutrients, doi:10.3390/ nu14234984	Effects of L-Arginine Plus Vitamin C Supplementation on Physical Performance, Endothelial Function, and Persistent Fatigue in Adults with Long COVID: A Single-Blind Randomized Controlled Trial
	46 patient RCT in Italy showing improved recovery from long COVID symptoms using combined treatment with L-arginine and vitamin C.	
Nov 16 2022	Guldemir et al., Work, doi:10.3233/ wor-220292	Clinical characteristics of bus drivers and field officers infected with COVID-19: A cross-sectional study from Istanbul
	31% lower hospitalization (p=0.05). Retrospective 477 COVID+ public transportation workers in Turkey, showing lower risk of hospitalization with vitamin C use in unadjusted results.	

<p>Oct 19 2022</p>	<p>Doocy et al., PLOS Global Public Health, doi:10.1371/ journal.pgph.0000924</p>	<p>Clinical progression and outcomes of patients hospitalized with COVID-19 in humanitarian settings: A prospective cohort study in South Sudan and Eastern Democratic Republic of the Congo</p>
<p>63% lower mortality (p=0.22). Prospective study of 144 hospitalized COVID-19 patients in the DRC and South Sudan, showing lower mortality with vitamin C treatment.</p>		
<p>Oct 18 2022</p>	<p>Cosentino et al., Journal of Clinical Medicine, doi:10.3390/ jcm11206138</p>	<p>Early Outpatient Treatment of COVID-19: A Retrospective Analysis of 392 Cases in Italy</p>
<p>Retrospective 392 outpatients in Italy showing 0.2% mortality with early treatment, compared with >3% in Italy at the time. Treatment varied for individual patients and included HCQ, vitamin D, vitamin C, vitamin A, zinc, quercetin, bromh..</p>		
<p>Oct 10 2022</p>	<p>Olczak-Pruc et al., Nutrients, doi:10.3390/ nu14194217</p>	<p>Vitamin C Supplementation for the Treatment of COVID-19: A Systematic Review and Meta-Analysis</p>
<p>56% lower mortality (p=0.004). Systematic review and meta analysis of 19 studies showing lower mortality with vitamin C treatment, statistically significant for RCTs but not for non-RCT studies, and longer ICU length of stay.</p>		
<p>Sep 22 2022</p>	<p>Özgültekin et al., Kastamonu Medical Journal, doi:10.51271/ KMJ-0059</p>	<p>The effect of high-dose vitamin C on renal functions in COVID-19 patients</p>
<p>5% higher mortality (p=1). Retrospective 43 ICU patients in Turkey, 21 treated with vitamin C, showing no significant difference in mortality and increased renal failure. Treatment included stage 1 AKI patients. Vitamin C 45-50 g/day for 5 days.</p>		
<p>Sep 19 2022</p>	<p>Mosadegh et al., Microbial Pathogenesis, doi:10.1016/ j.micpath.2022.105792</p>	<p>The effect of Nutrition Bio-shield superfood (NBS) on disease severity and laboratory biomarkers in patients with COVID-19: A randomized clinical trial</p>

		<p>61% lower mortality (p=0.002) and 28% shorter hospitalization (p=0.001). RCT 70 hospitalized severe COVID-19 patients in Iran, showing lower mortality and improved clinical markers with treatment combining vitamins A, B1–B3, B5, B6, B9, C, D, K, and magnesium, potassium, phosphorus, sulfur, manganese, calcium,...</p>
Sep 2 2022	<p>Foshati et al., Food Science & Nutrition, doi:10.1002/fsn3.3034</p>	<p>Antioxidants and clinical outcomes of patients with coronavirus disease 2019: A systematic review of observational and interventional studies</p>
		<p>Systematic review showing that vitamin C, vitamin D, selenium, and zinc can improve COVID-19 clinical outcomes.</p>
Aug 30 2022	<p>Kumar et al., Journal of Family Medicine and Primary Care, doi:10.4103/jfmpc.jfmpc_2437_21</p>	<p>Efficacy of intravenous vitamin C in management of moderate and severe COVID-19: A double blind randomized placebo controlled trial</p>
		<p>23% lower mortality (p=0.6) and 21% lower ventilation (p=0.6). RCT 60 ICU patients in India, showing no significant difference in outcomes with vitamin C. Mortality was lower in the vitamin C arm despite having more severe cases at baseline (87% vs. 67%). 1 gram intravenous vitamin C 8 hourly for fou..</p>
Aug 16 2022	<p>Loucera et al., medRxiv, doi:10.1101/2022.08.14.22278751</p>	<p>Real-world evidence with a retrospective cohort of 15,968 Andalusian COVID-19 hospitalized patients suggests 21 new effective treatments and one drug that increases death risk</p>
		<p>28% lower mortality (p=0.002). Retrospective 15,968 COVID-19 hospitalized patients in Spain, showing lower mortality with existing use of several medications including metformin, HCQ, aspirin, vitamin D, vitamin C, and budesonide.</p>
Aug 15	<p>Sinnberg et al., Antioxidants, doi:10.3390/antiox11081580</p>	<p>Vitamin C Deficiency in Blood Samples of COVID-19 Patients</p>

2022	<p>42% lower mortality (p=0.38), 41% lower ventilation (p=0.17), and 61% lower hospitalization (p=0.05). Analysis of 74 COVID-19 patients and 8 controls in Germany, showing low vitamin C levels associated with mortality. There was no significant difference for vitamin A, D, or E levels. Very few group details are provided, for example the ag..</p>	
Aug 8 2022	<p>Bhowmik et al., Health Science Reports, doi:10.1002/hsr2.762</p>	<p>Impact of high-dose vitamin C on the mortality, severity, and duration of hospital stay in COVID-19 patients: A meta-analysis</p>
<p>46% lower mortality (p<0.0001). Meta analysis of 15 studies with 2,125 COVID-19 patients showing significantly lower mortality with high-dose vitamin C.</p>		
Jul 27 2022	<p>Fogleman et al., The Journal of the American Board of Family Medicine, doi:10.3122/jabfm.2022.04.210529</p>	<p>A Pilot of a Randomized Control Trial of Melatonin and Vitamin C for Mild-to-Moderate COVID-19</p>
<p>4% improved recovery (p=0.83). Early terminated low-risk patient RCT with 32 low-dose vitamin C, 32 melatonin, and 34 placebo patients, showing faster resolution of symptoms with melatonin in spline regression analysis, and no significant difference for vitamin C. All ..</p>		
Jul 19 2022	<p>Izzo et al., Pharmacological Research, doi:10.1016/j.phrs.2022.106360</p>	<p>Combining L-Arginine with Vitamin C Improves Long-COVID Symptoms: The Nationwide Multicenter LINCOLN Study</p>
<p>41% improved recovery (p<0.0001). Long COVID trial comparing L-arginine + vitamin C with multivitamin treatment (vitamin B1, B2, B6, B12, nicotinamide, folic acid, pantothenic acid), showing significant improvement in symptoms with L-arginine + vitamin C treatment.</p>		
Jul 15 2022	<p>Zuo et al., EMBO reports, doi:10.15252/embr.202256374 (date from preprint)</p>	<p>Vitamin C promotes ACE2 degradation and protects against SARS-CoV-2 infection</p>
<p>In Vitro and mouse study showing that vitamin C inhibits SARS-CoV-2. Vitamin C lowered ACE2 protein levels in a dose-dependent manner at a concentration of 1-10mM in both cell and humanized ACE2 mouse models.</p>		

Jun 16 2022	Ortore et al., International Journal of Translational Medicine, doi:10.3390/ ijtm2020022	Evaluation of the Clinical Effects of an Antiviral, Immunostimulant and Antioxidant Phytotherapy in Patients Suffering from COVID-19 Infection: An Observational Pilot Study
	Retrospective case series of 240 patients in Italy in 2020, up to 96 years old, showing no mortality and 1.6% hospitalization with early treatment including vitamin C, quercetin, and green tea and red wine polyphenols. The formulation was..	
Jun 10 2022	Fowler et al., NCT04344184	SAFEty Study of Early Infusion of Vitamin C for Treatment of Novel Coronavirus Acute Lung Injury (SAFE EVICT CORONA-ALI)
	48 patient vitamin C late treatment RCT with results not reported over 1 year after completion.	
Jun 7 2022	Usanma Koban et al., Bratislava Medical Journal, doi:10.4149/ BLL_2022_082	The factors affecting the prolonged PCR positivity in COVID-19 patients
	33% improved viral clearance (p=0.73). Retrospective 126 patients in Turkey, showing no significant difference in PCR+ at day 14 with vitamin C treatment.	
May 30 2022	Kumar et al., Cureus, doi:10.7759/ cureus.25467	Efficacy and Safety of Aspirin, Promethazine, and Micronutrients for Rapid Clinical Recovery in Mild to Moderate COVID-19 Patients: A Randomized Controlled Clinical Trial
	89% improved recovery (p=0.05). RCT 260 patients in India, 130 treated with aspirin, promethazine, vitamin C, D, B3, zinc, and selenium, showing faster recovery with treatment. There was no hospitalization, ICU admission, or supplemental oxygen requirements in either gr..	
May 27 2022	Galmés et al., Nutrients, doi:10.3390/ nu14112254	Suboptimal Consumption of Relevant Immune System Micronutrients Is Associated with a Worse Impact of COVID-19 in Spanish Populations
	Ecological study in Spain, showing lower intake of vitamin D, A, B9, and zinc in regions with the highest COVID-19 incidence and mortality. Vitamin D intake was associated with lower prevalence, incidence, and a combined incidence+mortality..	

May 19 2022	Hellou et al., Journal of Cellular and Molecular Medicine, doi:10.1111/jcmm.17337	Effect of ArtemiC in patients with COVID-19: A Phase II prospective study
	77% improved recovery (p=0.04), 92% lower need for oxygen therapy (p=0.01), 13% shorter hospitalization (p=0.92), and 10% improved viral clearance (p=0.77). RCT 50 hospitalized patients in Israel, 33 treated with curcumin, vitamin C, artemisinin, and frankincense oral spray, showing improved recovery with treatment.	
May 18 2022	Yildirim et al., Research Square, doi:10.21203/rs.3.rs-1666161/v1	Mortality Predictors Of Pre-variant SARS-CoV-2 Infected ARDS Patients Receiving Favipiravir and Tocilizumab
	Retrospective 60 ICU patients in Turkey treated with tocilizumab and favipiravir, reporting that there was a higher rate of vitamin C treatment in surviving patients (35% vs 10%; p = 0.03), however the results in the table do not match. T..	
May 15 2022	Galindo et al., NCT05029037	High-dose Intravenous Vitamin C (HDIVC) as Adjuvant Therapy in Critical Patients With Positive COVID-19. A Pilot Randomized Controlled Dose-comparison Trial.
	Estimated 160 patient vitamin C late treatment RCT with results not reported over 1 year after estimated completion.	
May 13 2022	Zangeneh et al., Obesity Medicine, doi:10.1016/j.obmed.2022.100420	Survival analysis based on body mass index in patients with Covid-19 admitted to the intensive care unit of Amir Al-Momenin Hospital in Arak – 2021
	4% lower mortality (p=0.86). Retrospective 193 ICU patients in Iran, showing no significant difference with vitamin C treatment.	
Apr 20 2022	Pandya et al., Informatics in Medicine Unlocked, doi:10.1016/j.imu.2022.100951	Unravelling Vitamin B12 as a potential inhibitor against SARS-CoV-2: A computational approach
	In Silico study showing significant interaction with SARS-CoV-2 targets for multiple vitamins.	

Mar 29 2022	Hess et al., Internal and Emergency Medicine, doi:10.1007/ s11739-022-02954-6	High-dose intravenous vitamin C decreases rates of mechanical ventilation and cardiac arrest in severe COVID-19
	20% lower mortality (p=0.54), 40% lower ventilation (p=0.05), and 27% lower ICU admission (p=0.11). Retrospective 100 severe condition hospitalized patients in the USA, 25 treated with high dose IV vitamin C, showing lower mechanical ventilation and cardiac arrest, and increased length of survival with treatment. 3g IV vitamin C every ..	
Mar 19 2022	Coppock et al., Life, doi:10.3390/ life12030453	Pharmacologic Ascorbic Acid as Early Therapy for Hospitalized Patients with COVID-19: A Randomized Clinical Trial
	50% greater improvement (p=0.16) and 22% higher hospital discharge (p=0.07). RCT with 66 very late stage (8 days from symptom onset) hospitalized patients, 44 treated with vitamin C and 22 control patients, showing no significant differences with treatment.	
Mar 11 2022	Salehi et al., Research Square, doi:10.21203/ rs.3.rs-1362678/v1	Risk factors of death in mechanically ventilated COVID-19 patients: a retrospective multi-center study
	10% lower mortality (p=0.56). Retrospective 125 mechanically ventilated ICU patients in Iran, showing no significant difference with vitamin C treatment in unadjusted results.	
Feb 28 2022	Shehab et al., Tropical Journal of Pharmaceutical Research, doi:10.4314/ tjpr.v21i2.13	Immune-boosting effect of natural remedies and supplements on progress of, and recovery from COVID-19 infection
	4% lower severe cases (p=1). Retrospective survey-based analysis of 349 COVID-19 patients, showing no significant difference with vitamin C prophylaxis in unadjusted analysis. REC/UG/2020/03.	

<p>Feb 28 2022</p>	<p>Nimer et al., Bosnian Journal of Basic Medical Sciences, doi:10.17305/ bjbms.2021.7009</p>	<p>The impact of vitamin and mineral supplements usage prior to COVID-19 infection on disease severity and hospitalization</p>
<p>25% lower hospitalization (p=0.08) and 17% lower severe cases (p=0.18). Retrospective 2,148 COVID-19 recovered patients in Jordan, showing lower risk of severity and hospitalization with vitamin C prophylaxis, without statistical significance.</p>		
<p>Feb 26 2022</p>	<p>Hajdrik et al., Foods, doi:10.3390/ foods11050694</p>	<p>In Vitro Determination of Inhibitory Effects of Humic Substances Complexing Zn and Se on SARS-CoV-2 Virus Replication</p>
<p>In Vitro study of a humic substance containing vitamin C, selenium ions, and zinc ions, showing 50% SARS-CoV-2 inhibition at picomolar concentrations.</p>		
<p>Feb 24 2022</p>	<p>Kory et al., Journal of Clinical Medicine Research, doi:10.14740/ jocmr4658</p>	<p>“MATH+” Multi-Modal Hospital Treatment Protocol for COVID-19 Infection: Clinical and Scientific Rationale</p>
<p>Review of the data supporting the MATH+ hospital treatment protocol for COVID-19.</p>		
<p>Feb 11 2022</p>	<p>Gavrielatou et al., Frontiers in Medicine, doi:10.3389/ fmed.2022.814587</p>	<p>Effect of Vitamin C on Clinical Outcomes of Critically Ill Patients With COVID-19: An Observational Study and Subsequent Meta-Analysis</p>
<p>58% lower mortality (p=0.11). Retrospective 113 consecutive mechanically ventilated COVID+ ICU patients in Greece, 10 receiving high dose IV vitamin C, showing lower mortality with treatment, without statistical significance (p=0.11). The associated meta analysis incl..</p>		

Jan 29 2022	Mohajeri et al., Mediterranean Journal of Nutrition and Metabolism, doi:10.3233/ MNM-211521	The difference in the dietary inflammatory index, functional food, and antioxidants intake between COVID -19 patients and healthy persons
	Retrospective dietary survey analysis of 500 COVID-19 patients and 500 healthy matched controls in Iran, showing that COVID-19 patients had lower daily consumption of vitamin C, vitamin D, vitamin E, zinc, and selenium. IR.ARUMS.REC.1400...	
Jan 21 2022	Goc et al., European Journal of Microbiology and Immunology, doi:10.1556/1886.2021. 00022	Inhibitory effects of specific combination of natural compounds against SARS-CoV-2 and its Alpha, Beta, Gamma, Delta, Kappa, and Mu variants
	In Vitro study testing combinations of plant extracts and micronutrients with several variants of SARS-CoV-2. A combination of vitamin C, N-acetylcysteine, curcumin, quercetin, resveratrol, theaflavin, naringenin, baicalin, and broccoli e..	
Jan 15 2022	Yang et al., Am. J. Transl. Res., 14:1	Traditional Chinese medicine together with high-dose vitamin C improves the therapeutic effect of western medicine against COVID-19
	33% faster recovery (p<0.0001) and 36% faster viral clearance (p<0.0001). Prospective study of 60 patients in China with three arms: SOC, SOC+TCM, and SOC+TCM+high dose vitamin C, showing successively faster recovery with the addition of TCM and the addition of high dose vitamin C. TCM included inhaled vitamin ..	
Jan 13 2022	Tu et al., Infectious Diseases & Immunity, doi:10.1097/ ID9.000000000000003 7	Risk Factors for Severity and Mortality in Adult Patients Confirmed with COVID-19 in Sierra Leone: A Retrospective Study
	83% lower mortality (p<0.0001). Retrospective 180 hospitalized COVID-19 patients in Sierra Leone, showing lower mortality with vitamin C treatment in unadjusted results.	

Jan 3 2022	Hemilä et al., Life, doi:10.3390/ life12010062	Bias against Vitamin C in Mainstream Medicine: Examples from Trials of Vitamin C for Infections
	Analysis of bias against vitamin C for infections in major studies and editorials.	
Dec 28 2021	Baguma et al., Research Square, doi:10.21203/ rs.3.rs-1193578/v1	Characteristics of the COVID-19 patients treated at Gulu Regional Referral Hospital, Northern Uganda: A cross-sectional study
	48% higher mortality (p=0.54). Retrospective COVID+ hospitalized patients in Uganda, 385 patients receiving vitamin C treatment, showing higher mortality with treatment, without statistical significance.	
Dec 15 2021	Majidi et al., Frontiers in Immunology, doi:10.3389/ fimmu.2021.717816	The Effect of Vitamin C on Pathological Parameters and Survival Duration of Critically Ill Coronavirus Disease 2019 Patients: A Randomized Clinical Trial
	14% lower mortality (p=0.03). RCT 100 ICU patients in Iran, 31 treated with vitamin C, showing lower mortality with treatment.	
Dec 14 2021	Amssayef et al., Cardiovascular & Hematological Disorders-Drug Targets, doi:10.2174/1871529X2 1666211214153308	Vitamin C inhibits Angiotensin-Converting Enzyme-2 in Isolated Rat Aortic Ring
	Ex Vivo study showing vitamin C inhibiting vascular ACE2.	
Nov 30 2021	Deschasaux-Tanguy et al., BMC Medicine, doi:10.1186/ s12916-021-02168-1	Nutritional risk factors for SARS-CoV-2 infection: a prospective study within the NutriNet-Santé cohort
	Analysis of 7,766 adults in France, showing higher intakes of vitamin C, folate, vitamin K, dietary fibre, and fruit and vegetables associated with lower seropositivity.	

Nov 25 2021	Ried et al., Cureus, doi:10.7759/ cureus.19902	Therapies to Prevent Progression of COVID-19, Including Hydroxychloroquine, Azithromycin, Zinc, and Vitamin D3 With or Without Intravenous Vitamin C: An International, Multicenter, Randomized Trial 31% improved recovery (p=0.008) . RCT 237 patients in Turkey, 162 treated with IV vitamin C in addition to HCQ/AZ/zinc/vitamin D used for all patients, showing significantly faster recovery with the addition of IV vitamin C. 97% of patients were vitamin D deficient, and I..
Nov 14 2021	Beigmohammadi et al., Trials, doi:10.1186/ s13063-021-05795-4	The effect of supplementation with vitamins A, B, C, D, and E on disease severity and inflammatory responses in patients with COVID-19: a randomized clinical trial 89% lower mortality (p=0.11), 41% lower hospitalization (p=0.25), and 45% improved recovery (p=0.001) . Small RCT 60 ICU patients in Iran, 30 treated with vitamins A, B, C, D, and E, showing significant improvement in SOFA score and several inflammatory markers at day 7 with treatment. 5,000 IU vitamin A daily, 600,000 IU vitamin D once, 30..
Nov 8 2021	Tehrani et al., Urology Journal, doi:10.22037/ uj.v18i.6863	An investigation into the Effects of Intravenous Vitamin C on Pulmonary CT Findings and Clinical Outcomes of Patients with COVID 19 Pneumonia A Randomized Clinical Trial 87% lower mortality (p=0.13) and 18% shorter hospitalization (p=0.23) . RCT 54 late stage patients, 18 treated with IV vitamin C (2g every 6h for 5 days), showing significant relative improvements in oxygen saturation and respiratory rate.
Oct 28 2021	Shousha et al., World Journal of Gastroenterology, doi:10.3748/ wjg.v27.i40.6951	Hepatic and gastrointestinal disturbances in Egyptian patients infected with coronavirus disease 2019: A multicentre cohort study 94% lower mortality (p=0.003) . Retrospective 547 hospitalized COVID+ patients in Egypt, showing lower mortality with vitamin C treatment. Treatment was applied according to the official guidelines, indicating that vitamin C was co-administered with HCQ. Actual treatment..

<p>Oct 25 2021</p>	<p>Leal-Martínez et al., International Journal of Environmental Research and Public Health, doi:10.3390/ ijerph19031172 (date from preprint)</p>	<p>Effect of a Nutritional Support System to Increase Survival and Reduce Mortality in Patients with COVID-19 in Stage III and Comorbidities: A Blinded Randomized Controlled Clinical Trial</p> <p>86% lower mortality (p=0.03) and 57% lower ventilation (p=0.31). 80 patient RCT with 40 patients treated with a comprehensive regimen of nutritional support, showing significantly lower mortality with treatment. Treatment contained cholecalciferol, vitamin C, zinc, spirulina maxima, folic acid, glutami..</p>
<p>Sep 27 2021</p>	<p>Simsek et al., Annals of Medical Research, doi:10.5455/ annalsmedres.2020.10. 1043</p>	<p>Effects of high dose vitamin C administration in Covid-19 patients</p> <p>44% lower mortality (p=0.19) and 10% lower ICU admission (p=0.66). Retrospective 139 hospitalized patients in Turkey, 58 treated with high dose vitamin C, showing improved kidney functioning with treatment. Mortality was lower with treatment, but not reaching statistical significance with the small sampl..</p>
<p>Sep 22 2021</p>	<p>Zheng et al., Open Medicine, doi:10.1515/ med-2021-0361</p>	<p>No significant benefit of moderate-dose vitamin C on severe COVID-19 cases</p> <p>157% higher mortality (p=0.33) and 35% worse improvement (p=0.17). Retrospective 397 severe COVID-19 patients in China, showing worse outcomes with vitamin C treatment, without statistical significance. IV vitamin C 2-4g/day. Subject to confounding by indication and immortal time bias. Exclusion criteria..</p>
<p>Sep 7 2021</p>	<p>Xia et al., Aging, doi:10.18632/ aging.203503</p>	<p>High-dose vitamin C ameliorates cardiac injury in COVID-19 pandemic: a retrospective cohort study</p> <p>Retrospective 113 severe and critical patients in China with cardiac injury, 51 treated with high dose vitamin C, showing treatment associated with improvement of myocardial injury.</p>

Sep 1 2021	Sharmin et al., NCT04558424	Randomized, Double -Blind, Placebo Controlled, Trial to Evaluate the Effect of Zinc and Ascorbic Acid Supplementation in COVID-19 Positive Hospitalized Patients in BSMMU
	Estimated 50 patient vitamin C late treatment RCT with results not reported over 2 years after estimated completion.	
Aug 17 2021	Capone et al., Cureus, doi:10.7759/ cureus.9809	Characterization of Critically Ill COVID-19 Patients at a Brooklyn Safety-Net Hospital
	Retrospective 102 ICU patients in the USA, 73 receiving vitamin C and zinc, showing a negative correlation of treatment with mortality, but not reaching statistical significance (p = 0.31).	
Aug 4 2021	Mohseni et al., Nutrition & Food Science, doi:10.1108/ NFS-11-2020-0421	Do body mass index (BMI) and history of nutritional supplementation play a role in the severity of COVID-19? A retrospective study
	44% more cases (p=0.002). Retrospective 603 patients in Iran, 34 taking vitamin C supplements, showing increased risk of COVID-19 cases in unadjusted results. IR.SHOUSHTAR.REC.1399.015.	
Jul 26 2021	Tan et al., QJM, doi:10.1093/qjmed/ hcab184	Efficacy of diammonium glycyrrhizinate combined with vitamin C for treating hospitalized COVID-19 patients: a retrospective, observational stud
	25% lower combined mortality/intubation (p=0.74) and 73% lower progression (p=0.002). PSM retrospective 207 hospitalized patients in China, 46 treated with diammonium glycyrrhizinate and vitamin C, showing lower risk of ARDS with treatment.	
Jul 9 2021	Rabail et al., Food Science & Nutrition, doi:10.1002/fsn3.2458	Nutritional and lifestyle changes required for minimizing the recovery period in home quarantined COVID-19 patients of Punjab, Pakistan
	Survey of 80 recovered COVID-19 patients in Pakistan, showing faster recovery with vitamin C, vitamin D, and zinc supplementation.	

Jul 6 2021	Margolin et al., Journal of Evidence-Based Integrative Medicine, doi:10.1177/2515690X211026193	20-Week Study of Clinical Outcomes of Over-the-Counter COVID-19 Prophylaxis and Treatment
	94% fewer cases (p=0.003). Retrospective 113 outpatients, 53 (patient choice) treated with zinc, quercetin, vitamin C/D/E, l-lysine, and quina, showing lower cases with treatment. Results are subject to selection bias and limited information on the groups is provided.	
Jul 4 2021	Özgünay et al., The European Research Journal, doi:10.18621/eurj.938778	The use of vitamin C in the intensive care unit during the COVID-19 pandemic
	9% lower mortality (p=0.69) and 1% higher ventilation (p=1). Retrospective 160 ICU patients, 32 with raised neutrophil/lymphocyte ratio treated with vitamin C, showing no significant differences.	
Jun 30 2021	Vishnuram et al., Indian Journal of Basic and Applied Medical Research, doi:10.36848/IJBAMR/2020/29215.55599	Role of high dose oral liposomal vitamin C in reducing mortality in patients with COVID-19
	54% lower mortality (p=0.03). Retrospective 8,634 hospitalized patients in India, showing lower mortality with high-dose vitamin C in unadjusted results. No group details are provided, the text and table appear to show different results, and some numbers do not match.	
Jun 8 2021	Li et al., Journal of Pharmacy Practice, doi:10.1177/08971900211015052	Use of Intravenous Vitamin C in Critically Ill Patients With COVID-19 Infection
	11% higher mortality (p=1). PSM retrospective 8 ICU patients treated with vitamin C and 24 matched controls, showing no significant difference. Authors note that "it is possible for the delayed timing of IV vitamin C to have blunted the beneficial effects as th..	

Jun 1 2021	May et al., British Journal of Pharmacology, doi:10.1111/bph.15579	Therapeutic potential of megadose vitamin C to reverse organ dysfunction in sepsis and COVID-19
	Review of data supporting the use of megadose vitamin C as a treatment for sepsis and COVID-19.	
May 26 2021	Pourhoseingholi et al., Research Square, doi:10.21203/ rs.3.rs-365321/v2	Case Characteristics, Clinical Data, And Outcomes of Hospitalized COVID-19 Patients In Qom Province, Iran: A Prospective Cohort Study
	13% lower mortality (p=0.38). Prospective study of 2,468 hospitalized COVID-19 patients in Iran, showing no significant difference with vitamin C treatment. IR.MUQ.REC.1399.013.	
May 11 2021	Aldwihi et al., International Journal of Environmental Research and Public Health, doi:10.3390/ ijerph18105086	Patients' Behavior Regarding Dietary or Herbal Supplements before and during COVID-19 in Saudi Arabia
	36% lower hospitalization (p=0.006). Retrospective survey-based analysis of 738 COVID-19 patients in Saudi Arabia, showing lower hospitalization with vitamin C, turmeric, zinc, and nigella sativa, and higher hospitalization with vitamin D. For vitamin D, most patients contin..	
May 11 2021	Suna et al., Med. Clin. (Barc.), doi:10.1016/ j.medcli.2021.04.010	Effect of high-dose intravenous vitamin C on prognosis in patients with SARS- CoV-2 pneumonia
	21% lower mortality (p=0.52) and 2% higher ICU admission (p=1). Retrospective 323 hospitalized patients, 153 treated with vitamin C, showing no significant differences. Patients in each group were in different time periods, with the vitamin C group first. Time based confounding is possible due to impr..	
May 3	Malla et al., bioRxiv, doi:10.1101/2021.05.02 .442358	Vitamin C inhibits SARS coronavirus-2 main protease essential for viral replication

2021		In Silico and In Vitro study showing that vitamin C inhibits SARS-CoV-2 3CLpro. Authors note that the different clinical results may be explained in part by the widely varying dosages used, and they conclude that vitamin C and/or derivati..
Apr 30 2021	Elhadi et al., PLOS ONE, doi:10.1371/journal.pone.0251085	Epidemiology, outcomes, and utilization of intensive care unit resources for critically ill COVID-19 patients in Libya: A prospective multi-center cohort study
		12% higher mortality (p=0.15). Prospective study of 465 COVID-19 ICU patients in Libya showing no significant differences with treatment.
Apr 22 2021	Zhao et al., Frontiers in Pharmacology, doi:10.3389/fphar.2021.638556	High Dose Intravenous Vitamin C for Preventing The Disease Aggravation of Moderate COVID-19 Pneumonia. A Retrospective Propensity Matched Before-After Study
		72% lower progression (p=0.03) and 8% slower viral clearance (p=0.79). PSM retrospective 110 patients, 55 treated with high-dose IV vitamin C, showing lower progression to severe disease with treatment. Patients in each group were in different time periods, time based confounding is likely due to SOC improvi..
Apr 14 2021	Hakamifard et al., Immunopathologia Persa, doi:10.34172/ipp.2021.xx	The effect of vitamin E and vitamin C in patients with COVID-19 pneumonia; a randomized controlled clinical trial
		46% lower ICU admission (p=0.46) and 1% shorter hospitalization (p=0.82). RCT with 38 patients treated with vitamin C and vitamin E, and 34 control patients, showing lower ICU admission with treatment, but not statistically significant.
Apr 8 2021	Abdulateef et al., Open Medicine, doi:10.1515/med-2021-0273	COVID-19 severity in relation to sociodemographics and vitamin D use
		19% lower hospitalization (p=0.69). Survey of 428 recovered COVID-19 patients in Iraq, showing fewer hospital visits for patients on prophylactic vitamin C or D. Hospitalization was lower for those on vitamin C, D, or zinc, without statistical significance.

Apr 8 2021	Gadhiya et al., BMJ Open, doi:10.1136/ bmjopen-2020-042549	Clinical characteristics of hospitalised patients with COVID-19 and the impact on mortality: a single-network, retrospective cohort study from Pennsylvania state
	1% higher mortality (p=0.99). Retrospective 283 patients in the USA showing higher mortality with all treatments (not statistically significant). Confounding by indication is likely. In the supplementary appendix, authors note that the treatments were usually given fo..	
Apr 7 2021	Mulhem et al., BMJ Open, doi:10.1136/ bmjopen-2020-042042	3219 hospitalised patients with COVID-19 in Southeast Michigan: a retrospective case cohort study
	32% higher mortality (p=0.01). Retrospective database analysis of 3,219 hospitalized patients in the USA. Very different results in the time period analysis (Table S2), and results significantly different to other studies for the same medications (e.g., heparin OR 3.06..	
Apr 2 2021	Al Sulaiman et al., Research Square, doi:10.21203/ rs.3.rs-354711/v1	Ascorbic Acid as an Adjunctive Therapy in Critically Ill Patients with COVID-19: A Multicenter Propensity Score Matched Study
	15% lower mortality (p=0.27). Retrospective 158 critically ill patients receiving vitamin C and propensity matched controls, showing mortality OR 0.77 [0.48-1.23], and statistically significantly lower thrombosis, OR 0.42 [0.18-0.94]. 1000mg of vitamin C was given dai..	
Mar 30 2021	Holt et al., Thorax, doi:10.1136/ thoraxjnl-2021-217487	Risk factors for developing COVID-19: a population-based longitudinal study (COVIDENCE UK)
	3% more cases (p=0.86). Prospective survey-based study with 15,227 people in the UK, showing lower risk of COVID-19 cases with vitamin A, vitamin D, zinc, selenium, probiotics, and inhaled corticosteroids; and higher risk with metformin and vitamin C. Statistica..	

Mar 8 2021	Hamidi-Alamdari et al., Clinical and Translational Investigation, doi:10.24875/ RIC.21000028	Methylene blue for treatment of hospitalized COVID-19 patients: a randomized, controlled, open-label clinical trial, phase 2
	44% lower mortality (p=0.38) and 38% shorter hospitalization (p=0.004). RCT 80 hospitalized patients with severe COVID-19, 40 treated with methylene blue + vitamin C + N-acetylcysteine, showing lower mortality, shorter hospitalization, and significantly improved SpO2 and respiratory distress with treatment.	
Mar 2 2021	Hemilä et al., Research Square, doi:10.21203/ rs.3.rs-289381/v1	Vitamin C may increase the recovery rate of outpatient cases of SARS-CoV-2 infection by 70%: reanalysis of the COVID A to Z Randomized Clinical Trial
	Reanalysis of Thomas et al. showing that vitamin C increased the recovery rate by 70%, p = 0.025.	
Feb 28 2021	Bejan et al., Clinical Pharmacology & Therapeutics, doi:10.1002/cpt.2376 (date from preprint)	DrugWAS: Drug-wide Association Studies for COVID-19 Drug Repurposing
	34% lower mortality (p=0.33), 25% lower ventilation (p=0.47), 15% lower ICU admission (p=0.65), and no change in hospitalization (p=1). Retrospective 9,748 COVID-19 patients in the USA showing lower risk of mortality, ventilation, and ICU admission with vitamin C prophylaxis, without statistical significance.	
Feb 26 2021	Gao et al., Aging, doi:10.18632/ aging.202557	The efficiency and safety of high-dose vitamin C in patients with COVID-19: a retrospective cohort study
	86% lower mortality (p=0.04). Retrospective 76 COVID-19 patients, 46 treated with intravenous high-dose vitamin C, showing lower mortality and improved oxygen requirements with treatment. Dosage was 6g intravenous infusion per 12hr on the first day, and 6g once for th..	
Feb 15 2021	Mahto et al., American Journal of Blood Research, 11:1	Seroprevalence of IgG against SARS-CoV-2 and its determinants among healthcare workers of a COVID-19 dedicated hospital of India

		<p>26% higher IgG positivity (p=0.49). Retrospective 689 healthcare workers in India, showing no significant difference in IgG positivity with vitamin C prophylaxis.</p>
Feb 12 2021	<p>Thomas et al., JAMA Network Open, doi:10.1001/jamanetworkopen.2021.0369</p>	<p>Effect of High-Dose Zinc and Ascorbic Acid Supplementation vs Usual Care on Symptom Length and Reduction Among Ambulatory Patients With SARS-CoV-2 Infection: The COVID A to Z Randomized Clinical Trial</p>
		<p>18% faster recovery (p=0.15). Small 214 low-risk outpatient RCT showing non-statistically significant faster recovery with zinc and with vitamin C. A secondary analysis concludes that vitamin C increases recovery rate by 71% (p = 0.036) [pubpeer.com]. See also..</p>
Feb 9 2021	<p>Hancock et al., SSRN, doi:10.2139/ssrn.3779211</p>	<p>Case Cluster of RT-PCR COVID-19 Positive Patients with an Unexpected Benign Clinical Course With Vitamin D, Melatonin, Vitamin C, and Viscum Album</p>
		<p>Case series of 24 COVID-19 patients (12 confirmed PCR+) treated with vitamin D, vitamin C, and melatonin, showing positive outcomes with no patient having worse than a mild case, including 7 high risk patients.</p>
Feb 1 2021	<p>Muhammad et al., SAGE Open Medicine, doi:10.1177/2050312121991246</p>	<p>Deficiency of antioxidants and increased oxidative stress in COVID-19 patients: A cross-sectional comparative study in Jigawa, Northwestern Nigeria</p>
		<p>Case control study with 50 symptomatic COVID-19 patients and 21 healthy controls in Nigeria, showing that COVID-19 patients had significantly lower levels of selenium and zinc, and vitamins A, C, and E. Control patients were younger than ..</p>
Feb 1 2021	<p>Zhao et al., Ann. Palliat. Med., doi:10.21037/apm-20-1387</p>	<p>Beneficial aspects of high dose intravenous vitamin C on patients with COVID-19 pneumonia in severe condition: a retrospective case series study</p>
		<p>Retrospective case study of 12 severe/critical COVID-19 patients finding that high dose IV vitamin C improved inflammatory response, immune and organ function. There was no control group.</p>

Jan 31 2021	He et al., NCT04664010	Efficacy and Safety of High-dose Vitamin C Combined With Traditional Chinese Medicine in the Treatment of Moderate and Severe Coronavirus Pneumonia (COVID-19)
	60 patient vitamin C late treatment RCT with results not reported over 2.5 years after completion.	
Jan 27 2021	Xing et al., Journal of Pharmaceutical and Biomedical Analysis, doi:10.1016/j.jpba.2021.113927	Vitamin C supplementation is necessary for patients with coronavirus disease: An ultra-high-performance liquid chromatography-tandem mass spectrometry finding
	Prospective study with 31 COVID-19 patients and 60 controls reporting on a new method to assess plasma vitamin C concentrations. Vitamin C was deficient ($11.4\mu\text{mol/l}$ vs. $52\mu\text{mol/l}$ for healthy controls), and returned to a normal range ($76\mu\text{mo..}$	
Jan 18 2021	Hemilä et al., Frontiers in Medicine, doi:10.3389/fmed.2020.559811	Vitamin C and COVID-19
	Review of the use of vitamin C for infections and the potential benefit for COVID-19.	
Jan 9 2021	JamaliMoghadamSiahk ali et al., Research Square, doi:10.21203/rs.3.rs-139942/v1	Safety and Effectiveness of High-Dose Vitamin C in Patients with COVID-19; A Randomized Controlled open-label Clinical Trial
	25% higher ventilation (p=1) and 31% longer hospitalization (p=0.03). Small late stage RCT for the addition of vitamin C to HCQ and lopinavir/ritonavir, with 30 treatment and 30 control patients, finding a significant reduction in temperature and a significant improvement in oxygenation after 3 days in the ..	
Dec 23 2020	Su et al., BioScience Trends, doi:10.5582/bst.2020.03340	Efficacy of early hydroxychloroquine treatment in preventing COVID-19 pneumonia aggravation, the experience from Shanghai, China
	135% higher progression (p=0.18) and 34% slower improvement (p=0.04). Retrospective 616 patients in China showing increased risk of disease progression for vitamin C treatment within five days.	

Dec 16 2020	Jang et al., Heart & Lung, doi:10.1016/j.hrtlng.2020.10.010	Clinical course of COVID-19 patients treated with ECMO: A multicenter study in Daegu, South Korea
	51% improved recovery (p=0.15). Retrospective 19 COVID-19 ECMO patients in South Korea, showing a higher rate of weaning from ECMO with vitamin C treatment, without statistical significance. Authors perform multivariate analysis but do not provide full results, only rep..	
Dec 15 2020	Darban et al., Journal of Cellular & Molecular Anesthesia, doi:10.22037/jcma.v6i2.32182	Efficacy of High Dose Vitamin C, Melatonin and Zinc in Iranian Patients with Acute Respiratory Syndrome due to Coronavirus Infection: A Pilot Randomized Trial
	33% lower progression (p=1) and 6% shorter ICU admission (p=0.3). Small RCT in Iran with 20 ICU patients, 10 treated with high-dose vitamin C, melatonin, and zinc, not showing significant differences.	
Dec 10 2020	Rosenthal et al., JAMA Network Open, doi:10.1001/jamanetworkopen.2020.29058	Risk Factors Associated With In-Hospital Mortality in a US National Sample of Patients With COVID-19
	11% lower mortality (p=0.005). Retrospective database analysis of 64,781 hospitalized patients in the USA, showing lower mortality with vitamin C or vitamin D (authors do not distinguish between the two), and higher mortality with zinc and HCQ, statistically significant..	
Dec 7 2020	Holford et al., Nutrients, doi:10.3390/nu12123760	Vitamin C—An Adjunctive Therapy for Respiratory Infection, Sepsis and COVID-19
	Review of vitamin C use for respiratory infections including COVID-19 and the mechanisms of action. Authors note that evidence to date indicates oral vitamin C (2–8 g/day) may reduce the incidence and duration of respiratory infections, a..	

Nov 30 2020	Kumari et al., Cureus 12(11): e11779, doi:10.7759/ cureus.11779	The Role of Vitamin C as Adjuvant Therapy in COVID-19
	36% lower mortality (p=0.45), 20% lower ventilation (p=0.67), 26% faster recovery (p=0.0001), and 24% shorter hospitalization (p=0.0001). RCT 150 hospitalized patients in Pakistan showing 26% faster recovery, p < 0.0001. 36% lower mortality, not statistically significant due to the small number of events. Dosage was 50 mg/kg/day of intravenous vitamin C.	
Nov 30 2020	Louca et al., BMJ Nutrition, Prevention & Health, doi:10.1136/ bmjnph-2021-000250 (date from preprint)	Modest effects of dietary supplements during the COVID-19 pandemic: insights from 445 850 users of the COVID-19 Symptom Study app
	no change in cases (p=1). Survey analysis of dietary supplements showing no significant difference in PCR+ cases with vitamin C usage in the UK, however significant reductions were found in the US and Sweden. These results are for PCR+ cases only, they do not refl..	
Nov 3 2020	Behera et al., PLoS ONE, doi:10.1371/ journal.pone.0247163 (date from preprint)	Role of ivermectin in the prevention of SARS-CoV-2 infection among healthcare workers in India: A matched case-control study
	18% fewer cases (p=0.58). Retrospective matched case-control prophylaxis study for HCQ, ivermectin, and vitamin C with 372 healthcare workers, showing lower COVID-19 incidence for all treatments, with statistical significance reached for ivermectin. HCQ OR 0.56, p..	
Oct 1 2020	Patel et al., Chest Infections, doi:10.1016/ j.chest.2020.08.322	The significance of oral ascorbic acid in patients with COVID-19
	29% lower mortality (p=0.18). Retrospective 176 hospitalized patients, 96 treated with oral vitamin C (from 500mg to 1500mg daily), showing lower mortality with treatment.	

Sep 20 2020	Yüksel et al., Intensive Care Medicine Experimental, 9:S1, 001458, doi:10.1186/ s40635-021-00413-8	Effects of high dose vitamin c on patient outcomes in ARDS patients admitted to intensive care with COVID-19; multi-center retrospective study
	19% lower mortality (p=0.04). PSM retrospective 86 ICU patients on mechanical ventilation in Turkey, showing lower mortality with high dose vitamin C treatment (≥200mg/kg for 4 days).	
Sep 8 2020	Arvinte et al., Med. Drug Discov, doi:10.1016/ j.medidd.2020.100064	Serum Levels of Vitamin C and Vitamin D in a Cohort of Critically Ill COVID-19 Patients of a North American Community Hospital Intensive Care Unit in May 2020: A Pilot Study
	Pilot study with 21 ICU patients finding low serum levels of vitamin C and vitamin D in most patients. Older age and low vitamin C level appeared to be co-dependent risk factors for mortality.	
Sep 8 2020	Galmés et al., Nutrients, doi:10.3390/ nu12092738	Current State of Evidence: Influence of Nutritional and Nutrigenetic Factors on Immunity in the COVID-19 Pandemic Framework
	Ecological study of European countries analyzing 10 vitamins and minerals endorsed by the European Food Safety Authority as having sufficient evidence for a causal relationship between intake and optimal immune system function: vitamins D..	
Aug 26 2020	Chiscano-Camón et al., Critical Care, doi:10.1186/ s13054-020-03249-y	Vitamin C levels in patients with SARS-CoV-2-associated acute respiratory distress syndrome
	Small study of 18 COVID-19 ARDS patients showing that vitamin C levels were very low - 17 patients had undetectable levels and one had a low level (2.4 mg/L).	
Aug 10 2020	Zhang et al., Annals of Intensive Care, doi:10.1186/ s13613-020-00792-3	Pilot Trial of High-dose vitamin C in critically ill COVID-19 patients (preprint 8/10/2020)

	<p>50% lower mortality (p=0.2). Small RCT for high dose vitamin C for ICU patients showing reduced (but not statistically significant) mortality. Dosage was 12g of vitamin C/50ml every 12 hours for 7 days at a rate of 12ml/hour.</p>	
<p>Aug 1 2020</p>	<p>Hiedra et al., Expert Review of Anti-infective Therapy, doi:10.1080/14787210.2020.1794819</p>	<p>The use of IV vitamin C for patients with COVID-19: a case series</p> <p>Case study of 17 patients receiving IV vitamin C for COVID-19, finding a significant decrease in inflammatory markers, including ferritin and D-dimer, and a trend to decreasing FiO2 requirements, after vitamin C administration. There was ..</p>
<p>Jul 25 2020</p>	<p>Feyaerts et al., Nutrition, doi:10.1016/j.nut.2020.110948</p>	<p>Vitamin C as prophylaxis and adjunctive medical treatment for COVID-19?</p> <p>Review concluding that there is clear evidence that vitamin C in high doses can reduce interleukin-6 and endothelin-1 mediators. Authors suggest a relatively low dose as prophylaxis, and in cases of severe COVID-19, an (intravenous) high-..</p>
<p>Jul 20 2020</p>	<p>Krishnan et al., J Clin Anesth., doi:10.1016/j.jclinane.2020.110005</p>	<p>Clinical comorbidities, characteristics, and outcomes of mechanically ventilated patients in the State of Michigan with SARS-CoV-2 pneumonia</p> <p>31% lower mortality (p=0.04). Retrospective 152 mechanically ventilated patients in the USA showing unadjusted lower mortality with vitamin C, vitamin D, HCQ, and zinc treatment, statistically significant only for vitamin C.</p>
<p>Jun 19 2020</p>	<p>Biancatelli et al., Frontiers in Immunology, doi:10.3389/fimmu.2020.01451</p>	<p>Quercetin and Vitamin C: An Experimental, Synergistic Therapy for the Prevention and Treatment of SARS-CoV-2 Related Disease (COVID-19)</p> <p>Review of the evidence for the use of vitamin C and quercetin both for prophylaxis in high-risk populations and for the treatment of COVID-19 patients.</p>

<p>May 27 2020</p>	<p>Kumar et al., VirusDisease, doi:10.1007/ s13337-020-00643-6 (date from preprint)</p>	<p>In silico virtual screening-based study of nutraceuticals predicts the therapeutic potentials of folic acid and its derivatives against COVID-19</p>
<p>In Silico analysis finding that magnesium ascorbate, a form of Vitamin C, was found to be the top compound among 106 nutraceuticals for binding to Mpro of SARS-CoV-2.</p>		
<p>Jul 31 1993</p>	<p>Vojdani et al., Nutrition Research, doi:10.1016/ S0271-5317(05)80799- 7</p>	<p>In vivo effect of ascorbic acid on enhancement of human natural killer cell activity</p>
<p>Analysis of 20 healthy subjects in the USA showing that vitamin C increases natural killer (NK) cell activity. showed that a lower frequency of natural killer cells was associated with symptomatic COVID-19 infection.</p>		

Peer-reviewed and other studies on Vitamin D3

Chart courtesy c19early.org/d. For more charts, full analysis and more information, visit their website.

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Oct 2	Covid Analysis	Vitamin D for COVID-19: real-time meta analysis of 302 studies (116 treatment studies and 186 sufficiency studies)
	116 treatment studies show statistically significant lower risk for mortality, ICU admission, hospitalization, and cases. 58 studies from 54 independent teams in 20 countries show statistically significant lower risk. • Random effects m..	
Sep 22	Seely et al., BMJ Open, doi:10.1136/bmjopen-2023-073761	Dietary supplements to reduce symptom severity and duration in people with SARS-CoV-2: a double-blind randomised controlled trial
	14% improved recovery (p=0.41). Early terminated low-risk population (no hospitalization) very late treatment (mean 8 days) RCT with 44 patients treated with vitamin C, D, K, and zinc, and 46 control patients, showing no significant differences. Authors acknowledge that..	
Sep 13	Qiu et al., Virology Journal, doi:10.1186/s12985-023-02165-1	Vitamin D status in hospitalized COVID-19 patients is associated with disease severity and IL-5 production
	Retrospective 399 hospitalized patients in China, showing that lower vitamin D levels and higher IL-5 levels were independent risk factors for COVID-19 severity.	
Sep 1	Konikowska et al., Frontiers in Immunology, doi:10.3389/fimmu.2023.1231813	Association of serum vitamin D concentration with the final course of hospitalization in patients with COVID-19
	Retrospective 474 hospitalized COVID-19 patients in Poland, showing lower vitamin D levels associated with mortality.	

Sep 1	Ogasawara et al., Clinical Nutrition, doi:10.1016/j.clnu.2023.08.021	The effect of 1-hydroxy-vitamin D treatment in hospitalized patients with COVID-19: A retrospective study
78% lower progression (p=0.05) and 75% lower need for oxygen therapy (p=0.09). PSM retrospective 312 hospitalized patients in Japan, showing lower progression with vitamin D (alfacalcidol) treatment, statistically significant via KM log-rank.		
Aug 25	Mbata et al., Journal of Clinical Medicine, doi:10.3390/jcm12175520	Is Serum 25-Hydroxyvitamin D Level Associated with Severity of COVID-19? A Retrospective Study
Retrospective 763 hospitalized COVID-19 patients showing no significant difference in outcomes based on serum levels. Unadjusted results show non-significantly lower risk of critical severity, death, and complications with vitamin D suffi..		
Aug 24	Bogomaz et al., Canadian Journal of Respiratory Therapy, doi:10.29390/001c.87408	Vitamin D as a predictor of negative outcomes in hospitalized COVID-19 patients: An observational study
70% lower mortality (p=0.24), 75% lower ventilation (p=0.23), 62% lower progression (p=0.3), and 27% lower need for oxygen therapy (p=0.24). Retrospective 70 hospitalized COVID-19 patients in Iran, showing higher mortality, ventilation, and need for respiratory support with low vitamin D levels, all without statistical significance. Adjusted results are provided only for respi..		
Aug 14	Al Sulaiman et al., Frontiers in Medicine, doi:10.3389/fmed.2023.1237903	Survival implications vs. complications: unraveling the impact of vitamin D adjunctive use in critically ill patients with COVID-19—A multicenter cohort study
22% higher mortality (p=0.25), 27% higher ventilation (p=0.05), 17% higher ICU admission (p=0.07), and no change in hospitalization (p=1). Retrospective 1,435 ICU patients in Saudi Arabia, showing no significant difference in mortality, and longer mechanical ventilation with treatment. Vitamin D patients had higher Q1, median, and Q3 SOFA scores after propensity score matchi..		

Aug 11	Sposito et al., Mucosal Immunology, doi:10.1016/j.mucimm.2023.08.002	Age differential CD13 and interferon expression in airway epithelia affect SARS-CoV-2 infection - effects of vitamin D
	In Vitro study showing that vitamin D reduced SARS-CoV-2 replication in adult nasal epithelial cells via increased type I interferon expression. Administration of vitamin D by systemic supplementation or direct nasal delivery may be benef..	
Aug 9	Abdulameer et al., Cellular and Molecular Biology, doi:10.14715/cmb/2023.69.5.5	The vitamin D binding protein gene polymorphism association with Covid-19-infected Iraqi patients
	Case control study of 150 COVID-19 patients and 150 healthy controls showing that COVID-19 patients had significantly lower vitamin D levels, and that the DBP gene polymorphism rs12785878 TG genotype was associated with higher risk of COV..	
Aug 9	Gotelli et al., Neuroimmunomodulation, doi:10.1159/000533286	Understanding the immune-endocrine effects of vitamin D in SARS-CoV-2 infection: a role in protecting against neurodamage?
	Review of the potential benefits of vitamin D for COVID-19 in relation to neuroprotection. Authors note that neurological symptoms are common in COVID-19, likely related to disruption of the blood-brain barrier, inflammation, and immunoth..	
Aug 8	Mayurathan et al., Asian Journal of Internal Medicine, 2:2	Association of vitamin D levels with severity and outcome of COVID-19 infection among inward patients at a tertiary care unit in Sri Lanka
	98% higher mortality (p=0.69) and 67% higher severe cases (p=0.32). Retrospective 141 hospitalized patients in Sri Lanka, showing lower mortality and severity with vitamin D deficiency, without statistical significance. Authors state that "studies regarding the correlation between vitamin D and CO..	
Aug 3	Aci et al., Nucleosides, Nucleotides & Nucleic Acids, doi:10.1080/15257770.2023.2253281	Effect of vitamin D receptor gene BsmI polymorphism on hospitalization of SARS-CoV-2 positive patients

	<p>Analysis of 80 COVID-19 hospitalized patients and 110 healthy controls, showing lower vitamin D levels in COVID-19 patients. The vitamin D receptor gene BsmI b allele and bb genotype were associated with hospitalization. Authors note this..</p>	
Jul 30	<p>Mingiano et al., Nutrients, doi:10.3390/nu15153392</p>	<p>Vitamin D Deficiency in COVID-19 Patients and Role of Calcifediol Supplementation</p>
	<p>39% lower mortality (p=0.04), 23% lower need for oxygen therapy (p=0.22), and 35% shorter hospitalization (p=0.01). Retrospective 288 hospitalized COVID-19 patients in Italy, showing lower mortality and shorter hospitalization with calcifediol. Results may underestimate the benefits because only higher risk patients with vitamin D deficiency received..</p>	
Jul 26	<p>Umay et al., Journal of Contemporary Medicine, doi:10.16899/jcm.1319088</p>	<p>Comparison of Length of Hospital Stay and Routine Laboratory Parameters in Covid-19 Patients With and Without Serum Vitamin D Deficiency</p>
	<p>13% shorter hospitalization (p=0.33). Retrospective 413 hospitalized COVID-19 patients in Turkey showing vitamin D deficiency associated with higher CRP, fibrinogen, neutrophils, and hematocrit. There was no significant difference for length of stay.</p>	
Jul 26	<p>Ramírez-Stieben et al., Gaceta Médica de México, doi:10.24875/gmm.m23000770</p>	<p>25(OH)D levels during the COVID-19 pandemic: impact of lockdown and ultraviolet radiation</p>
	<p>Analysis of the impact of COVID-19 lockdown policies on vitamin D levels in Argentina. Vitamin D levels were lower in 2020 compared to 2019, especially during the first wave of COVID-19 from September-November 2020. Levels decreased after..</p>	
Jul 25	<p>Moghaddam et al., Journal of Health, Population and Nutrition, doi:10.1186/s41043-023-00409-y</p>	<p>High-dose vitamin D supplementation is related to an improvement in serum alkaline phosphatase in COVID-19 patients; a randomized double-blinded clinical trial</p>

		RCT 140 hospitalized patients in Iran, showing patients treated with high dose vitamin D had a significant decrease in serum alkaline phosphatase compared to the control group receiving lower dose vitamin D. No significant differences wer..
Jul 17	Shamsi et al., Canadian Journal of Infectious Diseases and Medical Microbiology, doi:10.1155/2023/5205188	Survival and Mortality in Hospitalized Children with COVID-19: A Referral Center Experience in Yazd, Iran
		58% lower mortality (p=0.7). Retrospective 183 hospitalized pediatric COVID-19 patients in Iran, showing no significant difference in mortality with in unadjusted results.
Jul 15	Graydon et al., Current Research in Immunology, doi:10.1016/j.crimmu.2023.100064	High baseline frequencies of natural killer cells are associated with asymptomatic SARS-CoV-2 infection
		Analysis of 88 COVID+ patients in the USA showing that a higher frequency of natural killer (NK) cells was associated with asymptomatic infection. Improved NK cell numbers and functioning has been shown for exercise [Oh], better sleep [lr..
Jul 11	Arayafar et al., Annals of Medicine & Surgery, doi:10.1097/MS9.0000000000000955	Vitamin D status and blood group among severe COVID19 patients
		Retrospective 305 COVID-19 ICU patients in Iran, showing vitamin D deficiency associated with mortality.
...	Partap et al., Current Developments in Nutrition, doi:10.1016/j.cdnut.2023.101971	Vitamin D and zinc supplementation to improve treatment outcomes among COVID-19 patients in India: results from a double-blind randomized placebo-controlled trial

JUL 11	<p>3% higher ventilation (p=0.91), 14% higher hospital discharge (p=0.53), and 11% improved recovery (p=0.65).</p> <p>Early terminated factorial RCT with 46 vitamin D, 48 zinc, 44 vitamin D + zinc, and 43 placebo patients in India. The most serious outcome (ventilation) numbers do not seem realistic. Authors do not specify outcomes per group, but with on..</p>	
Jul 6	<p>Aghajani et al., Frontiers in Nutrition, doi:10.3389/fnut.2023.1174113</p>	<p>Association between dietary antioxidant quality score and severity of coronavirus infection: a case-control study</p>
<p>Case control study of 295 COVID-19 patients in Iran, showing lower risk of severe cases with higher dietary antioxidant quality scores, and with higher intake of vitamin D.</p>		
Jun 30	<p>Saha et al., Exploratory Animal and Medical Research, doi:10.52635/eamr/13.1.16-21</p>	<p>Vitamin D status in Covid-19 patients admitted to the critical care unit of an Eastern India hospital</p>
<p>Analysis of 97 COVID-19 CCU patients in India. Patients with severe COVID-19 had significantly lower vitamin D levels compared to those with moderate COVID-19. There was a significant correlation between lower vitamin D levels and more se..</p>		
Jun 30	<p>Sanecka et al., Nutrients, doi:10.3390/nu15132976</p>	<p>Hospital Outcomes in Patients Hospitalized for COVID-19 Pneumonia: The Effect of SARS-CoV-2 Vaccination and Vitamin D Status</p>
<p>Prospective study of 171 hospitalized COVID-19 patients in Ireland, showing significantly lower mortality and ICU admission with sufficient vitamin D levels among unvaccinated patients. There were no significant differences for vaccinated..</p>		
Jun 22	<p>Cao et al., Frontiers in Nutrition, doi:10.3389/fnut.2023.1132528</p>	<p>The effects of vitamin D on all-cause mortality in different diseases: an evidence-map and umbrella review of 116 randomized controlled trials</p>
<p>Meta analysis showing significantly lower mortality for COVID-19 patients with vitamin D treatment, however it's not clear why Annweiler et al. is considered an RCT here, or why most of the COVID-19 vitamin D RCTs are not included.</p>		

Jun 20	Mahjoub et al., Explore, doi:10.1016/ j.explore.2023.06.009	Melatonin, vitamins and minerals supplements for the treatment of Covid-19 and Covid-like illness: a prospective, randomized, double-blind multicenter study.
	67% improved recovery (p=0.32). RCT 164 low-risk (no hospitalizations) patients in Tunisia, showing improved recovery with zinc, melatonin, and vitamins A-E. This study includes COVID-19 and COVID-like illness, with 49% of 128 patients receiving a PCR test being COVID-1..	
Jun 15	Frish et al., Journal of Clinical Medicine, doi:10.3390/jcm12124054	The Association of Weight Reduction and Other Variables after Bariatric Surgery with the Likelihood of SARS-CoV-2 Infection
	35% fewer cases (p=0.001). Retrospective 3,038 bariatric surgery patients in Israel, showing higher risk of SARS-CoV-2 infection with vitamin D deficiency, and lower risk with physical activity.	
Jun 15	Manojlovic et al., European Review for Medical and Pharmacological Sciences, doi:10.26355/ eurrev_202306_32651	Association between vitamin D hypovitaminosis and severe forms of COVID-19
	90% lower mortality (p=0.009). Retrospective 74 COVID-19 patients in Serbia, showing higher mortality with severe vitamin D deficiency in unadjusted results. Patients with severe deficiency were older (63.7 vs. 52.8).	
Jun 14	Orellana-Manzano et al., Frontiers in Pharmacology, doi:10.3389/ fphar.2023.1197973	A report on SARS-CoV-2 first wave in Ecuador: drug consumption dynamics
	Retrospective 10,175 people PCR tested in Ecuador, showing lower risk of PCR+ with multivitamin use and suggesting higher risk with acetaminophen use. The study analyzed drug consumption for COVID-19 symptoms during the 14 days before the..	
	Jalavu et al., IJID Regions, doi:10.1016/ j.ijregi.2023.05.007	An investigation of the correlation of vitamin D status and management outcomes in patients with severe COVID-19 at a South African tertiary hospital

Jun 1	<p>1% lower mortality (p=0.97). Prospective analysis of 68 COVID-19 ICU patients in South Africa, showing a high prevalence of vitamin D deficiency/insufficiency. There was no significant difference in mortality based on vitamin D sufficiency, however this result does n..</p>	
Jun 1	Wani et al., Intervirology, doi:10.1159/000530906	Impact of Age and Clinico-Biochemical Parameters on Clinical severity of SARS-CoV-2 Infection
	<p>72% lower severe cases (p=0.007). Retrospective 236 COVID-19 patients in India, showing higher risk of severe cases with vitamin D deficiency.</p>	
May 31	Jain et al., Journal of Cardiovascular Disease Research, doi:10.31838/jcdr.2023.14.05.215	Demographical Profile and Clinical Outcomes of Covid-19 Patients at a Tertiary Care Centre
	<p>Retrospective 100 COVID-19 patients in India, showing higher vitamin D levels associated with survival and lower severity in unadjusted results.</p>	
May 29	Saeed et al., University of Thi-Qar Journal of Medicine, 25:1	Vitamin D Deficiency and Clinical Outcomes in Patients with COVID-19
	<p>Analysis of 59 COVID-19 patients and 25 healthy controls in Iraq, showing lower vitamin D levels in COVID-19 patients.</p>	
May 25	Ducharme et al., BMJ Open, doi:10.1136/bmjopen-2022-064058	Prevention of COVID-19 with oral vitamin D supplemental therapy in essential healthcare teams (PROTECT): protocol for a multicentre, triple-blind, randomised, placebo-controlled trial
	<p>Report on the PROTECT vitamin D prophylaxis trial for healthcare workers, terminated after 34 patients and providing no results. Authors indicate the trial was terminated for low enrollment due to high use of vitamin D and a high concurrence..</p>	
May	Chen et al., Nutrition, doi:10.1016/j.nut.2023.112087	Early oral nutritional supplement improves COVID-19 outcomes among hospitalized older patients during the omicron wave

21	PSM retrospective 1,181 COVID-19 patients ≥60 years old in China, showing significantly lower mortality with a nutritional supplement. Hospitalization time and viral clearance time was improved with earlier initiation of treatment. The su..	
May 12	Pop-Kostova et al., Medical Journal MEDICUS, 28:1	Vitamin D status in patients with COVID-19 – sex differences associated with severity of the disease
	Retrospective 115 COVID-19 patients in North Macedonia, showing lower vitamin D levels associated with hospitalization.	
May 12	Repas et al., The Journal of Steroid Biochemistry and Molecular Biology, doi:10.1016/ j.jsbmb.2023.106329	Normal 24-hour Urine Calcium Concentrations after Long-term Daily Oral Intake of Vitamin D in Doses Ranging from 5000 to 50,000 International Units in 14 Adult Hospitalized Psychiatric Patients
	Retrospective psychiatric patients in the USA finding that prolonged daily oral intake of vitamin D3 from 5,000 to 10,000 IU/day was safe. There was no evidence for hypercalcemia, renal failure, calcium crystal formation, nephrolithiasis...	
May 3	Capraru et al., Medicina, doi:10.3390/ medicina59050877	COVID-19 Biomarkers Comparison: Children, Adults and Elders
	Retrospective 1,376 patients in Romania, showing vitamin D levels inversely related to COVID-19 symptoms, severity, ICU admission, and death.	
May 3	Hogarth et al., The American Journal of the Medical Sciences, doi:10.1016/ j.amjms.2023.04.019	Clinical Characteristics and Comorbidities associated with SARS-CoV-2 breakthrough infection in the University of California Healthcare Systems
	47% fewer cases (p<0.0001). Retrospective 110,380 patients in the USA, showing higher risk of COVID-19 breakthrough cases with vitamin D deficiency. Authors note that "lockdown measures pose an increased risk for individuals to develop vitamin D deficiency"..	

May 1	Taslim et al., Nutr. clín. diet. hosp., doi:10.12873/432taslim	The Effects of 10,000 IU Vitamin D Supplementation on Improvement of Clinical Outcomes, Inflammatory and Coagulation Markers in Moderate COVID-19 Patients: A Randomized-Controlled Trial
	71% lower need for oxygen therapy (p=0.01), 21% shorter hospitalization (p=0.0002), and 38% faster viral clearance (p<0.0001). RCT 72 moderate COVID-19 patients with vitamin D deficiency or insufficiency in Indonesia, showing faster viral clearance and improved recovery with 10,000IU vitamin D vs. 1,000IU vitamin D. Higher vitamin D levels were associated with sh..	
Apr 30	Sanamandra et al., Indian Journal of Endocrinology and Metabolism, doi:10.4103/ijem.ijem_383_22	Correlation between Serum Vitamin D3 levels and severity of COVID-19, experience from a COVID-19-dedicated tertiary care hospital from Western India
	21% lower mortality (p=0.67), 15% lower ventilation (p=0.73), and 435% higher severe cases (p=0.13). Prospective analysis of 200 hospitalized COVID-19 patients in India, showing no significant differences in outcomes with vitamin D deficiency.	
Apr 28	Ritsinger et al., BMJ Open, doi:10.1136/bmjopen-2022-069037	History of heart failure and chronic kidney disease and risk of all-cause death after COVID-19 during the first three waves of the pandemic in comparison with influenza outbreaks in Sweden: a registry-based, retrospective, case-control study
	9% lower mortality (p<0.0001). Retrospective 44,866 hospitalized COVID-19 patients in Sweden, showing higher mortality with vitamin D deficiency and with acetaminophen use. The study focuses on cardiorenal disease, finding higher risk of mortality with CRD. Authors als..	
Apr 26	Gholamalizadeh et al., Immunity, Inflammation and Disease, doi:10.1002/iid3.844	The association between vitamin D intake with inflammatory and biochemical indices and mortality in critically ill patients with COVID-19: A case-control study
	69% lower mortality (p=0.04). Case control study with 200 critical COVID-19 patients in Iran, showing lower mortality with higher vitamin D supplement intake. Authors do not provide enough information to assess confounding. Authors indicate that treatment was based on..	

Apr 25	Al Balwi et al., Annals of Thoracic Medicine, doi:10.4103/atm.atm_435_22	Risk factors predicting disease severity and mortality in coronavirus disease 2019 Saudi Arabian patients
	Retrospective 206 COVID-19 patients in Saudi Arabia, showing no significant difference in vitamin D levels based on survival.	
Apr 25	Jaun et al., Biomedicines, doi:10.3390/biomedicines11051277	Effect of Single High Dose Vitamin D Substitution in Hospitalized COVID-19 Patients with Vitamin D Deficiency on Length of Hospital Stay
	300% higher ventilation (p=0.2) . RCT late stage patients showing no significant differences with the addition of single dose 140,000IU vitamin D treatment. All patients received vitamin D 800IU daily. There was a non-significant shorter length of stay for patients with v..	
Apr 24	Baralić et al., Nutrients, doi:10.3390/nu15092050	Significance of 1,25-Dihydroxyvitamin D3 on Overall Mortality in Peritoneal Dialysis Patients with COVID-19
	67% lower mortality (p=0.02) . Prospective analysis of 52 peritoneal dialysis patients, 31 on calcitriol (vitamin D) therapy. All patients tested positive for COVID-19 during followup (median 26 months). Mortality was significantly lower for patients on calcitriol ther..	
Apr 19	Agüero-Domenech et al., Nutrients, doi:10.3390/nu15081972	Influence of Strict Lockdown on Vitamin D Deficiency in Pregnant Women: A Word of Caution
	Retrospective 886 pregnant women in Spain, showing that strict lockdowns increased the risk of vitamin D deficiency.	
Apr 19	Beheshti et al., Clinical Nutrition ESPEN, doi:10.1016/j.clnesp.2023.04.012	Correlation of vitamin D levels with serum parameters in Covid-19 patients
	Retrospective 140 COVID-19 patients in Iran showing lower vitamin D levels associated with hospitalization.	

Apr 17	Abdulrahman et al., The International Journal of Psychiatry in Medicine, doi:10.1177/0091217423171220	Correlates of poor clinical outcomes related to COVID-19 among older people with psychiatric illness - a mixed methods study
	90% lower mortality (p=0.05) and 82% lower progression (p=0.09). Retrospective 81 psychiatric inpatients in the UK, mean age 76, showing vitamin D deficiency associated with COVID-19 mortality.	
Apr 13	Rachman et al., F1000Research, doi:10.12688/f1000research.132214.1	Impact of vitamin D deficiency in relation to the clinical outcomes of hospitalized COVID-19 patients
	95% lower mortality (p=0.04) and 78% lower severe cases (p=0.01). Prospective study of hospitalized patients in Indonesia, showing higher risk of mortality and severe cases with vitamin D deficiency.	
Apr 13	di Filippo et al., The Journal of Clinical Endocrinology & Metabolism, doi:10.1210/clinem/dgad207	Low vitamin D levels are associated with Long COVID syndrome in COVID-19 survivors
	Retrospective 50 COVID-19 patients with long COVID and 50 matched patients without long COVID, showing lower vitamin D levels associated with long COVID.	
Apr 11	Rybakovsky et al., Physiological Reports, doi:10.14814/phy2.15592	Calcitriol modifies tight junctions, improves barrier function, and reduces TNF- α -induced barrier leak in the human lung-derived epithelial cell culture model, 16HBE 14o-
	In Vitro study showing that calcitriol improved barrier function in human airway epithelial cells. Authors note that this mechanism could explain in part the efficacy of vitamin D seen for COVID-19 and other airway diseases.	
Apr 0	Fernandes de Souza et al., Cells, doi:10.3390/cells12071092	Lung Inflammation Induced by Inactivated SARS-CoV-2 in C57BL/6 Female Mice Is Controlled by Intranasal Instillation of Vitamin D

Apr 6	C57BL/6 mouse study showing intranasal administration of vitamin D decreased inflammation following intranasal inactivated SARS-CoV-2. Authors suggest a promising potential of intranasal vitamin D to control pulmonary inflammation associa..	
Apr 6	Protas et al., Nutrients, doi:10.3390/nu15071781	Plasma 25-Hydroxyvitamin D Level and VDR Gene Single Nucleotide Polymorphism rs2228570 Influence on COVID-19 Susceptibility among the Kazakh Ethnic Group—A Pilot Study
	77% fewer cases (p=0.06). Retrospective 119 patients in Kazakhstan, showing significantly lower vitamin D levels in COVID-19 patients. There was an association between rs2228570 of the VDR gene and COVID-19. The C allele was associated with reduced likelihood of C..	
Apr 6	Azmi et al., Molecular Genetics & Genomic Medicine, doi:10.1002/mgg3.2172	The role of vitamin D receptor and IL-6 in COVID-19
	Retrospective 120 hospitalized COVID-19 patients and 120 controls, showing no significant difference in vitamin D levels, however vitamin D receptor gene expression was significantly lower in COVID-19 patients. Vitamin D receptor (VDR) ge..	
Apr 5	Bayrak et al., Turkish Archives of Pediatrics, doi:10.5152/turkarchpediatr.2023.22217	Association Between Vitamin D Levels and COVID-19 Infection in Children: A Case-Control Study
	33% fewer cases (p=0.23). Retrospective 73 COVID-19 and 76 healthy pediatric patients in Turkey, showing significantly lower vitamin D levels in COVID-19 patients.	
Apr 1	Reino-Gelardo et al., Nutrients, doi:10.3390/nu15071736	Effect of an Immune-Boosting, Antioxidant and Anti-Inflammatory Food Supplement in Hospitalized COVID-19 Patients: A Prospective Randomized Pilot Study
	61% lower mortality (p=0.05). RCT 162 late stage (65% on oxygen) patients in Spain, 78 treated with probiotics, prebiotics, vitamin D, zinc, and selenium, showing lower mortality with treatment, statistically significant only within the patients with high severity at ..	

Mar 31	DiGuilio et al., Experimental Lung Research, doi:10.1080/01902148.20 23.2193637	The multiphasic TNF- α -induced compromise of Calu-3 airway epithelial barrier function
	In Vitro study showing that TNF- α induced a multiphasic transepithelial leak in Calu-3 cell layers, and that vitamin A and vitamin D (calcitriol) were effective at reducing the barrier compromise caused by TNF- α .	
Mar 29	Aweimer et al., Scientific Reports, doi:10.1038/ s41598-023-31944-7	Mortality rates of severe COVID-19-related respiratory failure with and without extracorporeal membrane oxygenation in the Middle Ruhr Region of Germany
	21% lower mortality (p=0.31). Retrospective 149 patients under invasive mechanical ventilation in Germany showing no significant difference in mortality with vitamin D prophylaxis in unadjusted results.	
Mar 29	Wang et al., Elsevier BV, doi:10.2139/ ssrn.4401710	Influence of a High Vitamin D2 Dose on the Prevention and Improvement of Symptomatic COVID-19 in Health Care Workers: A Multicenter Randomized Clinical Trial
	23% lower progression (p=0.2), 9% fewer cases (p=0.57), and 11% faster viral clearance. RCT 214 low risk (no hospitalization) healthcare workers in China, showing no significant differences with short-term vitamin D2 prophylaxis. Patients with higher vitamin D levels (across both groups) were less likely to be infected. The ..	
Mar 28	Hermawan et al., Molecular and Cellular Biomedical Sciences, doi:10.21705/ mcbs.v7i1.306	Association between 25(OH)D3 Levels and the Presence of COVID-19 Symptoms
	71% fewer symptomatic cases (p<0.0001). Retrospective 47 patients in Indonesia showing lower vitamin D levels associated with increased COVID-19 symptoms. Adjusted results are only provided for vitamin D levels as a continuous value.	
Mar 28	Us et al., Research Square, doi:10.21203/ rs.3.rs-2718581/v1	The Role of Free Vitamin D and Vitamin D Binding Protein in SARS-Cov-2 Infection in Children

20	Prospective study of 82 pediatric patients in Turkey, showing symptom severity associated with free vitamin D and bioavailable vitamin D levels.	
Mar 27	Sposato et al., Epidemiol Prev., doi:10.19191/ EP23.1.A503.016	COVID-19 severity appears to be reduced in spring/summer
	Retrospective 8,221 COVID+ patients in Italy, showing significantly lower ICU admission and CPAP/NIV use in the spring/summer compared to the winter. There was no significant difference in viral load. Vitamin D levels were higher and CRP ..	
Mar 24	Cetin Ozbek et al., Clinical Science of Nutrition, doi:10.5152/ ClinSciNutr.2023.22059	Does the Level of Vitamin D in COVID-19 Patients Affect the Survival and Duration of Hospital Stay?
	51% lower mortality (p=0.07). Retrospective 168 hospitalized COVID-19 patients, showing no significant association between vitamin D levels and mortality. Adjusted results are only provided for vitamin D as a continuous variable.	
Mar 24	Basińska- Lewandowska et al., Nutrients, doi:10.3390/ nu15071581	Frequency of COVID-19 Infection as a Function of Vitamin D Levels
	58% fewer cases (p=0.02). Retrospective 134 patients in Poland between ages 6-50, showing higher risk of COVID-19 cases with vitamin D levels <12 ng/mL.	
Mar 24	Huang et al., Frontiers in Medicine, doi:10.3389/ fmed.2023.1121256	Effect of vitamin D status on adult COVID-19 pneumonia induced by Delta variant: A longitudinal, real-world cohort study
	25% faster recovery (p=0.02). Retrospective COVID-19 pneumonia patients in China, showing slower recovery with vitamin D deficiency.	
Mar 22	Schmidt et al., Journal of Clinical Medicine, doi:10.3390/jcm12062429	Identification of Clinical Response Predictors of Tocilizumab Treatment in Patients with Severe COVID-19 Based on Single-Center Experience

		<p>86% lower mortality (p=0.003). Prospective study of 120 severe COVID-19 patients in Poland treated with tocilizumab, showing significantly higher mortality with low vitamin D levels.</p>
Mar 17	<p>Cui et al., Frontiers in Nutrition, doi:10.3389/fnut.2023.1070808</p>	<p>Global and regional prevalence of vitamin D deficiency in population-based studies from 2000 to 2022: A pooled analysis of 7.9 million participants</p>
		<p>Meta analysis of the global and regional prevalence of vitamin D deficiency from 308 studies, showing that globally 48% of people had vitamin D levels <50 nmol/l. The prevalence in winter-spring was 1.7 times that in summer-autum.</p>
Mar 15	<p>Davran et al., Konuralp Tıp Dergisi, doi:10.18521/ktd.1134319</p>	<p>Relationship between vitamin D level and clinical status in COVID-19 patients</p>
		<p>75% lower mortality (p=0.02). Retrospective 47 outpatient and 47 hospitalized COVID-19 patients in Turkey, showing higher mortality with vitamin D deficiency in unadjusted results.</p>
Mar 15	<p>Schloss et al., Inflammopharmacology, doi:10.1007/s10787-023-01183-3</p>	<p>Nutritional deficiencies that may predispose to long COVID</p>
		<p>Review of 22 nutritional factors that have been linked to COVID-19 outcomes, the role of nutrients in COVID-19 infection, and the prevalence of multiple nutritional deficiencies in the population.</p>
Mar 14	<p>Dong et al., Frontiers in Public Health, doi:10.3389/fpubh.2023.1048087</p>	<p>Comparison of anthropometric parameters and laboratory test results before and after the COVID-19 outbreak among Chinese children aged 3–18 years</p>
		<p>Retrospective 2,162 children 3-18 in China, showing 2.8 times greater vitamin D deficiency, and increased obesity, hypercholesterol, and hyperuricemia after extended COVID-19 lockdown in China.</p>

Mar 13	Gonzalez et al., Revista de Nutrición Clínica y Metabolismo, doi:10.35454/rncm.v6n2.485	Vitamin D on admission and disease severity in patients with COVID-19 in the Intensive Care Unit
	66% lower mortality (p=0.05). Retrospective 164 ICU patients in Argentina, showing significantly higher mortality with severe vitamin D deficiency.	
Mar 9	Siuka et al., F1000Research, doi:10.12688/f1000research.131730.1	The effect of Vitamin D levels on the course of COVID-19 in hospitalized patients – a 1-year prospective cohort study
	56% lower mortality (p=0.24), 59% higher ICU admission (p=0.59), and 61% higher severe cases (p=0.009). Prospective study of 301 hospitalized patients in Slovenia, showing higher mortality with vitamin D deficiency, without statistical significance. Fewer patients with severe cases were deficient, which authors hypothesize was due to their..	
Mar 6	Bucurica et al., Diagnostics, doi:10.3390/diagnostics13050998	Association of Vitamin D Deficiency and Insufficiency with Pathology in Hospitalized Patients
	28% fewer cases (p<0.0001). Retrospective 11,182 hospitalized patients in Romania, showing vitamin D deficiency associated with COVID-19 cases.	
Mar 6	Bhat et al., Journal of Infection, doi:10.1016/j.jinf.2023.03.004	Effect of calcifediol supplementation as add-on therapy on the immune repertoire in recipients of the ChAdOx1 nCoV-19 vaccine: A prospective open-label, placebo-controlled, clinical trial
	34% fewer symptomatic cases (p=0.01). Prospective study of 580 ChAdOx1 recipients, 262 treated with calcifediol (patient choice), showing lower cases with treatment. Supplementation did not significantly affect antibody levels following ChAdOx1 receipt. Calcifediol patients w..	
Mar 5	Liu et al., The Journal of Nutrition, doi:10.1016/j.tjnut.2023.03.001	Vitamin D and SARS-CoV-2 Infection: SERVE Study (SARS-CoV-2 Exposure and the Role of Vitamin D among Hospital Employees)

Mar 5	Prospective study of 250 healthcare workers in the USA. The results are unclear - Figure 3 shows ~40% lower incidence with vitamin D supplementation, while the text indicates OR 1.18. Authors collected symptom information, stating that &q..	
Mar 3	Al-Gharrawi et al., Scientific Reports, doi:10.1038/ s41598-023-30859-7	Association of Apal rs7975232 and Bsm1 rs1544410 in clinical outcomes of COVID-19 patients according to different SARS-CoV-2 variants
	Retrospective 3,184 patients in Iran, showing COVID-19 outcomes for specific variants were associated with genotypes of the Apal rs7975232 and Bsm1 rs1544410 vitamin D receptor polymorphisms.	
Feb 28	Boukef et al., NCT05670444	Melatonin, Vitamins and Minerals Supplements for the Treatment of Covid-19 and Covid-like Illness: Results of a Prospective, Randomised, Double-blinded Multicentre Study
	150 patient vitamin D early treatment RCT with results not reported over 7 months after completion.	
Feb 28	Arabadzhiyska et al., Bratislava Medical Journal, doi:10.4149/ bll_2023_069	Serum vitamin D levels and inflammatory status in COVID-19 patients
	30% lower severe cases (p=0.16). Retrospective 100 hospitalized COVID-19 patients in Bulgaria and 40 healthy controls, showing significantly lower vitamin D levels in COVID-19 patients, and lower levels in patients with severe vs. moderate disease.	
Feb 28	Topan et al., Nutrients, doi:10.3390/nu15051227	25 Hydroxyvitamin D Serum Concentration and COVID-19 Severity and Outcome — A Retrospective Survey in a Romanian Hospital
	31% lower mortality (p=0.02) and 11% lower severe cases (p=0.02). Retrospective 2,342 hospitalized COVID-19 patients in Romania with vitamin D levels measured on admission day, showing lower risk of mortality and severe/critical cases with vitamin D levels ≥ 20ng/mL.	
Feb	Domazet Bugarin et al., Nutrients, doi:10.3390/ nu15051234	Vitamin D Supplementation and Clinical Outcomes in Severe COVID-19 Patients — Randomized Controlled Trial

28	<p>21% lower mortality (p=0.2), no change in recovery (p=0.71), and 6% longer hospitalization (p=0.76). Very late stage RCT 155 ICU patients in Croatia with low vitamin D levels, showing no significant differences with 10,000IU cholecalciferol daily. Calcifediol or calcitriol, which avoids several days delay in conversion, may be more succe..</p>	
Feb 28	<p>Chen et al., Infection and Drug Resistance, doi:10.2147/idr.s400561</p>	<p>Plasma 25(OH)D Level is Associated with the Nucleic Acid Negative Conversion Time of COVID-19 Patients: An Exploratory Study</p>
<p>40% improved viral clearance (p=0.01). Retrospective 158 COVID+ patients in China, showing low vitamin D levels associated with slower viral clearance.</p>		
Feb 27	<p>Bader et al., Nutrients, doi:10.3390/nu15051188</p>	<p>The Effect of Weekly 50,000 IU Vitamin D3 Supplements on the Serum Levels of Selected Cytokines Involved in Cytokine Storm: A Randomized Clinical Trial in Adults with Vitamin D Deficiency</p>
<p>RCT 100 patients in Jordan, showing that high-dose cholecalciferol (50,000 IU/week) significantly increased IL-6, indicating that high weekly doses could have a negative effect for cytokine storm with COVID-19. Other studies have found no..</p>		
Feb 27	<p>Tan et al., Journal of the ASEAN Federation of Endocrine Societies, doi:10.15605/jafes.038.01.07</p>	<p>Association of Vitamin D levels on the Clinical Outcomes of Patients Hospitalized for COVID-19 in a Tertiary Hospital</p>
<p>71% lower progression (p=0.04), 91% lower mortality (p=0.002), and 82% lower ICU admission (p=0.01). Retrospective 135 hospitalized COVID-19 patients in the Philippines, showing higher risk of a poor outcome with vitamin D deficiency.</p>		
Feb 16	<p>Montini et al., Journal of Neurology, doi:10.1007/s00415-023-11618-0</p>	<p>Modifiable risk factors of COVID-19 in patients with multiple sclerosis: a single-centre case-control study</p>
<p>Case control analysis with 149 multiple sclerosis patients and 292 matched controls in Italy, showing lower risk of COVID-19 cases with higher vitamin D levels.</p>		

Feb 15	Xie et al., Critical Reviews in Food Science and Nutrition, doi:10.1080/10408398.2023.2174948	Micronutrient perspective on COVID-19: Umbrella review and reanalysis of meta-analyses
	Systematic review and meta analysis of micronutrient supplementation, showing vitamin D supplementation associated with lower mortality, mechanical ventilation, ICU admission, and severity. Note that forest plots have OR>1 favoring supple..	
Feb 14	Ortatatli et al., Archives of Medical Research, doi:10.1016/j.arcmed.2023.02.002	Potential Role of Vitamin D, ACE2 and the Proteases as TMPRSS2 and Furin on SARS-CoV-2 Pathogenesis and COVID-19 Severity
	82% lower mortality (p=0.09). Analysis of 68 COVID-19 patients and 17 healthy controls, showing higher mortality with vitamin D deficiency, and with 1,25(OH)2D levels <1 ng/mL, statistically significant only for 1,25(OH)2D levels. Serum ACE2, 1,25(OH)2D, and ACE2 mRNA..	
Feb 13	D'Alessandro et al., Scientific Reports, doi:10.1038/s41598-023-29519-7	Contribution of vitamin D3 and thiols status to the outcome of COVID-19 disease in Italian pediatric and adult patients
	Retrospective 173 patients in Italy showing significantly lower glutathione levels and high prevalence of vitamin D deficiency in COVID-19 patients, and lower levels of glutathione and vitamin D associated with mortality. Acetaminophen (p..	
Feb 2	Arora et al., Nutrients, doi:10.3390/nu15030771	Global Dietary and Herbal Supplement Use during COVID-19—A Scoping Review
	Review of 14 global studies showing that the most frequently used dietary supplements during COVID-19 were vitamin C, vitamin D, zinc, and multivitamins. The most common reason was for improved immune system functioning or reduced COVID-1..	

Jan 30	Sallam et al., Journal of Food and Nutrition Research, doi:10.12691/jfnr-11-1-10	Dietary Supplement Use among Children Whose Parents Work at National Research Centre: A Pilot Study
Survey of dietary supplementation showing high usage, and greater use by more highly educated people. The survey covered 200 children whose parents were employees of a research center in Egypt, showing 50% prevalence of supplementation du..		
Jan 24	Rathod et al., Annals of African Medicine, doi:10.4103/aam.aam_21_22	Association of vitamin D with the severity of disease and mortality in COVID-19: Prospective study in central India
Prospective study of 766 hospitalized patients in India, showing higher vitamin D levels associated with lower COVID-19 severity and mortality.		
Jan 22	Arabi et al., Journal of Renal Injury Prevention, doi:10.34172/jrip.2022.32126	The association between vitamin D3 deficiency and acute kidney injury in COVID-19 patients
40% lower mortality (p=0.28), 39% lower ICU admission (p=0.2), and 42% improvement (p=0.13). Retrospective 69 hospitalized COVID-19 patients in Iran, showing lower vitamin D associated with higher mortality, ICU admission, and AKI in unadjusted results. The mean age of deficient patients was lower. Statistical significance is not..		
Jan 18	Din Ujjan et al., Frontiers in Nutrition, doi:10.3389/fnut.2022.1023997	The possible therapeutic role of curcumin and quercetin in the early-stage of COVID-19—Results from a pragmatic randomized clinical trial
29% improved recovery (p=0.11) and 91% improved viral clearance (p=0.05). Small RCT with 50 outpatients, 25 treated with curcumin, quercetin, and vitamin D, showing improved recovery and viral clearance with treatment. 168mg curcumin, 260mg, 360IU vitamin D3 daily for 14 days.		

Jan 16	Viglione et al., The Gazette of Medical Sciences, doi:10.46766/ thegms.pubheal.2212090 5	Intravenous high dose vitamin C and ozonated saline effective treatment for Covid -19: The Evolution of Local Standard of Care
	Retrospective 479 high risk outpatients in the USA treated with a protocol including intravenous vitamin C, vitamin D, zinc, quercetin, bromelain, lactoferrin, HCQ, ivermectin, ozonated saline, azithromycin, ceftriaxone, methylprednisolon..	
Jan 16	Argano et al., Pharmaceuticals, doi:10.3390/ph16010130	Protective Effect of Vitamin D Supplementation on COVID-19-Related Intensive Care Hospitalization and Mortality: Definitive Evidence from Meta-Analysis and Trial Sequential Analysis
	51% lower mortality (p=0.0002) and 72% lower ICU admission (p<0.0001). Meta analysis and trial sequential analysis of 5 vitamin D RCTs, showing significantly lower mortality and ICU admission with treatment. Only a small subset of the RCTs are included. Note that [Nogués] uses randomization by ward, was cen..	
Jan 10	Ubaldi et al., Work, doi:10.3233/ WOR-220387	Vitamin D status and COVID-19 prevention in a worker subgroup in Italy
	Report on vitamin D supplementation with 139 employees in Italy from April to June 2021, showing only one confirmed COVID-19 case (0.7%) and 4 cases of flu-like symptoms, compared to ~7-9% COVID-19 incidence for the same Italian district ..	
Dec 31 2022	Şengül et al., Cukurova Anestezi ve Cerrahi Bilimler Dergisi, doi:10.36516/ jocass.1185181	Serum Vitamin D Concentrations and Covid-19 In Pregnant Women, Does Vitamin D Supplementation Impact Results? A Comprehensive Study
	69% fewer cases (p=0.004). Retrospective 318 pregnant women, 54 COVID+ and 264 healthy controls, showing lower risk of COVID-19 with vitamin D supplementation, and with higher vitamin D levels.	
Dec 31 2022	De Nicolò et al., Nutrients, doi:10.3390/ nu15010169	Possible Impact of Vitamin D Status and Supplementation on SARS-CoV-2 Infection Risk and COVID-19 Symptoms in a Cohort of Patients with Inflammatory Bowel Disease

29 2022	<p>88% lower IgG positivity (p=0.002). Prospective study of 106 IBD patients in Italy, showing lower risk of IgG positivity with vitamin D supplementation. Vitamin D levels below 30 ng/mL were associated with a higher probability of symptomatic cases.</p>	
Dec 26 2022	<p>Batur et al., Diagnostics, doi:10.3390/ diagnostics13010059</p>	<p>Association between Vitamin D Status and Secondary Infections in Patients with Severe COVID-19 Admitted in the Intensive Care Unit of a Tertiary-Level Hospital in Turkey</p>
	<p>72% lower mortality (p<0.0001) and 23% improvement (p=0.03). Retrospective 194 ICU patients and 30 non-COVID-19 patients in Turkey, showing significantly lower vitamin D levels in COVID-19 patients. There was significantly higher COVID-19 mortality with vitamin D deficiency, and significantly higher..</p>	
Dec 25 2022	<p>Qu et al., arXiv, doi:10.48550/ arXiv.2301.02660</p>	<p>Decreased serum vitamin D level as a prognostic marker in patients with COVID-19</p>
	<p>Retrospective 719 COVID-19 patients in China, showing higher vitamin D levels associated with faster viral clearance and lower severity.</p>	
Dec 15 2022	<p>Khojah et al., Nutrients, doi:10.3390/nu14245329</p>	<p>The Impact of Serum Levels of Vitamin D3 and Its Metabolites on the Prognosis and Disease Severity of COVID-19</p>
	<p>Analysis of 103 COVID-19 patients and 50 healthy controls in Saudi Arabia, showing significantly lower vitamin D and vitamin D metabolite levels in COVID-19 patients, and correlations between vitamin D levels and ACE2 levels, IL-6, and NL..</p>	
Dec 8 2022	<p>Ali et al., Asian Journal of Research in Biochemistry, doi:10.9734/ajrb/2022/ v11i2214</p>	<p>Vitamin D, Calcium and Phosphorus Status Involvement during COVID-19 Infection</p>
	<p>Retrospective 50 hospitalized COVID-19 patients and 50 healthy controls, showing lower vitamin D levels in COVID-19 patients, and a negative correlation between vitamin D level and COVID-19 severity.</p>	
Dec 7	<p>Baxter et al., Nutrients, doi:10.3390/nu14245204</p>	<p>Correlation between 25-hydroxyvitamin D/D3 Deficiency and COVID-19 Disease Severity in Adults from Northern Colorado</p>

2022	Analysis of 131 COVID+ patients and 18 healthy controls, showing COVID-19 severity associated with lower vitamin D levels.	
Dec 5 2022	Abdrabbo AlYafei et al., Qatar Medical Journal, doi:10.5339/qmj.2022.48	Association of Serum Vitamin D level and COVID-19 infection: A Case-control Study
	23% fewer cases ($p<0.0001$). Retrospective 16,446 COVID-19 patients and 46,005 healthy controls in Qatar, showing higher risk of COVID-19 infection with vitamin D deficiency.	
Dec 2 2022	Vásquez-Procopio et al., International Journal of Molecular Sciences, doi:10.3390/ ijms232315188	Association between 25-OH Vitamin D Deficiency and COVID-19 Severity in Pregnant Women
	83% lower severe cases ($p=0.04$). Retrospective 165 pregnant women in Mexico, showing increased risk of severe COVID-19 with vitamin D deficiency.	
Nov 30 2022	Mostafa et al., International Journal of General Medicine, doi:10.2147/ IJGM.S386815	Clinical and Prognostic Significance of Baseline Serum Vitamin D Levels in Hospitalized Egyptian Covid-19 Patients
	93% lower mortality ($p<0.0001$), 95% lower ventilation ($p<0.0001$), and 91% lower ICU admission ($p<0.0001$). Retrospective hospitalized patients in Egypt, showing lower vitamin D levels associated with COVID-19 severity and mortality. Adjusted results are only provided for vitamin D as a continuous variable.	
Nov 26 2022	Sharif et al., Nutrients, doi:10.3390/nu14235029	Impact of Zinc, Vitamins C and D on Disease Prognosis among Patients with COVID-19 in Bangladesh: A Cross-Sectional Study
	28% lower severe cases ($p=0.001$). Retrospective 962 COVID-19 patients in Bangladesh, showing significantly lower severity with vitamin C, vitamin D, and zinc supplementation, and improved results from the combination of all three.	

Nov 18 2022	Nicoll et al., Journal of Clinical Medicine, doi:10.3390/jcm11226818	COVID-19 Prevention: Vitamin D Is Still a Valid Remedy
	Discussion of limitations and concerns for [Jolliffe].	
Nov 16 2022	Guldemir et al., Work, doi:10.3233/wor-220292	Clinical characteristics of bus drivers and field officers infected with COVID-19: A cross-sectional study from Istanbul
	5% lower hospitalization (p=0.89). Retrospective 477 COVID+ public transportation workers in Turkey, showing no significant difference in hospitalization with vitamin D use in unadjusted results.	
Nov 15 2022	Tallon et al., Diabetes Research and Clinical Practice, doi:10.1016/j.diabres.2022.110156	Impact of diabetes status and related factors on COVID-19-associated hospitalization: A nationwide retrospective cohort study of 116,370 adults with SARS-CoV-2 infection
	42% lower hospitalization (p<0.0001). Retrospective 116,370 COVID+ patients in the USA, showing higher risk of hospitalization with vitamin D deficiency/insufficiency.	
Nov 12 2022	Gibbons et al., Scientific Reports, doi:10.1038/s41598-022-24053-4	Association between vitamin D supplementation and COVID-19 infection and mortality
	33% lower mortality (p<0.0001) and 20% fewer cases (p<0.0001). PSM retrospective in the USA, showing lower COVID-19 mortality and cases with vitamin D prophylaxis.	
Nov 8 2022	Allami et al., 1st Samarra International Conference for Pure and Applied Sciences (SICPS2021), doi:10.1063/5.0121166	The risk of up normal values of two parameters obesity and vitamin D in incidence of coronavirus disease-19 among Iraqi patients
	93% lower hospitalization (p<0.0001). Retrospective 86 COVID-19 hospitalized patients and 86 healthy controls in Iraq, showing COVID-19 cases associated with severe vitamin D deficiency.	

Nov 8 2022	Khalil et al., 1st Samarra International Conference for Pure and Applied Sciences (SICPS2021), doi:10.1063/5.0122108	Evaluation of vitamin D in COVID-19 patients
	42% fewer cases (p=0.27). Case control study with 52 COVID-19 patients and 30 matched controls, showing significantly lower vitamin D levels in COVID-19 patients.	
Nov 8 2022	Said et al., Frontiers in Pharmacology, doi:10.3389/fphar.2022.1011522	The effect of Nigella sativa and vitamin D3 supplementation on the clinical outcome in COVID-19 patients: A randomized controlled clinical trial
	42% improved recovery (p=0.57) and 49% improved viral clearance (p=0.2). 120 patient RCT comparing vitamin D, nigella sativa, and combined vitamin D+nigella sativa, showing improved symptom recovery and viral clearance with both vitamin D and nigella sativa, and further improvements with the combination of bot..	
Nov 7 2022	Green et al., European Journal of General Practice, doi:10.1080/13814788.2022.2138855	A higher frequency of physical activity is associated with reduced rates of SARS-CoV-2 infection
	19% fewer cases (p<0.0001). Retrospective 113,075 people in Israel, showing lower risk of COVID-19 cases with higher vitamin D levels.	
Nov 3 2022	Bychinin et al., Scientific Reports, doi:10.1038/s41598-022-22045-y	Effect of vitamin D3 supplementation on cellular immunity and inflammatory markers in COVID-19 patients admitted to the ICU
	27% lower mortality (p=0.18), 7% lower ventilation (p=0.68), 94% longer ICU admission (p=0.001), and 41% longer hospitalization (p=0.007). RCT ICU patients in Russia, showing significantly increased lymphocyte counts with treatment. Mortality was lower but without statistical significance. 40% of patients were on mechanical ventilation at baseline in the treatment group, com..	

Oct 28 2022	Álvarez et al., bioRxiv, doi:10.1101/2022.10.27.5 14012	Vitamin D deficiency and SARS-CoV-2 infection: Big-data analysis from March 2020 to March 2021. D-COVID study
	39% lower mortality (p<0.0001), 55% lower ICU admission (p<0.0001), and 43% lower hospitalization (p<0.0001). Retrospective free-text analysis of 143,157 COVID-19 patients, showing vitamin D deficiency associated with mortality, ICU admission, and hospitalization in unadjusted results.	
Oct 22 2022	Hafezi et al., Scientific Reports, doi:10.1038/s41598-022-22307-9	Vitamin D enhances type I IFN signaling in COVID-19 patients
	63% lower mortality (p=0.04). Retrospective 80 ICU patients, and in vitro study with human airway epithelial cells, showing that vitamin D enhances host IFN- α/β signaling. Significantly lower mortality was seen with vitamin D treatment.	
Oct 18 2022	Cosentino et al., Journal of Clinical Medicine, doi:10.3390/jcm11206138	Early Outpatient Treatment of COVID-19: A Retrospective Analysis of 392 Cases in Italy
	Retrospective 392 outpatients in Italy showing 0.2% mortality with early treatment, compared with >3% in Italy at the time. Treatment varied for individual patients and included HCQ, vitamin D, vitamin C, vitamin A, zinc, quercetin, bromh..	
Oct 7 2022	Morad et al., Egyptian Rheumatology and Rehabilitation, doi:10.1186/s43166-022-00155-9	Serum vitamin D level in COVID-19 patients and its correlation with disease severity
	Retrospective 80 COVID-19 patients in Egypt, showing lower vitamin D levels associated with mechanical ventilation and mortality.	
Oct 3 2022	Karimpour-Razkenari et al., Journal of Pharmaceutical Care, doi:10.18502/jpc.v10i3.10790	Evaluating the Effects of Clinical Characteristics and Therapeutic Regimens on Mortality in Hospitalized Patients with Severe COVID-19

		79% lower mortality ($p<0.0001$). Retrospective 478 moderate to severe hospitalized patients in Iran, showing lower mortality with vitamin D treatment.
Sep 27 2022	Sarhan et al., Medicina, doi:10.3390/ medicina58101358	Evidence for the Efficacy of a High Dose of Vitamin D on the Hyperinflammation State in Moderate-to-Severe COVID-19 Patients: A Randomized Clinical Trial
		19% lower mortality ($p=0.003$), 74% greater improvement ($p=0.03$), and 31% shorter hospitalization ($p=0.04$). RCT comparing 200,000IU IM cholecalciferol and 1mcg/day alfacalcidol, showing lower mortality and improved recovery with high dose treatment.
Sep 24 2022	Mansour et al., The Egyptian Journal of Internal Medicine, doi:10.1186/ s43162-022-00159-z	Association of serum zinc level and clinical outcome in Egyptian COVID-19 patients
		Retrospective 30 ICU patients and 30 non-ICU hospitalized patients in Egypt, showing lower vitamin D levels in ICU patients.
Sep 19 2022	Mosadegh et al., Microbial Pathogenesis, doi:10.1016/ j.micpath.2022.105792	The effect of Nutrition Bio-shield superfood (NBS) on disease severity and laboratory biomarkers in patients with COVID-19: A randomized clinical trial
		61% lower mortality ($p=0.002$) and 28% shorter hospitalization ($p=0.001$). RCT 70 hospitalized severe COVID-19 patients in Iran, showing lower mortality and improved clinical markers with treatment combining vitamins A, B1–B3, B5, B6, B9, C, D, K, and magnesium, potassium, phosphorus, sulfur, manganese, calcium,..
Sep 17 2022	van Helmond et al., Nutrients, doi:10.3390/ nu15010180 (date from preprint)	Vitamin D3 Supplementation at 5000 IU Daily for the Prevention of Influenza-like Illness in Healthcare Workers: A Pragmatic Randomized Clinical Trial
		98% fewer cases ($p=0.07$). Prospective prophylaxis trial with 255 healthcare workers taking vitamin D and 2,827 controls, showing significantly lower influenza-like illness with treatment, and lower COVID-19 cases, without statistical significance. While the interv..

<p>Sep 12 2022</p>	<p>Szerszeń et al., Medical Science Monitor, doi:10.12659/MSM.937741</p>	<p>Effect of Vitamin D Concentration on Course of COVID-19</p> <p>Retrospective 505 hospitalized patients in Poland, showing low vitamin D levels associated with oxygen therapy and ventilation. There was no significant difference for cases.</p>
<p>Sep 9 2022</p>	<p>Zeidan et al., Pediatric Research, doi:10.1038/s41390-022-02275-6</p>	<p>Vitamin D deficiency and vitamin D receptor FokI polymorphism as risk factors for COVID-19</p> <p>62% lower hospitalization (p=0.002). Prospective study of 180 moderate to critical hospitalized pediatric COVID-19 patients and 200 matched controls, showing vitamin D deficiency and the VDR Fok I polymorphism associated with COVID-19 hospitalization.</p>
<p>Sep 7 2022</p>	<p>Brunvoll et al., BMJ, doi:10.1136/bmj-2022-071245</p>	<p>Prevention of covid-19 and other acute respiratory infections with cod liver oil supplementation, a low dose vitamin D supplement: quadruple blinded, randomised placebo controlled trial</p> <p>11% lower hospitalization (p=1), 20% higher severe cases (p=0.17), and no change in cases (p=0.98). RCT 17,278 low-risk patients (zero mortality) treated with 5mL/day cod liver oil (~400IU vitamin D) and 17,323 placebo patients in Norway with, showing no significant differences with treatment. The placebo group had higher vitamin D at b..</p>
<p>Sep 2 2022</p>	<p>Foshati et al., Food Science & Nutrition, doi:10.1002/fsn3.3034</p>	<p>Antioxidants and clinical outcomes of patients with coronavirus disease 2019: A systematic review of observational and interventional studies</p> <p>Systematic review showing that vitamin C, vitamin D, selenium, and zinc can improve COVID-19 clinical outcomes.</p>
<p>Aug 04</p>	<p>Sharif-Askari et al., Life Sciences, doi:10.1016/j.lfs.2022.120909</p>	<p>Vitamin D modulates systemic inflammation in patients with severe COVID-19</p>

24 2022	<p>36% shorter ICU admission (p=0.01). Retrospective 20 ICU patients treated with vitamin D in the UAE, and 25 matched controls, showing significantly shorter ICU stay with treatment. Lower proinflammatory cytokines were associated with lower severity markers. Authors also per..</p>	
Aug 15 2022	<p>Sinnberg et al., Antioxidants, doi:10.3390/ antiox11081580</p>	<p>Vitamin C Deficiency in Blood Samples of COVID-19 Patients</p>
<p>Analysis of 74 COVID-19 patients and 8 controls in Germany, showing low vitamin C levels associated with mortality. There was no significant difference for vitamin A, D, or E levels. Very few group details are provided, for example the ag..</p>		
Aug 12 2022	<p>Shannak et al., Technium BioChemMed, doi:10.47577/ biochemmed.v3i2.7179</p>	<p>Evaluation of the level of vitamin D3 in the blood serum of patients infected with COVID-19 in Al-Amiriya city</p>
<p>Analysis of 35 COVID-19 patients and 25 healthy controls in Iraq, showing significantly lower vitamin D levels in COVID-19 patients.</p>		
Aug 11 2022	<p>Dana et al., The Eurasian Journal of Medicine, doi:10.5152/ eurasianjmed.2022.2108 8</p>	<p>Vitamin D Level in Laboratory Confirmed COVID-19 and Disease Progression</p>
<p>33% lower mortality (p=0.29) and no change in severe cases (p=1). Analysis of 831 hospitalized patients in Iran, showing higher mortality with severe vitamin D deficiency, without statistical significance.</p>		
Aug 10 2022	<p>Chellasamy et al., Journal of King Saud University - Science, doi:10.1016/ j.jksus.2022.102277</p>	<p>Docking and molecular dynamics studies of human ezrin protein with a modelled SARS-CoV-2 endodomain and their interaction with potential invasion inhibitors</p>
<p>In Silico study of SARS-CoV-1&2 endodomains and ezrin docking, identifying ivermectin, quercetin, calcifediol, calcitriol, selamectin, and minocycline as potential therapeutic drugs with strong ezrin binding which may restrict viral endod..</p>		

Aug 9 2022	Hafez et al., Antibiotics, doi:10.3390/ antibiotics11081078	Factors Influencing Disease Stability and Response to Tocilizumab Therapy in Severe COVID-19: A Retrospective Cohort Study
	94% lower mortality (p=0.07). Retrospective 49 severe COVID-19 patients treated with tocilizumab, showing lower mortality with vitamin D treatment and a dose-dependent response.	
Aug 9 2022	Barrett et al., Nutrients, doi:10.3390/nu14163252	Vitamin D Status and Mortality from SARS CoV-2: A Prospective Study of Unvaccinated Caucasian Adults
	78% lower mortality (p=0.006), 15% lower ICU admission (p=0.63), and 53% lower progression (p=0.12). Prospective study of 232 hospitalized COVID-19 pneumonia patients, showing higher risk of mortality with vitamin D deficiency.	
Aug 4 2022	Doğan et al., Journal of Tropical Pediatrics, doi:10.1093/tropej/ fmac072	The Clinical Significance of Vitamin D and Zinc Levels with Respect to Immune Response in COVID-19 Positive Children
	64% fewer cases (p=0.003). Prospective study of 88 pediatric COVID-19 patients and 88 healthy controls, showing significantly lower zinc and vitamin D levels in COVID-19 patients.	
Jul 31 2022	Alarslan et al., Medical Journal of İzmir Hospital, 26:3	Vitamin D levels and disease severity in COVID-19
	Retrospective 153 COVID-19 patients in Turkey, showing lower age-adjusted vitamin D levels in hospitalized patients vs. outpatients.	
Jul 31 2022	Mishra et al., Journal of Preventive Medicine and Public Health, doi:10.3961/ jpmph.21.640	Vitamin D Deficiency and Comorbidities as Risk Factors of COVID-19 Infection: A Systematic Review and Meta-analysis
	Systematic review and meta analysis showing low vitamin D levels associated with COVID-19 cases.	

Jul 27 2022	Lakkireddy et al., Archives of Clinical and Biomedical Research, doi:10.26502/ acbr.50170273	Effect of Short Term High Dose Oral Vitamin D Therapy on the Inflammatory Markers in Patients with COVID 19 Disease
	61% lower mortality (p=0.27), 22% lower ICU admission (p=0.74), and 7% shorter hospitalization (p=0.9). RCT 44 treatment and 43 control patients with vitamin D levels <30ng/ml, showing significant reduction in inflammatory markers with treatment of 60,000IU vitamin D per day for 8 days (10 days for BMI >25). Death and ICU admission was lowe..	
Jul 26 2022	Fairfield et al., Nutrients, doi:10.3390/nu14153073	Association of Vitamin D Prescribing and Clinical Outcomes in Adults Hospitalized with COVID-19
	9% higher mortality (p<0.0001) and 41% higher ventilation (p<0.0001). N3C retrospective showing higher risk with vitamin D treatment for hospitalized patients. As noted by authors, confounding by indication may be significant. The more extreme ventilation result, which is a significant outlier among all stu..	
Jul 26 2022	De Niet et al., Nutrients, doi:10.3390/nu14153048	Positive Effects of Vitamin D Supplementation in Patients Hospitalized for COVID-19: A Randomized, Double-Blind, Placebo-Controlled Trial
	45% faster recovery (p=0.06) and 50% shorter hospitalization (p=0.003). RCT with 21 vitamin D and 22 placebo hospitalized patients in Belgium with vitamin D deficiency, showing significantly shorter hospitalization and improved clinical recovery with treatment.	
Jul 25 2022	Peng et al., Frontiers in Nutrition, doi:10.3389/ fnut.2022.960859	Vitamin D levels and clinical outcomes of SARS-CoV-2 Omicron subvariant BA.2 in children: A longitudinal cohort study
	Retrospective 116 hospitalized pediatric patients in China, showing accelerated viral clearance early in the disease course, and greater pneumonia lesion improvement with vitamin D sufficiency.	
Jul 25	Zurita-Cruz et al., Frontiers in Pediatrics, doi:10.3389/ fped.2022.943529	Efficacy and safety of vitamin D supplementation in hospitalized COVID-19 pediatric patients: A randomized controlled trial

2022	<p>79% lower mortality (p=0.11), 72% lower ventilation (p=0.08), and 73% lower ICU admission (p=0.006). RCT 45 hospitalized high-risk pediatric patients requiring supplemental oxygen in Mexico, showing lower mortality, ventilation, and intensive care with vitamin D treatment, however there were less severe and critical cases at baseline in ..</p>	
Jul 21 2022	<p>Abroug et al., Trials, doi:10.1186/s13063-023-07114-5</p>	<p>Effect of vitamin D supplementation versus placebo on recovery delay among COVID-19 Tunisian patients: a randomized-controlled clinical trial</p>
	<p>8% improved recovery (p=0.85) and 58% worse viral clearance (p=0.02). Long COVID RCT with mostly asymptomatic patients that remained PCR positive for 14 days, showing slower viral conversion with treatment. Authors report "a 30-day follow-up of our patients showed that a long-lasting COVID-19 was no..</p>	
Jul 19 2022	<p>Gholi et al., Complementary Therapies in Medicine, doi:10.1016/j.ctim.2022.102855</p>	<p>Vitamin D deficiency is associated with increased risk of delirium and mortality among critically ill, elderly covid-19 patients</p>
	<p>75% lower mortality (p=0.0007) and 45% higher ventilation (p=0.27). Prospective study of 310 COVID-19 ICU patients in Iran, showing higher mortality for patients with vitamin D deficiency.</p>	
Jul 19 2022	<p>Hosseini et al., Research Square, doi:10.21203/rs.3.rs-1588325/v1</p>	<p>Prevention of COVID-19 with Oral Vitamin D supplemental Therapy in Essential healthCare Teams (PROTECT): Ancillary study of a randomised controlled trial</p>
	<p>82% fewer cases (p=0.19). Early terminated prophylaxis RCT for healthcare workers in Canada, showing 0/19 cases with vitamin D prophylaxis vs. 2/15 for control. 100,000IU cholecalciferol at baseline, 10,000IU weekly for 16 weeks.</p>	
Jul 15 2022	<p>Romero-Ibarguengoitia et al., medRxiv, doi:10.1101/2022.07.12.22277450</p>	<p>Effect of Vitamin D3 supplementation vs. dietary-hygienic measures on SARS-COV-2 infection rates in hospital workers with 25-hydroxyvitamin D3 [25(OH)D3] levels >20 ng/mL</p>
	<p>79% fewer cases (p=0.008). RCT healthcare workers with vitamin D levels between 20-100 ng/mL, 43 treated with vitamin D 52,000 IU monthly, and 42 with dietary-hygienic measures, which were also focused on increasing vitamin D, including sun exposure for at least 10..</p>	

Jul 13 2022	Charla et al., Research Square, doi:10.21203/rs.3.rs-1826271/v1	Is suboptimal circulating level of vitamin D a risk factor for the poor prognosis of COVID-19? – A comparison of first and second waves in India
	11% lower mortality (p=0.74). Retrospective 179 hospitalized COVID-19 patients in India, showing no significant difference in mortality with vitamin D deficiency in unadjusted results. Patients with deficiency were younger.	
Jul 6 2022	D'Ecclesiis et al., PLOS ONE, doi:10.1371/journal.pone.0268396	Vitamin D and SARS-CoV2 infection, severity and mortality: A systematic review and meta-analysis
	65% lower mortality (p=0.004) and 62% lower severe cases (p=0.003). Systematic review showing significantly lower risk of mortality and severe cases with vitamin D supplementation, and for high vs. low vitamin D levels.	
Jul 6 2022	Mamurova et al., Research Square, doi:10.21203/rs.3.rs-1806260/v1	A strong association between the VDR gene markers and SARS-CoV-2 variants
	Analysis of 300 PCR+ and 300 PCR- patients, showing COVID-19 associated with vitamin D receptor polymorphisms FokI and TaqI. Notably, these polymorphisms have been found to be associated with improved response to vitamin D supplementation..	
Jul 5 2022	Bogliolo et al., Frontiers in Nutrition, doi:10.3389/fnut.2022.934258	Vitamin D 25OH Deficiency and Mortality in Moderate to Severe COVID-19: A Multi-Center Prospective Observational Study
	15% lower mortality (p=0.29). Prospective 361 consecutive hospitalized patients in Italy, showing 77% had vitamin D deficiency. There was no statistically significant difference in mortality with deficiency.	
Jul 4 2022	Cervero et al., Frontiers in Pharmacology, doi:10.3389/fphar.2022.863587	Beneficial Effect of Short-Term Supplementation of High Dose of Vitamin D3 in Hospitalized Patients With COVID-19: A Multicenter, Single-Blinded, Prospective Randomized Pilot Clinical Trial
	79% lower ICU admission (p=0.2) and 28% lower ARDS (p=0.74). RCT 85 hospitalized patients in Spain, comparing 10,000IU/day vs. 2,000IU/day cholecalciferol, showing beneficial effects of the larger dose.	

Jul 2 2022	Gupta et al., Nutrients, doi:10.3390/nu14132757	Temporal Association of Reduced Serum Vitamin D with COVID-19 Infection: Two Single-Institution Case–Control Studies
	Retrospective study of 107 COVID-19 patients with vitamin D levels measured within 180 days before diagnosis, and 203 patients with levels measured after diagnosis, showing lower vitamin D levels for COVID-19 hospitalized patients compare..	
Jun 29 2022	Quesada-Gomez et al., Nutrients, doi:10.3390/ nu14132716	Vitamin D Endocrine System and COVID-19: Treatment with Calcifediol
	Review of the use of calcifediol for COVID-19. Authors note several advantages of calcifediol vs. cholecalciferol: calcifediol induces a more rapid increase in circulating 25OHD; calcifediol is more potent than cholecalciferol; calcifedio..	
Jun 29 2022	Hunt et al., Journal of General Internal Medicine, doi:10.1007/ s11606-022-07701-3	Medications Associated with Lower Mortality in a SARS-CoV-2 Positive Cohort of 26,508 Veterans
	47% lower mortality (p=0.0007). Retrospective 26,508 consecutive COVID+ veterans in the USA, showing lower mortality with multiple treatments including vitamin D. Treatment was defined as drugs administered ≥50% of the time within 2 weeks post-COVID+, and may be a conti..	
Jun 26 2022	Nicolescu et al., Farmacia, doi:10.31925/ farmacia.2022.3.17	The evaluation of vitamin D deficiency as a risk factor in the case of patients with moderate COVID-19
	Retrospective 128 hospitalized patients in Romania, showing a negative outcome associated with lower vitamin D levels.	
Jun 23 2022	Alzahrani et al., Cureus, doi:10.7759/ cureus.26266	The Association Between Vitamin D Serum Level and COVID-19 Patients' Outcomes in a Tertiary Center in Saudi Arabia: A Retrospective Cohort Study
	43% lower mortality (p=0.46) and 7% lower ICU admission (p=0.8). Retrospective 545 hospitalized patients in Saudi Arabia, showing higher mortality with vitamin D deficiency, without statistical significance.	

<p>Jun 23 2022</p>	<p>Karonova et al., Nutrients, doi:10.3390/ nu14132602</p>	<p>Effect of Cholecalciferol Supplementation on the Clinical Features and Inflammatory Markers in Hospitalized COVID-19 Patients: A Randomized, Open-Label, Single-Center Study</p> <p>86% lower ICU admission (p=0.11) and 7% lower need for oxygen therapy (p=0.85). RCT with 56 cholecalciferol and 54 control hospitalized patients with vitamin D insufficiency or deficiency in Russia, showing positive effects on immune status. The median age in the treatment group was 7 years lower and deficiency was I..</p>
<p>Jun 17 2022</p>	<p>Shahid et al., Abstracts from the 2022 Annual Meeting of the Society of General Internal Medicine, Journal of General Internal Medicine, doi:10.1007/ s11606-022-07653-8</p>	<p>The effects of vitamin D therapy on outcomes for hispanic patients hospitalized for COVID-19</p> <p>38% lower mortality (p=0.001). Retrospective 1,478 hospitalized Hispanic patients in the USA with 705 receiving vitamin D treatment, showing lower mortality with treatment in unadjusted results. Very minimal information is currently available.</p>
<p>Jun 14 2022</p>	<p>Neves et al., Clinical Nutrition ESPEN, doi:10.1016/ j.clnesp.2022.05.027</p>	<p>Vitamin D deficiency predicts 30-day hospital mortality of adults with COVID-19</p> <p>57% lower mortality (p=0.05) and 20% higher ICU admission (p=0.81). Retrospective 115 hospitalized patients in Brazil, showing lower mortality with higher vitamin D levels. Adjusted results are only provided for vitamin D as a continuous variable.</p>
<p>Jun 1 2022</p>	<p>Singh et al., Abstracts Criticare - IJCCM2022, Indian J. Crit. Care Med., doi:10.5005/ijccm-26-S1- S1</p>	<p>Single, High Dose Vitamin D Supplementation in Vitamin D Deficient Severe COVID-19: Randomized, Double-Blind, Placebocontrol Study (Shade-S)</p>

	<p>45% lower mortality (p=0.05). RCT 90 vitamin D deficient moderate/severe COVID-19 ARDS patients in India, showing lower mortality with vitamin D treatment. 600,000IU nanoformulation cholecalciferol. Minimal information is currently available.</p>	
<p>May 31 2022</p>	<p>Annweiler et al., PLoS Medicine, doi:10.1371/ journal.pmed.1003999</p>	<p>High-dose versus standard-dose vitamin D supplementation in older adults with COVID-19 (COVIT-TRIAL): A multicenter, open-label, randomized controlled superiority trial</p>
	<p>30% lower mortality (p=0.29). RCT comparing single dose 400,000IU and single dose 50,000IU vitamin D in France, showing lower mortality with the higher dose, statistically significant only at day 14. The aHR for days 0-5 was 1.30 [0.31-5.35], compared to 0.11 [0.02-0...</p>	
<p>May 30 2022</p>	<p>Baykal et al., Journal of Health Sciences and Medicine, doi:10.32322/ jhsm.1063405</p>	<p>Correlation of vitamin D level with the clinical-radiological severity of COVID-19 in geriatric patients</p>
	<p>22% lower mortality (p=0.43) and 59% lower ICU admission (p=0.005). Retrospective 75 patients in Turkey showing lower ICU admission with vitamin D treatment in unadjusted results subject to confounding by time and indication (treatment was given to patients with low levels and only during a certain period..</p>	
<p>May 30 2022</p>	<p>Kumar et al., Cureus, doi:10.7759/ cureus.25467</p>	<p>Efficacy and Safety of Aspirin, Promethazine, and Micronutrients for Rapid Clinical Recovery in Mild to Moderate COVID-19 Patients: A Randomized Controlled Clinical Trial</p>
	<p>89% improved recovery (p=0.05). RCT 260 patients in India, 130 treated with aspirin, promethazine, vitamin C, D, B3, zinc, and selenium, showing faster recovery with treatment. There was no hospitalization, ICU admission, or supplemental oxygen requirements in either gr..</p>	
<p>May 27 2022</p>	<p>Galmés et al., Nutrients, doi:10.3390/nu14112254</p>	<p>Suboptimal Consumption of Relevant Immune System Micronutrients Is Associated with a Worse Impact of COVID-19 in Spanish Populations</p>
	<p>Ecological study in Spain, showing lower intake of vitamin D, A, B9, and zinc in regions with the highest COVID-19 incidence and mortality. Vitamin D intake was associated with lower prevalence, incidence, and a combined incidence+mortality..</p>	

<p>May 27 2022</p>	<p>Mariani et al., PLOS ONE, doi:10.1371/journal.pone.0267918</p>	<p>High-dose vitamin D versus placebo to prevent complications in COVID-19 patients: Multicentre randomized controlled clinical trial</p> <p>25% lower ventilation (p=0.85), 27% lower ICU admission (p=0.62), and 3% lower progression (p=0.82). Late stage RCT with 115 patients treated with a single dose of 500,000IU cholecalciferol and 103 placebo patients, showing no significant differences. Authors do not explain why they did very late treatment with cholecalciferol instead of..</p>
<p>May 22 2022</p>	<p>Fiore et al., Healthcare, doi:10.3390/healthcare10050956</p>	<p>Effectiveness of Vitamin D Supplements among Patients Hospitalized for COVID-19: Results from a Monocentric Matched-Cohort Study</p> <p>93% lower mortality (p=0.02), 50% lower ventilation (p=0.36), 50% lower ICU admission (p=0.36), and 48% lower progression (p=0.04). Retrospective 116 patients with D levels < 30ng/mL, 58 treated with vitamin D 100,000IU daily for two days, and 58 matched controls, showing significantly lower mortality with treatment.</p>
<p>May 20 2022</p>	<p>Hosseini et al., Nutrients, doi:10.3390/nu14102134</p>	<p>Effects of Vitamin D Supplementation on COVID-19 Related Outcomes: A Systematic Review and Meta-Analysis</p> <p>54% lower mortality (p=0.0004), 65% lower ICU admission (p=0.0003), and 9% fewer cases (p=0.11). Systematic review and meta analysis showing significantly lower ICU admission and mortality with vitamin D treatment. There was no significant difference for cases.</p>
<p>May 16 2022</p>	<p>Ozturk et al., Bratislava Medical Journal, doi:10.4149/BLL_2022_065</p>	<p>Is there a relationship between vitamin D levels, inflammatory parameters, and clinical severity of COVID-19 infection?</p> <p>46% lower severe cases (p=0.1). Retrospective 300 hospitalized patients in Turkey with vitamin D levels measured with 6 months before admission, showing no significant difference in severity based on vitamin D deficiency.</p>
<p>May 13</p>	<p>Zangeneh et al., Obesity Medicine, doi:10.1016/j.obmed.2022.100420</p>	<p>Survival analysis based on body mass index in patients with Covid-19 admitted to the intensive care unit of Amir Al-Momenin Hospital in Arak – 2021</p>

2022		26% higher mortality (p=0.4) . Retrospective 193 ICU patients in Iran, showing no significant difference with vitamin D treatment.
May 13 2022	Galluzzo et al., Mechanisms of Ageing and Development, doi:10.1016/ j.mad.2022.111684	Association between vitamin D status and physical performance in COVID-19 survivors: Results from the Gemelli against COVID-19 post-acute care project
		Analysis of 681 COVID-19 survivors in Italy, showing a high prevalence of vitamin D deficiency. Low vitamin D levels were associated with poor physical performance, and were more common in patients that had been hospitalized.
May 11 2022	Jabeen et al., Pakistan Journal of Medical and Health Sciences, doi:10.53350/ pjmhs221631053	Protective Effect of Vitamin-D Supplementation in Patients of Acute Coronary Syndrome During COVID-19 Pandemic
		89% fewer symptomatic cases (p=0.11) . Prospective study of 40 acute coronary syndrome patients in Pakistan, 20 given a single dose of 200,000IU vitamin D, showing lower incidence of COVID-19 in the following 2 months.
May 7 2022	Kazemi et al., BMC Infectious Diseases, doi:10.1186/ s12879-022-07438-8	Comparison of the cardiovascular system, clinical condition, and laboratory results in COVID-19 patients with and without vitamin D insufficiency
		76% lower mortality (p=0.26) and 5% higher severe cases (p=1) . Retrospective 202 hospitalized COVID-19 patients in Iran, showing no significant difference in outcomes based on vitamin D levels.
May 5 2022	Charkowick et al., AJRCCM Conference	Vitamin D Deficiency and Thrombosis in Hospitalized SARS-CoV-2 Patients with Suspected Pulmonary Embolism
		73% lower mortality (p=0.02) and 67% lower ICU admission (p=0.001) . Retrospective 208 hospitalized COVID+ patients in the USA, showing vitamin D deficiency associated with higher mortality and ICU admission.

<p>May 3 2022</p>	<p>Nguyen et al., PLOS ONE, doi:10.1371/journal.pone.0268038</p>	<p>25-hydroxyvitamin D is a predictor of COVID-19 severity of hospitalized patients</p> <p>81% lower mortality (p=0.008), 53% lower ventilation (p=0.13), and 74% higher hospital discharge (p<0.0001). Retrospective 88 COVID-19 hospitalized patients and 122 controls, showing higher mortality, ventilation, and length of stay with vitamin D deficiency.</p>
<p>May 1 2022</p>	<p>Khan et al., Frontiers in Pharmacology, doi:10.3389/fphar.2022.898062</p>	<p>Oral Co-Supplementation of Curcumin, Quercetin, and Vitamin D3 as an Adjuvant Therapy for Mild to Moderate Symptoms of COVID-19—Results From a Pilot Open-Label, Randomized Controlled Trial</p> <p>33% improved recovery (p=0.15) and 50% improved viral clearance (p=0.009). RCT 50 COVID+ outpatients in Pakistan, 25 treated with curcumin, quercetin, and vitamin D, showing significantly faster viral clearance, significantly improved CRP, and faster resolution of acute symptoms (p=0.154). 168mg curcumin, 260mg ..</p>
<p>Apr 30 2022</p>	<p>Voelkle et al., Nutrients, doi:10.3390/nu14091862</p>	<p>Prevalence of Micronutrient Deficiencies in Patients Hospitalized with COVID-19: An Observational Cohort Study</p> <p>23% lower combined mortality/ICU admission (p=0.55). Prospective study of 57 consecutive hospitalized COVID-19 patients in Switzerland, showing higher risk of mortality/ICU admission with vitamin A, vitamin D, and zinc deficiency, with statistical significance only for vitamin A and zinc. A..</p>
<p>Apr 26 2022</p>	<p>Valecha et al., International Journal of Pharmaceutical and Clinical Research, 14:5</p>	<p>The Effect of Vitamin B12, Magnesium and Vitamin D in COVID-19 among Geriatric Patients</p> <p>87% lower ICU admission (p=0.09) and 38% shorter hospitalization (p<0.0001). Prospective study of 30 patients treated with vitamin D, magnesium, and vitamin B12, and 25 control patients, showing shorter hospitalization and lower oxygen and ICU requirements with treatment. Cholecalciferol 1000IU, magnesium oxide 15..</p>
<p>Apr 26 2022</p>	<p>Kalichuran et al., Southern African Journal of Infectious Diseases, doi:10.4102/sajid.v37i1.359</p>	<p>Vitamin D status and COVID-19 severity</p>

		<p>60% fewer symptomatic cases (p<0.0001). Prospective study of 100 COVID-19 patients in South Africa, 50 with COVID-19 pneumonia and 50 asymptomatic, showing higher risk of symptomatic COVID-19 with vitamin D deficiency and with lower exposure to sunlight. Authors analyzed sunlig..</p>
Apr 20 2022	<p>Pandya et al., Informatics in Medicine Unlocked, doi:10.1016/j.imu.2022.100951</p>	<p>Unravelling Vitamin B12 as a potential inhibitor against SARS-CoV-2: A computational approach</p>
		<p>In Silico study showing significant interaction with SARS-CoV-2 targets for multiple vitamins.</p>
Apr 20 2022	<p>Karimian et al., European Journal of Translational Myology, doi:10.4081/ejtm.2022.10453</p>	<p>Association of vitamin D and severity of COVID-19 in children</p>
		<p>Analysis of 99 pediatric COVID-19 cases in Iran, mean age 2.9, showing severity associated with vitamin D levels.</p>
Apr 18 2022	<p>Villasis-Keever et al., Archives of Medical Research, doi:10.1016/j.arcmed.2022.04.003</p>	<p>Efficacy and Safety of Vitamin D Supplementation to Prevent COVID-19 in Frontline Healthcare Workers. A Randomized Clinical Trial</p>
		<p>78% fewer cases (p=0.001). RCT 321 healthcare workers in Mexico, showing significantly lower SARS-CoV-2 infection with vitamin D prophylaxis. 4,000IU daily for 30 days. In comparison to [Jolliffe], this study used a higher dose, the participants had much higher exp..</p>
Apr 14 2022	<p>Torres et al., Biomedicine & Pharmacotherapy, doi:10.1016/j.biopha.2022.112965</p>	<p>Changes in the immune response against SARS-CoV-2 in individuals with severe COVID-19 treated with high dose of vitamin D</p>
		<p>28% lower ARDS (p=0.74) and 31% shorter hospitalization. RCT comparing 41 patients treated with 10,000IU/day cholecalciferol and 44 treated with 2,000IU/day in Spain, showing significantly shorter hospitalization for ARDS patients with the higher dose. There was also an increase of anti-inflamm..</p>
	<p>Parant et al., Nutrients, doi:10.3390/nu14081641</p>	<p>Vitamin D and COVID-19 Severity in Hospitalized Older Patients: Potential Benefit of Prehospital Vitamin D Supplementation</p>

Apr 14 2022	<p>50% lower mortality ($p=0.11$), 51% lower ICU admission ($p=0.008$), and 39% lower severe cases ($p=0.01$). Retrospective 228 hospitalized COVID-19 patients, median age 78, showing significantly lower risk of ICU admission and severe cases with vitamin D prophylaxis. NCT04877509.</p>	
Apr 9 2022	<p>Takase et al., Clinical Nutrition ESPEN, doi:10.1016/j.clnesp.2022.04.003</p>	<p>Association between 25-hydroxyvitamin D levels and COVID-19 severity</p>
<p>Retrospective 117 consecutive COVID+ hospitalized patients in Japan, showing lower vitamin D levels associated with mechanical ventilation or mortality.</p>		
Apr 5 2022	<p>Latifi-Pupovci et al., Scientific Reports, doi:10.1038/s41598-022-09785-7</p>	<p>Relationship of anti-SARS-CoV-2 IgG antibodies with Vitamin D and inflammatory markers in COVID-19 patients</p>
<p>Prospective study of 69 COVID+ patients in Kosovo, showing lower vitamin D levels associated with COVID-19 severity.</p>		
Mar 31 2022	<p>Martínez-Rodríguez et al., Gaceta Médica de México, doi:10.24875/GMM.M22000637</p>	<p>Evaluation of the usefulness of vitamin D as a predictor of mortality in patients with COVID-19</p>
<p>52% lower mortality ($p=0.04$). Retrospective 154 consecutive COVID-19 patients in Mexico, showing low vitamin D levels associated with higher mortality.</p>		
Mar 29 2022	<p>Hafez et al., Frontiers in Medicine, doi:10.3389/fmed.2022.843737</p>	<p>Vitamin D Status in Relation to the Clinical Outcome of Hospitalized COVID-19 Patients</p>
<p>98% lower mortality ($p=0.02$). Retrospective 126 hospitalized COVID-19 patients in the UAE, showing vitamin D deficiency associated with mortality.</p>		

Mar 26 2022	Ferrer-Sánchez et al., International Journal of Environmental Research and Public Health, doi:10.3390/ ijerph19073965	Serum 25(OH) Vitamin D Levels in Pregnant Women with Coronavirus Disease 2019 (COVID-19): A Case-Control Study
	63% fewer cases (p=0.01). Retrospective 256 pregnant women, 82 with COVID-19 and 174 controls, showing significantly lower vitamin D levels for COVID-19 patients.	
Mar 23 2022	Ghanei et al., European Journal of Clinical Nutrition, doi:10.1038/ s41430-022-01095-5	Low serum levels of zinc and 25-hydroxyvitmain D as potential risk factors for COVID-19 susceptibility: a pilot case-control study
	42% fewer cases (p=0.09). Case control study with 90 COVID-19 cases and 95 matched controls in Iran, showing significantly lower vitamin D levels for cases.	
Mar 23 2022	Jolliffe et al., BMJ, doi:10.1136/ bmj-2022-071230 (date from preprint)	Effect of a test-and-treat approach to vitamin D supplementation on risk of all cause acute respiratory tract infection and covid-19: phase 3 randomised controlled trial (CORONAVIT)
	41% higher hospitalization (p=0.16) and 9% more cases (p=0.55). RCT 5,979 low risk patients (0 COVID-19 deaths) in the UK, showing no significant differences with vitamin D prophylaxis. CORONAVIT. NCT04579640. For more discussion see [reddit.com , twitter.com] . 51% of confirmed COVID-19 cases were ..	
Mar 16 2022	Pande et al., Journal of Communicable Diseases, doi:10.24321/0019.5138. 202227	Vitamin D Levels and its Association with Inflammatory Markers, Severity and Outcome in Hospitalised COVID-19 Patients - An Indian Perspective
	93% lower severe cases (p<0.0001). Retrospective 209 hospitalized patients in India, showing vitamin D deficiency associated with COVID-19 severity.	

<p>Mar 10 2022</p>	<p>DiGuilio et al., International Journal of Molecular Sciences, doi:10.3390/ ijms23062995</p>	<p>Micronutrient Improvement of Epithelial Barrier Function in Various Disease States: A Case for Adjuvant Therapy</p>
<p>Review of epithelial and endothelial barrier compromise and associated disease risk including COVID-19, and the potential benefits of vitamin A, vitamin D, and zinc for improving barrier function.</p>		
<p>Mar 7 2022</p>	<p>Wadi Al Ramahi et al., The International Arabic Journal of Antimicrobial Agents, doi:10.3823/862</p>	<p>The Effect of Vitamin D treatment on COVID 19- Patients, an Inverted Propensity Score Weighting (IPSW), and Inverted Probability of Treatment Weighting (IPTW) Analyzed Study</p>
<p>Retrospective study comparing 847 patients receiving $\leq 149,000$ IU vitamin D and 170 receiving $\geq 150,000$ IU, showing no significant differences, however the result may not be very meaningful - membership in the higher cumulative dose group req..</p>		
<p>Mar 2 2022</p>	<p>Karonova et al., Pharmaceuticals, doi:10.3390/ph15030305</p>	<p>Vitamin D Status and Immune Response in Hospitalized Patients with Moderate and Severe COVID-19</p>
<p>22% lower severe cases (p=0.01). Retrospective 331 hospitalized patients in Russia, showing lower risk of severe cases with higher vitamin D levels.</p>		
<p>Feb 28 2022</p>	<p>Shehab et al., Tropical Journal of Pharmaceutical Research, doi:10.4314/ tjpr.v21i2.13</p>	<p>Immune-boosting effect of natural remedies and supplements on progress of, and recovery from COVID-19 infection</p>
<p>46% lower severe cases (p=0.2). Retrospective survey-based analysis of 349 COVID-19 patients, showing a lower risk of severe cases with vitamin D, zinc, turmeric, and honey prophylaxis in unadjusted analysis, without statistical significance. REC/UG/2020/03.</p>		

Feb 28 2022	Nimer et al., Bosnian Journal of Basic Medical Sciences, doi:10.17305/ bjbms.2021.7009	The impact of vitamin and mineral supplements usage prior to COVID-19 infection on disease severity and hospitalization
	33% lower hospitalization (p=0.001) and 29% lower severe cases (p=0.01). Retrospective 2,148 COVID-19 recovered patients in Jordan, showing lower risk of severity and hospitalization with vitamin D prophylaxis.	
Feb 24 2022	Rodríguez-Vidales et al., Nutrición Hospitalaria, doi:10.20960/nh.03731	Severe COVID-19 patients have severe vitamin D deficiency in Northeast Mexico
	39% lower severe cases (p=0.05). Retrospective 181 diagnostic center patients and 116 ICU patients in Mexico, showing higher risk of severity with vitamin D levels <10ng/mL.	
Feb 24 2022	Kory et al., Journal of Clinical Medicine Research, doi:10.14740/ jocmr4658	"MATH+" Multi-Modal Hospital Treatment Protocol for COVID-19 Infection: Clinical and Scientific Rationale
	Review of the data supporting the MATH+ hospital treatment protocol for COVID-19.	
Feb 22 2022	Tylicki et al., Viruses, doi:10.3390/v14030451	Angiotensin Converting Enzyme Inhibitors May Increase While Active Vitamin D May Decrease the Risk of Severe Pneumonia in SARS-CoV-2 Infected Patients with Chronic Kidney Disease on Maintenance Hemodialysis
	45% lower severe cases (p=0.02). Retrospective 85 COVID+ hemodialysis patients in Poland, showing lower severity with existing vitamin D use. Patients in this study are also analyzed in [Tylicki].	
Feb 21 2022	Saeed et al., The Egyptian Journal of Internal Medicine, doi:10.1186/ s43162-022-00116-w	Cholecalciferol level and its impact on COVID-19 patients
	Prospective study of 414 COVID+ ICU patients in Egypt, showing mortality associated with lower vitamin D levels.	

Feb 19 2022	Zidrou et al., Cureus, doi:10.7759/ cureus.22385	The Relationship Between Vitamin D Status and the Clinical Severity of COVID-19 Infection: A Retrospective Single-Center Analysis 18% lower progression (p=0.26) and 38% shorter hospitalization (p=0.16). Retrospective 71 hospitalized COVID-19 patients in Greece with vitamin D levels measured within 48 hours of admission, showing longer hospitalization, more radiographic findings, and higher inflammatory and cellular damage markers with vi..
Feb 19 2022	Sanson et al., Irish Journal of Medical Science (1971 -), doi:10.1007/ s11845-022-02952-9	A combined role for low vitamin D and low albumin circulating levels as strong predictors of worse outcome in COVID-19 patients 64% lower progression (p=0.03). Prospective study of 69 hospitalized COVID-19 pneumonia patients, showing higher risk of combined NIV/IMV/60-day death with low vitamin D levels.
Feb 18 2022	Cannata-Andía et al., BMC Medicine, doi:10.1186/ s12916-022-02290-8	A single-oral bolus of 100,000 IU of cholecalciferol at hospital admission did not improve outcomes in the COVID-19 disease: the COVID-VIT-D — a randomised multicentre international clinical trial 44% higher mortality (p=0.31), 5% higher ICU admission (p=0.82), and 5% longer hospitalization. RCT 274 very late stage (>80% pulmonary involvement at baseline) hospitalized COVID-19 patients treated with a single dose of cholecalciferol, and 269 control patients, showing no significant differences. High serum calcidiol levels at ad..
Feb 17 2022	Junior et al., BMC Geriatrics, doi:10.1186/ s12877-022-02776-3	Chronic diseases, chest computed tomography, and laboratory tests as predictors of severe respiratory failure and death in elderly Brazilian patients hospitalized with COVID-19: a prospective cohort study 22% lower mortality (p=0.61) and 31% lower progression (p=0.26). Prospective study of 201 COVID+ hospitalized adults in Brazil, mean age 73, showing a lower risk of mortality and respiratory failure with vitamin D supplementation in unadjusted results, without statistical significance, and a higher ris..
Feb 15	Shah et al., QJM: An International Journal of Medicine, doi:10.1093/ qjmed/hcac040	Does vitamin D supplementation reduce COVID-19 severity? - a systematic review

<p>15 2022</p>	<p>52% lower mortality ($p<0.0001$), 46% lower ventilation ($p<0.0001$), and 64% lower ICU admission ($p<0.0001$). Meta-analysis of seven systematic reviews showing that vitamin D supplementation reduces the risk of COVID-19 mortality, ventilation, and ICU admission. Authors note that oral and IV supplements were well tolerated, safe, and effective.</p>	
<p>Feb 8 2022</p>	<p>Bushnaq et al., International Journal of Environmental Research and Public Health, doi:10.3390/ ijerph19031901</p>	<p>The Impact of Vitamin D Status on COVID-19 Severity among Hospitalized Patients in the Western Region of Saudi Arabia: A Retrospective Cross-Sectional Study</p> <p>32% lower ventilation ($p=0.27$) and 4% lower ICU admission ($p=0.87$). Retrospective 197 hospitalized patients in Saudi Arabia, showing no significant differences based on vitamin D levels. Adjusted results are provided only for vitamin D as a continuous variable.</p>
<p>Feb 5 2022</p>	<p>Bishop et al., Nutrition, doi:10.1016/ j.nut.2022.111899 (date from preprint)</p>	<p>REsCue Trial: Randomized Controlled Clinical Trial with Extended-Release Calcifediol in Symptomatic COVID-19 Outpatients</p> <p>34% improved recovery ($p=0.56$). Small RCT with low-risk patients in Florida, USA, showing no significant differences in overall recovery. Minimal details on outcomes are provided in the preprint. Authors note significantly faster resolution of respiratory symptoms when ..</p>
<p>Feb 2 2022</p>	<p>Grant et al., Nutrients, doi:10.3390/nu14030639</p>	<p>A Narrative Review of the Evidence for Variations in Serum 25-Hydroxyvitamin D Concentration Thresholds for Optimal Health</p> <p>Review of the benefits of vitamin D for cardiovascular disease, hypertension, cancer, type 2 diabetes, and COVID-19. Authors conclude that optimal levels are above 30ng/mL for cardiovascular disease and all-cause mortality, whereas the th..</p>
<p>Jan 31</p>	<p>AlKhafaji et al., International Journal of General Medicine, doi:10.2147/ijgm.s346169</p>	<p>The Impact of Vitamin D Level on the Severity and Outcome of Hospitalized Patients with COVID-19 Disease</p>

2022	<p>39% lower mortality ($p=0.5$), 31% lower ventilation ($p=0.51$), and 42% lower ICU admission ($p=0.2$). Retrospective 203 hospitalized COVID-19 patients in Saudi Arabia, showing no significant difference in outcomes with vitamin D deficiency.</p>	
Jan 31 2022	<p>Levy et al., Gerontology, doi:10.1159/000521412</p>	<p>Frail Older Adults with Presymptomatic SARS-CoV-2 Infection: Clinical Course and Prognosis</p>
	<p>30% lower combined mortality/hospitalization ($p=0.05$). Retrospective 849 COVID-19+ patients in skilled nursing homes, showing lower risk of combined hospitalization/death with vitamin D prophylaxis, very close to statistical significance.</p>	
Jan 31 2022	<p>Subramanian et al., The American Journal of Clinical Nutrition, doi:10.1093/ajcn/nqac027</p>	<p>Vitamin D, D-binding protein, free vitamin D and COVID-19 mortality in hospitalized patients</p>
	<p>27% lower mortality ($p=0.12$). Retrospective 427 hospitalized COVID-19 patients in the United Kingdom, showing lower mortality with vitamin D supplementation ($p=0.12$), and higher mortality with both low and high vitamin D levels compared to a reference range of 50-74 n..</p>	
Jan 29 2022	<p>Mohajeri et al., Mediterranean Journal of Nutrition and Metabolism, doi:10.3233/MNM-211521</p>	<p>The difference in the dietary inflammatory index, functional food, and antioxidants intake between COVID -19 patients and healthy persons</p>
	<p>Retrospective dietary survey analysis of 500 COVID-19 patients and 500 healthy matched controls in Iran, showing that COVID-19 patients had lower daily consumption of vitamin C, vitamin D, vitamin E, zinc, and selenium. IR.ARUMS.REC.1400...</p>	
Jan 27 2022	<p>Schmitt et al., Journal of Medical Virology, doi:10.1002/jmv.27606</p>	<p>Oxidative stress status and vitamin D levels of asymptomatic to mild symptomatic COVID-19 infections during the third trimester of pregnancy: A retrospective study in Metz, France</p>
	<p>Retrospective 15 COVID+ pregnant women and 20 healthy controls in France, showing that all COVID+ patients were vitamin D deficient, and vitamin D levels were significantly lower in symptomatic patients compared to controls or asymptomatic.</p>	

<p>Jan 24 2022</p>	<p>Karonova et al., Nutrients, doi:10.3390/ nu14030505</p>	<p>Vitamin D Intake May Reduce SARS-CoV-2 Infection Morbidity in Health Care Workers</p> <p>95% fewer symptomatic cases (p=0.002) and 42% fewer cases (p=0.1). Small RCT in Russia with 45 high dose vitamin D patients (50,000IU/wk for 2 wks followed by 5,000IU/day) and 46 low dose patients (2,000IU/day), showing lower cases and lower symptomatic cases with high dose treatment.</p>
<p>Jan 24 2022</p>	<p>Saponaro et al., Frontiers in Immunology, doi:10.3389/ fimmu.2021.745713</p>	<p>Is There a Crucial Link Between Vitamin D Status and Inflammatory Response in Patients With COVID-19?</p> <p>36% lower ARDS (p=0.43). Retrospective 93 COVID-19 pneumonia patients in Italy, showing low vitamin D levels associated with severe ARDS, and significantly lower vitamin D levels for non-survivors.</p>
<p>Jan 22 2022</p>	<p>Juraj et al., International Journal of Infectious Diseases, doi:10.1016/ j.ijid.2022.01.044</p>	<p>COVID-19 pneumonia patients with 25(OH)D levels lower than 12 ng/ml are at increased risk of death</p> <p>19% lower mortality (p=0.05). Retrospective 357 COVID-19 pneumonia patients in Slovakia, showing higher mortality with vitamin D deficiency (<12ng/mL). All patients received vitamin D supplementation in hospital. In multivariable linear regression, vitamin D levels we..</p>
<p>Jan 15 2022</p>	<p>Tentolouris et al., Diabetes/Metabolism Research and Reviews, doi:10.1002/dmrr.3517</p>	<p>The effect of vitamin D supplementation on mortality and intensive care unit admission of COVID-19 patients. A systematic review, meta-analysis and meta-regression</p> <p>40% lower mortality (p=0.11) and 67% lower ICU admission (p=0.005). Systematic review and meta analysis of 10 vitamin D studies showing lower mortality, and ICU admission with treatment, statistically significant only for ICU admission.</p>
<p>Jan 15 2022</p>	<p>Soltani-Zangbar et al., Gene Reports, doi:10.1016/ j.genrep.2022.101509</p>	<p>Serum levels of vitamin D and immune system function in patients with COVID-19 admitted to intensive care unit</p>

	Analysis of 50 COVID-19 ICU patients and 50 healthy controls in Iran, showing significantly lower vitamin D levels in COVID-19 patients.	
Jan 13 2022	Mansouri et al., Scientific Reports, doi:10.1038/s41598-022-04778-y	The impact of calcitriol and estradiol on the SARS-CoV-2 biological activity: a molecular modeling approach
	In Silico study predicting that calcitriol and estradiol disrupt the interaction between the SARS-CoV-2 spike protein and ACE2. Authors note that calcitriol may be more effective in the presence of estradiol.	
Jan 13 2022	Regalia et al., Nutrients, doi:10.3390/nu14020317	Vitamin D Status and SARS-CoV-2 Infection in a Cohort of Kidney Transplanted Patients
	33% fewer cases (p=0.21). Retrospective 61 COVID+ kidney transplant patients and 122 matched controls, showing significantly lower vitamin D levels in COVID+ patients, and lower cases with vitamin D supplementation, without statistical significance.	
Jan 7 2022	Al-Saleh et al., BioMetals, doi:10.1007/s10534-021-00355-48	Essential metals, vitamins and antioxidant enzyme activities in COVID-19 patients and their potential associations with the disease severity
	Prospective study of 155 COVID-19 patients in Saudi Arabia, showing that 68% of patients were vitamin D deficient (<20.05 µg/L). Vitamin D levels were not significantly different between the asymptomatic (mean 10.9 µg/L), mild (14.2 µg/L)..	
Jan 6 2022	Tylicki et al., Journal of Clinical Medicine, doi:10.3390/jcm11020285	Predictors of Mortality in Hemodialyzed Patients after SARS-CoV-2 Infection
	14% lower mortality (p=0.61). Retrospective 133 COVID+ hemodialysis patients in Poland, showing lower mortality with existing vitamin D use, without statistical significance.	
Jan 1 2022	Seal et al., Journal of General Internal Medicine, doi:10.1007/s11606-021-07170-0	Association of Vitamin D Status and COVID-19-Related Hospitalization and Mortality

			<p>45% lower mortality (p=0.001) and 22% lower hospitalization (p=0.01). Retrospective 4,599 COVID+ veterans in the USA with vitamin D levels measured 15 to 90 days prior to testing positive, showing a significant independent inverse dose-response relationship between vitamin D levels (from 15 to 60ng/mL) and ..</p>
Jan 1 2022	<p>Bilir et al., Journal of Contemporary Medicine, doi:10.16899/jcm.990057</p>	<p>Does Vitamin D Supplementation Reduce Cytokine Storm and Mortality in Geriatric Intensive Care Patients Diagnosed with COVID-19</p>	<p>23% lower mortality (p=0.26), 3% lower ventilation (p=1), 20% improved recovery (p=0.13), and 10% shorter ICU admission (p=0.44). Retrospective 80 elderly ICU patients in Turkey, 40 with vitamin D levels <30ng/ml received vitamin D treatment, showing no significant differences in outcomes. Although not statistically significant, results favored treatment which sugge..</p>
Dec 31 2021	<p>Jabbar et al., Nat. Volatiles & Essent. Oils, 8:4</p>	<p>Vitamin D Serum Levels and Its Association With COVID 19 Infection In Babylon Governorate, Iraq</p>	<p>Analysis of 120 COVID-19 and 120 control patients in Iraq, showing significantly lower vitamin D levels for COVID-19 patients.</p>
Dec 31 2021	<p>Efird et al., International Journal of Environmental Research and Public Health, doi:10.3390/ijerph19010447</p>	<p>The Interaction of Vitamin D and Corticosteroids: A Mortality Analysis of 26,508 Veterans Who Tested Positive for SARS-CoV-2</p>	<p>49% lower mortality (p=0.1). Retrospective 26,508 COVID+ veterans in USA, showing lower mortality with vitamin D use after testing positive (defined as being administered ≥7 days or half of the survival time within 2 weeks after testing), with statistical significanc..</p>
Dec 29 2021	<p>Mahmood et al., European Journal of Medical and Health Sciences, doi:10.24018/ejmed.2021.3.6.1159</p>	<p>Coronavirus in HIP Fractures CHIP 2: Is Vitamin D Deficiency Associated with Increased Mortality from COVID-19 Infections in A Hip Fracture Population?</p>	

		<p>9% lower mortality (p=0.67). Retrospective 517 hip fracture patients in the UK with vitamin D levels measured during COVID-19 admission, not showing significant differences in mortality for supplementation in unadjusted analysis with no group details and subject to c..</p>
Dec 28 2021	<p>Baguma et al., Research Square, doi:10.21203/rs.3.rs-1193578/v1</p>	<p>Characteristics of the COVID-19 patients treated at Gulu Regional Referral Hospital, Northern Uganda: A cross-sectional study</p>
		<p>97% lower mortality (p=0.02). Retrospective COVID+ hospitalized patients in Uganda, 23 patients receiving vitamin D treatment, showing significantly lower mortality with treatment.</p>
Dec 25 2021	<p>Apaydin et al., Clinical Endocrinology, doi:10.1111/cen.14664</p>	<p>Effects of vitamin D receptor gene polymorphisms on the prognosis of COVID-19</p>
		<p>Analysis of 297 hospitalized COVID-19 patients in Turkey, showing no significant association between vitamin D levels and severity, ICU admission, or mortality. VDR gene polymorphisms were independently associated with COVID-19 severity a..</p>
Dec 22 2021	<p>Chiodini et al., Frontiers in Public Health, doi:10.3389/fpubh.2021.736665</p>	<p>Vitamin D Status and SARS-CoV-2 Infection and COVID-19 Clinical Outcomes</p>
		<p>Meta analysis concluding that "patients with low vitamin D levels present an increased risk of ARDS requiring admission to intensive care unit (ICU) or mortality due to SARS-CoV-2 infection and a higher susceptibility to SARS-CoV-2 i..</p>
Dec 10 2021	<p>Putra et al., European Journal of Medical and Health Sciences, doi:10.24018/ejmed.2021.3.6.1131</p>	<p>Vitamin D Levels among Hospitalized and Non-Hospitalized COVID-19 Patients in Dr. M. Djamil General Hospital Padang</p>
		<p>26% lower hospitalization (p=0.59). Case control study in Indonesia with 31 moderate to critical hospitalized COVID-19 patients, and 31 asymptomatic or mild non-hospitalized COVID-19 patients, showing lower vitamin D levels in the hospitalized patients, without reaching sta..</p>

Dec 3 2021	Ma et al., The American Journal of Clinical Nutrition, doi:10.1093/ajcn/nqab389	Associations between predicted vitamin D status, vitamin D intake, and risk of SARS-CoV-2 infection and Coronavirus Disease 2019 severity 49% lower hospitalization (p=0.04), 7% more symptomatic cases (p=0.25), and 17% fewer cases (p=0.07). Analysis of 39,915 patients with 1,768 COVID+ cases based on surveys in the Nurses' Health Study II, showing higher predicted vitamin D levels associated with lower risk of COVID-19 cases. There was significantly lower risk of hospitaliza..
Nov 30 2021	Fatemi et al., Acute and Critical Care, doi:10.4266/acc.2021.00605	Association of vitamin D deficiency with COVID-19 severity and mortality in Iranian people: a prospective observational study 42% lower mortality (p=0.07) and 38% lower severe cases (p=0.007). Prospective study of 248 hospitalized COVID+ patients in Iran with vitamin D levels measured in the previous year and again at admission, showing vitamin D status associated with severity and mortality.
Nov 30 2021	Kaur et al., Indian Journal of Clinical Practice, 32:6	Correlation of Vitamin D Levels with COVID-19 Severity and Outcome 90% lower mortality (p<0.0001) and 90% lower ventilation (p<0.0001). Prospective study of 81 hospitalized COVID+ patients in India, showing low vitamin D levels associated with COVID-19 severity and mortality.
Nov 29 2021	Ranjbar et al., Journal of Research in Medical Sciences, doi:10.4103/jrms.JRMS_1151_20	Serum level of Vitamin D is associated with COVID-19 mortality rate in hospitalized patients 42% lower mortality (p=0.07). Retrospective 317 COVID-19 hospitalized patients in Iran, showing mortality associated with lower vitamin D levels.
Nov 24	Jenei et al., Clinical Nutrition ESPEN, doi:10.1016/j.clnesp.2021.11.025	COVID-19 mortality is associated with low Vitamin D levels in patients with risk factors and/or advanced age

2021	Retrospective 257 hospitalized patients in Hungary, showing mortality associated with lower vitamin D levels for all patients, for patients >60, and for age-matched patients with risk factors or age >60. The non-age-matched analyses are c..	
Nov 23 2021	Ahmed et al., BioMed Research International, doi:10.1155/2021/1676914	Factors Affecting the Incidence, Progression, and Severity of COVID-19 in Type 1 Diabetes Mellitus
	Retrospective type 1 diabetes patients in Saudi Arabia showing that mean vitamin D levels were significantly lower in type 1 diabetes patients with COVID-19 than in type 1 diabetes patients without COVID-19, or in a control group of patie..	
Nov 23 2021	Seven et al., The Journal of Maternal-Fetal & Neonatal Medicine, doi:10.1080/14767058.2021.2005564	Correlation between 25-hydroxy vitamin D levels and COVID-19 severity in pregnant women: a cross-sectional study
	47% lower severe cases (p=0.006). Prospective study of 403 pregnant COVID+ hospitalized women in Turkey, showing higher risk of severe disease or poor prognostic factors with vitamin D deficiency.	
Nov 21 2021	Ahmed et al., medRxiv, doi:10.1101/2021.11.18.21266489	Causal Inference and COVID-19 Nursing Home Patients: Identifying Factors That Reduced Mortality Risk
	10% lower mortality (p=0.28). Retrospective causal inference analysis of 4,091 COVID+ long-term care high risk patients in the USA, showing lower mortality with vitamin D, without statistical significance.	
Nov 21 2021	Asgari et al., Acta Medica Iranica, doi:10.18502/acta.v59i11.7779	Vitamin D Insufficiency in Disease Severity and Prognosis of the Patients With SARS Corona Virus-2 Infection
	73% lower mortality (p=0.03) and 66% lower progression (p=0.02). Retrospective 98 moderate/severe hospitalized COVID-19+ patients in Iran, showing significantly increased risk of mortality and severity with vitamin D deficiency. IR.AJAUMS.REC.1399.060.	

Nov 15 2021	Ramos et al., Global Journal of Health Science, doi:10.5539/ gjhs.v14n1p1	Vitamin D, Zinc and Iron in Adult Patients with Covid-19 and Their Action in the Immune Response as Biomarkers 46% fewer cases (p=0.16). Retrospective 13 COVID-19 patients and 7 controls in Brazil, showing higher prevalence of vitamin D deficiency for COVID-19 cases, without statistical significance.
Nov 14 2021	Beigmohammadi et al., Trials, doi:10.1186/ s13063-021-05795-4	The effect of supplementation with vitamins A, B, C, D, and E on disease severity and inflammatory responses in patients with COVID-19: a randomized clinical trial 89% lower mortality (p=0.11), 41% lower hospitalization (p=0.25), and 45% improved recovery (p=0.001). Small RCT 60 ICU patients in Iran, 30 treated with vitamins A, B, C, D, and E, showing significant improvement in SOFA score and several inflammatory markers at day 7 with treatment. 5,000 IU vitamin A daily, 600,000 IU vitamin D once, 30..
Nov 12 2021	Sacristán et al., Transplantation Proceedings, doi:10.1016/ j.transproceed.2021.08.0 60	Risk of severe COVID-19 infection in kidney transplant recipients Retrospective 63 COVID+ kidney transplant recipients, showing significantly lower vitamin D levels before infection in patients requiring ICU admission.
Nov 12 2021	Gönen et al., Nutrients, doi:10.3390/nu13114047	Rapid and Effective Vitamin D Supplementation May Present Better Clinical Outcomes in COVID-19 (SARS-CoV-2) Patients by Altering Serum INOS1, IL1B, IFNg, Cathelicidin-LL37, and ICAM1 21% lower hospitalization (p=0.11). Retrospective 867 hospitalized COVID-19 patients in Turkey, showing worse outcomes with vitamin D deficiency (without statistical significance); followed by a prospective study of 210 patients with vitamin D supplementation for those that..
Nov 10	Asghar et al., Am. J. Trop. Med. Hyg., doi:10.4269/ ajtmh.21-0577	Evaluation of Vitamin-D Status and Its Association with Clinical Outcomes Among COVID-19 Patients in Pakistan

10 2021	<p>53% lower mortality (p=0.05), 19% lower ventilation (p=0.32), and 33% lower ICU admission (p=0.54).</p> <p>Retrospective 91 hospitalized patients in Pakistan, showing vitamin D deficiency associated with mortality in multivariate Cox regression.</p>	
Nov 3 2021	<p>Gallelli et al., Nutrients, doi:10.3390/nu13113932</p>	<p>Vitamin D Serum Levels in Subjects Tested for SARS-CoV-2: What Are the Differences among Acute, Healed, and Negative COVID-19 Patients? A Multicenter Real-Practice Study</p>
	<p>Analysis of 117 patients in Italy, showing COVID-19 patients had significantly lower vitamin D levels than control patients.</p>	
Nov 2 2021	<p>Atanasovska et al., Redox Report, doi:10.1080/13510002.2021.1999126</p>	<p>Vitamin D levels and oxidative stress markers in patients hospitalized with COVID-19</p>
	<p>59% lower severe cases (p=0.13). Retrospective 33 COVID-19 hospitalized patients in North Macedonia, showing significantly lower vitamin D levels for severe vs. moderate cases. Oxidative stress was also higher for vitamin D insufficient patients.</p>	
Oct 25 2021	<p>Leal-Martínez et al., International Journal of Environmental Research and Public Health, doi:10.3390/ ijerph19031172 (date from preprint)</p>	<p>Effect of a Nutritional Support System to Increase Survival and Reduce Mortality in Patients with COVID-19 in Stage III and Comorbidities: A Blinded Randomized Controlled Clinical Trial</p>
	<p>86% lower mortality (p=0.03) and 57% lower ventilation (p=0.31). 80 patient RCT with 40 patients treated with a comprehensive regimen of nutritional support, showing significantly lower mortality with treatment. Treatment contained cholecalciferol, vitamin C, zinc, spirulina maxima, folic acid, glutami..</p>	
Oct 22	<p>Hurst et al., BMJ Open, doi:10.1136/ bmjopen-2021-055435</p>	<p>Vitamin D insufficiency in COVID-19 and influenza A, and critical illness survivors: a cross-sectional study</p>

2021	<p>68% lower mortality (p=0.005) and 66% lower ventilation (p=0.004). Analysis of 259 hospitalized COVID-19 patients in the UK, showing a majority of patients had vitamin D deficiency/insufficiency, which was associated with poor outcomes. Both free and total 25(OH)D were analyzed with consistent results...</p>	
Oct 20 2021	<p>Al-Anouti et al., Nutrients, doi:10.3390/nu13113680</p>	<p>Associations between Genetic Variants in the Vitamin D Metabolism Pathway and Severity of COVID-19 among UAE Residents</p>
<p>68% lower severe cases (p=0.0007). Retrospective 646 COVID-19 patients in the UAE, showing significant associations between genetic determinants of vitamin D metabolism and COVID-19 severity, and an association with vitamin D deficiency and COVID-19 severity. Patients in t..</p>		
Oct 15 2021	<p>Ramirez-Sandoval et al., Archives of Medical Research, doi:10.1016/ j.arcmed.2021.09.006</p>	<p>Very Low Vitamin D Levels are a Strong Independent Predictor of Mortality in Hospitalized Patients with Severe COVID-19</p>
<p>32% lower mortality (p<0.0001) and 22% shorter hospitalization (p=0.001). Retrospective 2,908 hospitalized patients in Mexico with vitamin D levels measured on admission, showing significantly lower mortality for patients without vitamin D deficiency.</p>		
Oct 13 2021	<p>Maghbooli et al., Endocrine Practice, doi:10.1016/ j.eprac.2021.09.016</p>	<p>Treatment with 25-hydroxyvitamin D3 (calcifediol) is associated with a reduction in the blood neutrophil-to-lymphocyte ratio marker of disease severity in patients hospitalized with COVID-19: a pilot, multicenter, randomized, placebo-controlled double blind clinical trial</p>
<p>40% lower ICU admission (p=0.42) and 17% shorter hospitalization (p=0.1). RCT 106 hospitalized patients with vitamin D levels <30ng/ml in Iran, 53 treated with calcifediol, showing that treatment was able to correct vitamin D deficiency/insufficiency, resulting in improved immune system function. Hospitalizatio..</p>		
Oct 12 2021	<p>Afaghi et al., The Tohoku Journal of Experimental Medicine, doi:10.1620/ tjem.255.127</p>	<p>Prevalence and Clinical Outcomes of Vitamin D Deficiency in COVID-19 Hospitalized Patients: A Retrospective Single-Center Analysis</p>
<p>55% lower mortality (p=0.002), 56% lower ventilation (p<0.0001), and 34% lower ICU admission (p=0.0001). Retrospective 646 COVID-19+ hospitalized patients in Iran, showing higher mortality with vitamin D deficiency.</p>		

Oct 12 2021	Worcel et al., Annals of Palliative Medicine, doi:10.21037/apm-21-1707	Low mortality from COVID-19 at a nursing facility in France following a combined preventive and active treatment protocol
	Report on the relatively low mortality and relatively mild COVID-19 symptoms at a French nursing facility that has adopted several treatments including vitamin D, zinc, anticoagulants, corticosteroids, and a multivitamin.	
Oct 9 2021	Caballero-García et al., Medicina, doi:10.3390/medicina57101079	Effect of Vitamin D Supplementation on Muscle Status in Old Patients Recovering from COVID-19 Infection
	Small RCT with 30 patients examining the effect of vitamin D supplementation on muscle status in elderly recovering COVID-19 patients, showing serum creatine kinase levels returned to optimal values, however there was no significant diffe..	
Oct 5 2021	Mukherjee et al., FEBS Open Bio, doi:10.1002/2211-5463.13309	Seasonal UV exposure and vitamin D: Association with the dynamics of COVID-19 transmission in Europe
	Analysis of UV and temperature levels in 26 European countries, showing that low temperature, UV index, and cloud-free vitamin D UV dose levels were negatively correlated with COVID-19 prevalence. Authors suggest that low UV exposure can ..	
Oct 2 2021	Abdollahzadeh et al., Infection, Genetics and Evolution, doi:10.1016/j.meegid.2021.105098	Association of Vitamin D receptor gene polymorphisms and clinical/severe outcomes of COVID-19 patients
	Analysis of 500 hospitalized patients in Iran, showing associations between specific vitamin D receceptor gene polymorphisms and COVID-19 outcomes.	
Sep 27	Yildiz et al., Bratislava Medical Journal, doi:10.4149/BLL_2021_119	The prognostic significance of vitamin D deficiency in patients with COVID-19 pneumonia

2021	<p>81% lower mortality (p=0.04), 94% lower ICU admission (p=0.13), and 10% shorter hospitalization (p=0.32). Retrospective 207 hospitalized patients in Turkey, 37 with vitamin D levels <30ng/ml treated with a 300,000IU vitamin D, showing lower mortality with treatment.</p>	
Sep 25 2021	<p>Borsche et al., Nutrients, doi:10.3390/nu13103596 (date from preprint)</p>	<p>COVID-19 Mortality Risk Correlates Inversely with Vitamin D3 Status, and a Mortality Rate Close to Zero Could Theoretically Be Achieved at 50 ng/mL 25(OH)D3: Results of a Systematic Review and Meta-Analysis</p>
	<p>Meta analysis of 8 studies with vitamin D levels measured pre-infection or on the day of hospital admission, showing a correlation between the levels and mortality. Authors recommend combining vaccination with vitamin D supplementation to..</p>	
Sep 24 2021	<p>Arroyo-Díaz et al., Frontiers in Public Health, doi:10.3389/fpubh.2021.758347</p>	<p>Previous Vitamin D Supplementation and Morbidity and Mortality Outcomes in People Hospitalised for COVID19: A Cross-Sectional Study</p>
	<p>12% higher mortality (p=0.59), 43% lower ventilation (p=0.22), 44% lower ICU admission (p=0.03), and 12% shorter hospitalization (p=0.2). Retrospective 1,267 hospitalized patients in Spain, 189 on vitamin D supplementation before admission, showing lower ICU admission with supplementation, and no statistically significant difference for mortality or ventilation.</p>	
Sep 22 2021	<p>Castle et al., Journal of Inflammation Research, doi:10.2147/JIR.S323356</p>	<p>Implications for Systemic Approaches to COVID-19: Effect Sizes of Remdesivir, Tocilizumab, Melatonin, Vitamin D3, and Meditation</p>
	<p>Review of the effects of COVID-19 on inflammatory markers, and the effects on those markers of standard treatments vs. vitamin D, melatonin, and meditation, showing comparable or superior effects with the non-standard treatments. The stan..</p>	
Sep 22 2021	<p>Marino-Ramirez et al., medRxiv, doi:10.1101/2021.09.20.21263865</p>	<p>Vitamin D and socioeconomic deprivation mediate COVID-19 ethnic health disparities</p>
	<p>UK Biobank retrospective showing that vitamin supplements, including vitamin D, mediate the Asian disparity in COVID-19 susceptibility, and vitamin D levels mediate Asian and Black COVID-19 severity disparities. Authors conclude that the ..</p>	

Sep 20 2021	Israel et al., Internal and Emergency Medicine, doi:10.1007/ s11739-021-02902-w	Vitamin D deficiency is associated with higher risks for SARS-CoV-2 infection and COVID-19 severity: a retrospective case-control study
	34% lower severe cases (p=0.0001) and 20% fewer cases (p<0.0001). Retrospective 41,757 PCR+ patients in Israel and 417,570 matched controls, showing an inverse correlation between vitamin D levels and the risks of SARS-CoV-2 infection and of severe disease in those infected. COM-0046-20.	
Sep 19 2021	Derakhshanian et al., Food Science & Nutrition, doi:10.1002/fsn3.2591	The predictive power of serum vitamin D for poor outcomes in COVID-19 patients
	45% lower mortality (p=0.05), 42% lower ventilation (p=0.09), and 37% lower ICU admission (p=0.04). Retrospective 290 hospitalized patients in Iran, showing higher mortality with vitamin D deficiency.	
Sep 14 2021	Padhi et al., International Immunopharmacology, doi:10.1016/ j.intimp.2020.107001	Lower levels of vitamin D are associated with SARS-CoV-2 infection and mortality in the Indian population: An observational study
	Analysis of vitamin D levels and COVID-19 in Indian states and union territories, showing an inverse correlation of vitamin D levels with SARS-CoV-2 cases and mortality.	
Sep 9 2021	Pickard et al., PLOS Pathogens, doi:10.1371/ journal.ppat.1009840	Discovery of re-purposed drugs that slow SARS-CoV-2 replication in human cells
	In Vitro studying identifying 35 compounds that inhibit SARS-CoV-2 in Vero cells and hepatocytes when treated prior to infection, and several compounds that slow replication when treated after infection: vitamin D, amodiaquine, atovaquone..	
	Elamir et al., Bone, doi:10.1016/ j.bone.2021.116175	A Randomized Pilot Study Using Calcitriol in Hospitalized Patients

<p>Sep 8 2021</p>	<p>86% lower mortality (p=0.23), 38% lower ICU admission (p=0.33), 40% shorter hospitalization (p=0.14), and 86% improved recovery (p=0.03). RCT 50 hospitalized patients in the USA, 25 treated with calcitriol, showing significantly improved oxygenation with treatment. Mortality, intubation, ICU admission, and hospitalization time also favored treatment, while not reaching stat..</p>	
<p>Sep 6 2021</p>	<p>Zafar et al., Postgraduate Medical Journal, doi:10.1136/postgradmedj-2021-140564</p>	<p>Vitamin D levels and mortality with SARS-COV-2 infection: a retrospective two-centre cohort study</p>
<p>43% higher mortality (p=0.71). Retrospective 433 patients in the UK, 52 positive for COVID-19, showing no significant difference in mortality based on vitamin D levels. Authors also include results for all 433 patients, however given the expected test false negative ra..</p>		
<p>Sep 5 2021</p>	<p>Lázaro et al., Endocrine Abstracts, doi:10.1530/endoabs.70.EP552</p>	<p>Vitamin D deficit in type 2 diabetes patients during COVID-19 lockdown with and without supplementation</p>
<p>27% fewer cases (p=1). Analysis of 239 consecutive diabetic patients, 97 taking vitamin D supplements, showing significantly higher vitamin D levels in supplemented patients. There was no statistically significant difference in cases based on supplementation, w..</p>		
<p>Sep 1 2021</p>	<p>Bagheri et al., Journal of Family & Reproductive Health, doi:10.18502/jfrh.v14i3.4668</p>	<p>Supplement Usage Pattern in a Group of COVID-19 Patients in Tehran</p>
<p>71% lower severe cases (p=0.02) and 38% lower hospitalization (p=0.11). Retrospective 510 patients in Iran, showing lower risk of severity with vitamin D (statistically significant) and zinc (not statistically significant) supplementation. IR.TUMS.VCR.REC.1398.1063.</p>		
<p>Sep 1 2021</p>	<p>Soliman et al., Proceedings of Singapore Healthcare, doi:10.1177/20101058211041405</p>	<p>Impact of Vitamin D Therapy on the Progress COVID-19: Six Weeks Follow-Up Study of Vitamin D Deficient Elderly Diabetes Patients</p>

		<p>63% lower mortality (p=0.21), 20% lower ventilation (p=0.56), and 20% improved recovery (p=0.56). Small RCT with 56 elderly diabetes patients hospitalized in Egypt, 40 treated with cholecalciferol, not showing significant differences.</p>
Aug 31 2021	<p>Ben-Eltriki et al., Journal of the American College of Nutrition, doi:10.1080/07315724.2021.1951891</p>	<p>Association between Vitamin D Status and Risk of Developing Severe COVID-19 Infection: A Meta-Analysis of Observational Studies</p>
		<p>Meta analysis of 24 observational studies with 3,637 participants, showing low vitamin D status associated with a higher risk of death and a higher risk of developing severe COVID-19 pneumonia.</p>
Aug 29 2021	<p>Karonova et al., Nutrients, doi:10.3390/nu13093021</p>	<p>Low 25(OH)D Level Is Associated with Severe Course and Poor Prognosis in COVID-19</p>
		<p>78% lower mortality (p=0.006) and 67% lower severe cases (p=0.005). Retrospective 161 hospitalized patients in Russia, showing COVID-19 severity and mortality associated with vitamin D deficiency. Patients in this study may overlap with those in an earlier smaller study from some of the same authors.</p>
Aug 28 2021	<p>Assiri et al., Journal of Infection and Public Health, doi:10.1016/j.jiph.2021.08.030</p>	<p>COVID-19 related treatment and outcomes among COVID-19 ICU patients: A retrospective cohort study</p>
		<p>66% higher mortality (p=0.6). Retrospective 118 ICU patients in Saudi Arabia showing no significant differences in unadjusted results with zinc, vitamin D, and favipiravir treatment.</p>
Aug 27 2021	<p>Pecina et al., Journal of Primary Care & Community Health, doi:10.1177/21501327211041206</p>	<p>Vitamin D Status and Severe COVID-19 Disease Outcomes in Hospitalized Patients</p>
		<p>70% higher mortality (p=0.52), 10% higher ventilation (p=0.89), and 30% higher ICU admission (p=0.61). Retrospective 92 hospitalized patients not showing significant differences in outcomes based on vitamin D status or supplementation.</p>

<p>Aug 26 2021</p>	<p>Golabi et al., <i>Nutrients</i>, doi:10.3390/nu13103368 (date from preprint)</p>	<p>The Association between Vitamin D and Zinc Status and the Progression of Clinical Symptoms among Outpatients Infected with SARS-CoV-2 and Potentially Non-Infected Participants: A Cross-Sectional Study</p> <p>25% more cases (p=0.56). Analysis of vitamin D and zinc levels in 53 PCR+ outpatients and 53 matched controls, showing lower zinc levels in COVID-19 patients, and increased risk of cases and symptoms with vitamin D deficiency. There was no significant difference ..</p>
<p>Aug 26 2021</p>	<p>Golabi et al., <i>Nutrients</i>, doi:10.3390/nu13103368 (date from preprint)</p>	<p>The Association between Vitamin D and Zinc Status and the Progression of Clinical Symptoms among Outpatients Infected with SARS-CoV-2 and Potentially Non-Infected Participants: A Cross-Sectional Study</p> <p>90% improved recovery (p<0.0001) and 72% fewer cases (p=0.07). Analysis of vitamin D and zinc levels in 53 PCR+ outpatients and 53 matched controls, showing lower zinc levels in COVID-19 patients, and increased risk of cases and symptoms with vitamin D deficiency. There was no significant difference ..</p>
<p>Aug 25 2021</p>	<p>Varikasuvu et al., <i>Expert Review of Anti-infective Therapy</i>, doi:10.1080/14787210.2022.2035217</p>	<p>COVID-19 and Vitamin D (Co-VIVID Study): a systematic review and meta-analysis of randomized controlled trials</p> <p>Meta analysis of 6 vitamin D treatment RCTs, showing statistically significant improvements for pooled outcomes and PCR positivity, and positive but not statistically significant improvements for mortality, mechanical ventilation, ICU adm..</p>
<p>Aug 24 2021</p>	<p>Parra-Ortega et al., <i>Nutrition Research and Practice</i>, doi:10.4162/nrp.2021.15.S1.S32</p>	<p>25-Hydroxyvitamin D level is associated with mortality in patients with critical COVID-19: a prospective observational study in Mexico City</p> <p>99% lower mortality (p<0.0001). Prospective study of 94 COVID-19 patients in Mexico, showing lower vitamin D levels associated with mortality in multivariate analysis. 84% of patients were vitamin D deficient, and the remaining 16% had insufficient vitamin D levels.</p>

<p>Aug 20 2021</p>	<p>Song et al., Journal of Biomolecular Structure and Dynamics, doi:10.1080/07391102.2021.1964601</p>	<p>Vitamin D3 and its hydroxyderivatives as promising drugs against COVID-19: a computational study</p>
<p>In Silico study suggesting that vitamin D3 and its biologically active hydroxyderivatives can serve as an TMPRSS2 inhibitor, and inhibit ACE2 binding with the SARS-CoV-2 RBD.</p>		
<p>Aug 18 2021</p>	<p>Shakeri et al., Journal of Medical Virology, doi:10.1002/jmv.27277</p>	<p>Evaluation of the relationship between serum levels of zinc, vitamin B12, vitamin D, and clinical outcomes in patients with COVID-19</p>
<p>Retrospective 293 hospitalized patients in Iran showing lower levels of zinc, vitamin B12, and vitamin D in patients that died, with statistical significance reached only for zinc.</p>		
<p>Aug 17 2021</p>	<p>Breslin et al., Proceedings of the Nutrition Society, doi:10.1017/S0029665121002214</p>	<p>The relationship between vitamin D, biomarkers and clinical outcome in hospitalised Covid-19 patients</p>
<p>56% lower progression (p=0.03). Retrospective 138 COVID-19 hospitalized patients in Ireland, showing increased risk of infiltrates on chest X-ray for patients with vitamin D deficiency, and lower vitamin D levels in patients that died (21.8 nmol/L vs. 37.8 nmol/L, p = 0..</p>		
<p>Aug 17 2021</p>	<p>Connolly et al., Proceedings of the Nutrition Society, doi:10.1017/S0029665121002482</p>	<p>An observational study of the association of vitamin D status and other patient characteristics with COVID-19 severity and mortality</p>
<p>90% lower mortality (p=0.06) and 73% lower need for oxygen therapy (p=0.05). Retrospective 114 hospitalized COVID-19 patients in Ireland, showing higher risk of mortality and oxygen therapy with vitamin D deficiency, with statistical significance for oxygen therapy.</p>		

<p>Aug 12 2021</p>	<p>di Filippo et al., The Journal of Clinical Endocrinology & Metabolism, doi:10.1210/clinem/dgab599</p>	<p>Vitamin D levels associate with blood glucose and BMI in COVID-19 patients predicting disease severity</p>
<p>11% lower mortality (p=1), 42% lower ICU admission (p=0.22), and 40% lower severe cases (p=0.04). Retrospective 88 patients in Italy, showing vitamin D deficiency associated with severe cases, blood glucose, and BMI.</p>		
<p>Aug 11 2021</p>	<p>Sinaci et al., The Journal of Steroid Biochemistry and Molecular Biology, doi:10.1016/j.jsbmb.2021.105964</p>	<p>Impact of vitamin D on the course of COVID-19 during pregnancy: A case control study</p>
<p>90% lower severe cases (p=0.35) and 19% more moderate/severe cases (p=0.64). Retrospective 159 COVID-19+ pregnant women in Turkey and 332 healthy pregnant controls, showing significantly lower vitamin D levels in COVID-19+ patients. 23% of COVID-19 patients were on vitamin D supplementation, while none of the 7 s..</p>		
<p>Aug 10 2021</p>	<p>Alpcan et al., Epidemiology & Infection, doi:10.1017/S0950268821001825</p>	<p>Vitamin D levels in children with COVID-19: a report from Turkey</p>
<p>73% fewer cases (p=0.0005). Retrospective 75 COVID-19 hospitalized pediatric patients in Turkey and 80 healthy controls, showing significantly lower vitamin D levels in COVID-19 patients.</p>		
<p>Aug 5 2021</p>	<p>Eden et al., BMJ Nutrition, Prevention & Health, doi:10.1136/bmjnph-2021-000270</p>	<p>Nutritional parameters and outcomes in patients admitted to intensive care with COVID-19: a retrospective single-centre service evaluation</p>
<p>64% lower mortality (p=0.1). Retrospective 72 ICU patients in the UK, showing higher mortality with vitamin D deficiency, not reaching statistical significance.</p>		

<p>Aug 5 2021</p>	<p>Ribeiro et al., Clinica Chimica Acta, doi:10.1016/ j.cca.2021.08.003</p>	<p>Previous vitamin D status and total cholesterol are associated with SARS-CoV-2 infection</p> <p>50% fewer cases (p=0.02). Retrospective 1,634 patients tested for SARS-CoV-2 in Brazil, showing vitamin D levels <30ng/mL associated with greater odds of a positive SARS-CoV-2 test in patients older than 49 years.</p>
<p>Aug 5 2021</p>	<p>Nimavat et al., Annals of Medicine and Surgery, doi:10.1016/ j.amsu.2021.102661</p>	<p>Vitamin D deficiency and COVID-19: A case-control study at a tertiary care hospital in India</p> <p>50% lower mortality (p=0.17) and 68% lower severe cases (p=0.003). Case control study with 156 PCR+ cases in India and 204 controls, showing more frequent vitamin D deficiency in COVID-19 patients, and an association between lower vitamin D levels and COVID-19 severity.</p>
<p>Aug 4 2021</p>	<p>Hosseini et al., Infectious Diseases in Clinical Practice, doi:10.1097/ IPC.0000000000001051</p>	<p>Comparing Serum Levels of Vitamin D and Zinc in Novel Coronavirus-Infected Patients and Healthy Individuals in Northeastern Iran, 2020</p> <p>Analysis of 56 COVID-19 patients and 46 healthy control patients in Iran, showing that severe cases had lower levels of vitamin D compared with non-severe cases and healthy controls.</p>
<p>Aug 4 2021</p>	<p>Mohseni et al., Nutrition & Food Science, doi:10.1108/ NFS-11-2020-0421</p>	<p>Do body mass index (BMI) and history of nutritional supplementation play a role in the severity of COVID-19? A retrospective study</p> <p>12% fewer cases (p=0.09). Retrospective 603 patients in Iran, 192 taking vitamin D supplements, showing no significant difference in COVID-19 cases in unadjusted results. IR.SHOUSHTAR.REC.1399.015.</p>
<p>Jul 30 2021</p>	<p>Matin et al., Archives of Microbiology, doi:10.1007/ s00203-021-02482-5</p>	<p>The sufficient vitamin D and albumin level have a protective effect on COVID-19 infection</p>

	<p>66% fewer cases (p<0.0001). Case control study with 191 COVID-19 patients and 203 healthy controls in Iran, showing an association between vitamin D deficiency and COVID-19 infection and severity. 84.4% of COVID-19 patients had vitamin D deficiency.</p>	
<p>Jul 29 2021</p>	<p>Desai et al., Open Forum Infectious Diseases, doi:10.1093/ofid/ofab408</p>	<p>Vitamin K & D Deficiencies Are Independently Associated With COVID-19 Disease Severity</p>
<p>Case control study with 100 COVID-19+ patients and 50 age and gender matched controls, showing vitamin K and vitamin D levels independently associated with COVID-19 severity.</p>		
<p>Jul 29 2021</p>	<p>Al-Salman et al., Nutrition & Food Science, doi:10.1108/NFS-05-2021-0143</p>	<p>In COVID-19 patients, low 25-hydroxyvitamin D level in serum is associated with longer viral clearance time and higher risk of intensive care unit admission</p>
<p>44% lower ICU admission (p=0.03). Retrospective 450 hospitalized patients in Bahrain, showing increased risk of ICU admission and slower viral clearance with vitamin D deficiency.</p>		
<p>Jul 29 2021</p>	<p>Ghasemian et al., The International Journal of Clinical Practice, doi:10.1111/ijcp.14675</p>	<p>The Role of Vitamin D in the Age of COVID-19: A Systematic Review and Meta-Analysis</p>
<p>Systematic review and meta analysis of 23 studies, finding significantly higher risk of COVID-19 cases and severity with vitamin D deficiency. Mortality risk was higher with deficiency, but not reaching statistical significance, OR 1.6 [0..</p>		
<p>Jul 29 2021</p>	<p>Annweiler et al., The Journal of Steroid Biochemistry and Molecular Biology, doi:0.1016/j.jsbmb.2021.105958</p>	<p>Vitamin D supplementation prior to or during COVID-19 associated with better 3-month survival in geriatric patients: Extension phase of the GERIA-COVID study</p>
<p>64% lower mortality (p=0.002). Report on extended results from the GERIA-COVID study, showing significantly lower mortality at 3 months with vitamin D treatment. Results combine prophylaxis and early treatment.</p>		

Jul 27 2021	Qayyum et al., Endocrinology and Metabolism, doi:10.1152/ ajpendo.00174.2021	Vitamin D and lumisterol novel metabolites can inhibit SARS-CoV-2 replication machinery enzymes
	In Silico analysis showing that vitamin D and lumisterol metabolites may inhibit SARS-CoV-2 Mpro and RdRP.	
Jul 27 2021	Cozier et al., PLoS ONE, doi:10.1371/ journal.pone.0255132	Lower serum 25(OH)D levels associated with higher risk of COVID-19 infection in U.S. Black women
	39% fewer cases (p=0.04). Prospective study of vitamin D levels and COVID-19 infection in the Black Women's Health Study, showing higher risk of infection for lower vitamin D levels. Vitamin D levels were from 3-7 years before infection. Levels at the time of infe..	
Jul 27 2021	Israel et al., Epidemiology and Global Health Microbiology and Infectious Disease, doi:10.7554/eLife.68165	Identification of drugs associated with reduced severity of COVID-19: A case-control study in a large population
	13% lower hospitalization (p=0.003). Case control study examining medication usage with a healthcare database in Israel, showing lower risk of hospitalization with vitamin D (defined as being picked up within 35 days prior to PCR+). Other patients may have acquired vitamin D..	
Jul 26 2021	Jimenez et al., Nutrients, doi:10.3390/nu13082559	Mortality in Hemodialysis Patients with COVID-19, the Effect of Paricalcitol or Calcimimetics
	50% lower mortality (p=0.02). Retrospective 288 hemodialysis patients in Spain, 137 with existing vitamin D treatments (94 with paricalcitol), showing lower mortality with treatment. There was no significant difference in outcomes based on serum levels, however author..	
Jul 23 2021	Güven et al., European Journal of Clinical Nutrition, doi:10.1038/ s41430-021-00984-5	The effect of high-dose parenteral vitamin D3 on COVID-19-related in-hospital mortality in critical COVID-19 patients during intensive care unit admission: an observational cohort study

		<p>25% lower mortality (p=0.32). Retrospective 175 ICU patients, 113 treated with a single dose of 300,000IU intramuscular cholecalciferol, showing lower mortality with treatment, but not reaching statistical significance. Calcifediol or calcitriol, which avoids several ..</p>
Jul 17 2021	<p>Oristrell et al., Journal of Endocrinological Investigation, doi:10.1007/s40618-021-01639-9</p>	<p>Vitamin D supplementation and COVID-19 risk: a population-based, cohort study</p>
		<p>1% higher mortality (p=0.91) and 1% fewer cases (p=0.65). Retrospective study of cholecalciferol and calcitriol supplementation in Catalonia showing a small but significant lower risk of cases with cholecalciferol, but no significant difference for mortality, or for calcitriol supplementation. S..</p>
Jul 9 2021	<p>Rabail et al., Food Science & Nutrition, doi:10.1002/fsn3.2458</p>	<p>Nutritional and lifestyle changes required for minimizing the recovery period in home quarantined COVID-19 patients of Punjab, Pakistan</p>
		<p>Survey of 80 recovered COVID-19 patients in Pakistan, showing faster recovery with vitamin C, vitamin D, and zinc supplementation.</p>
Jul 7 2021	<p>González-Estevez et al., International Journal of Environmental Research and Public Health, doi:10.3390/ijerph18147266</p>	<p>Association of Food Intake Quality with Vitamin D in SARS-CoV-2 Positive Patients from Mexico: A Cross-Sectional Study</p>
		<p>25% fewer symptomatic cases (p=0.04). Retrospective 40 COVID+ patients in Mexico, showing higher risk of symptoms with vitamin D deficiency. Higher food intake quality and intense physical activity were associated with vitamin D sufficiency. Insufficient intake of several mic..</p>
Jul 6 2021	<p>Margolin et al., Journal of Evidence-Based Integrative Medicine, doi:10.1177/2515690X211026193</p>	<p>20-Week Study of Clinical Outcomes of Over-the-Counter COVID-19 Prophylaxis and Treatment</p>

		<p>94% fewer cases (p=0.003). Retrospective 113 outpatients, 53 (patient choice) treated with zinc, quercetin, vitamin C/D/E, l-lysine, and quina, showing lower cases with treatment. Results are subject to selection bias and limited information on the groups is provided.</p>
Jul 1 2021	<p>Bianconi et al., Nutrition, doi:10.1016/ j.nut.2021.111408</p>	<p>Prevalence of vitamin D deficiency and its prognostic impact on patients hospitalized with COVID-19</p>
		<p>18% lower mortality (p=0.59) and 16% lower combined mortality/ICU admission (p=0.53). Prospective study of 200 hospitalized patients in Italy, showing 80% of patients had vitamin D deficiency. There was no significant differences in outcomes based on vitamin D levels. There was also no significant difference in vitamin D I..</p>
Jun 30 2021	<p>Kumar et al., Journal of Cardiovascular Disease Research, 12:6</p>	<p>Association of vitamin D status with severity of COVID-19</p>
		<p>Analysis of 50 COVID-19 hospitalized patients, showing lower vitamin D levels associated with COVID-19 severity.</p>
Jun 30 2021	<p>Nasiri et al., International Journal of Infectious Diseases, doi:10.1016/ j.ijid.2021.04.083</p>	<p>Does vitamin D serum level affect prognosis of COVID-19 patients?</p>
		<p>9% higher mortality (p=0.89). Retrospective 329 COVID-19 patients in Iran, showing lower vitamin D levels associated with longer hospitalization, but no significant association with mortality.</p>
Jun 27 2021	<p>Hariyanto et al., Reviews in Medical Virology, doi:10.1002/rmv.2269</p>	<p>Vitamin D supplementation and Covid-19 outcomes: A systematic review, meta-analysis and meta-regression</p>
		<p>63% lower mortality (p=0.0007), 66% lower ventilation (p=0.005), and 73% lower ICU admission (p=0.02). Meta analysis of 11 COVID-19 studies showing lower mortality, mechanical ventilation, and ICU admission with vitamin D. Authors also perform meta-regression showing greater efficacy with increasing age.</p>
Jun 24	<p>Sabico et al., Nutrients, doi:10.3390/nu13072170</p>	<p>Effects of a 2-Week 5000 IU versus 1000 IU Vitamin D3 Supplementation on Recovery of Symptoms in Patients with Mild to Moderate Covid-19: A Randomized Clinical Trial</p>

24 2021	<p>14% higher hospital discharge (p=0.14) and 14% faster recovery (p=0.97). Small RCT of 69 hospitalized patients comparing 1,000IU and 5,000IU daily cholecalciferol, showing faster recovery with the higher dose (statistically significant only for cough and ageusia).</p>	
Jun 24 2021	<p>Pal et al., Journal of Endocrinological Investigation, doi:10.1007/s40618-021-01614-4</p>	<p>Vitamin D supplementation and clinical outcomes in COVID-19: a systematic review and meta-analysis</p>
	<p>Meta analysis of 13 vitamin D treatment studies, showing significantly lower ICU admission/mortality with treatment.</p>	
Jun 24 2021	<p>Beigmohammadi et al., Nutrition, doi:10.1016/j.nut.2021.111400</p>	<p>The association between serum levels of micronutrients and the severity of disease in patients with COVID-19</p>
	<p>Retrospective 60 ICU patients in Iran, showing that lower levels of vitamin D, magnesium, and zinc were significantly associated with higher APACHE scores (P = 0.001, 0.028, and <0.001, respectively) and higher lung involvement (P = 0.002..</p>	
Jun 23 2021	<p>Oh et al., Frontiers in Immunology, doi:10.3389/fimmu.2021.594356</p>	<p>Vitamin D and Exercise Are Major Determinants of Natural Killer Cell Activity, Which Is Age- and Gender-Specific</p>
	<p>Analysis of 2,095 patients in South Korea, showing exercise and vitamin D associated with improved natural killer cell activity. showed that a lower frequency of natural killer cells was associated with symptomatic COVID-19 infection.</p>	
Jun 22 2021	<p>Zelzer et al., Nutrients, doi:10.3390/nu13072129</p>	<p>Vitamin D Metabolites and Clinical Outcome in Hospitalized COVID-19 Patients</p>
	<p>46% lower mortality (p=0.08). Retrospective 148 patients in Austria, showing no statistically significant differences in vitamin D levels and metabolites for mortality or respiratory support.</p>	
Jun 20	<p>Al-Jarallah et al., Journal of Medical Virology, doi:10.1002/jmv.27133</p>	<p>In-hospital mortality in SARS-CoV-2 stratified by serum 25-hydroxy-vitamin D levels: A retrospective study</p>

2021	88% higher mortality (p=0.45). Retrospective 231 hospitalized patients in Kuwait showing no significant difference in mortality based on vitamin D levels.	
Jun 17 2021	Jude et al., Journal of Clinical Endocrinology & Metabolism, doi:10.1210/clinem/dgab439	Vitamin D deficiency is associated with higher hospitalisation risk from COVID-19: a retrospective case-control study
	72% lower hospitalization (p<0.0001). Retrospective 80,670 people in the UK with vitamin D levels measured within the last 12 months, showing higher risk of hospitalization with low vitamin D levels.	
Jun 14 2021	Campi et al., BMC Infectious Diseases, doi:10.1186/s12879-021-06281-7	Vitamin D and COVID-19 severity and related mortality: a prospective study in Italy
	88% lower severe cases (p<0.0001). Prospective study of 103 hospitalized patients in Italy, showing very high prevalence of vitamin D deficiency, and increased severity for lower vitamin D levels. Vitamin D supplementation was significantly less common for cases.	
Jun 9 2021	Herrera-Quintana et al., Nutrients, doi:10.3390/nu13061988	Bad Prognosis in Critical Ill Patients with COVID-19 during Short-Term ICU Stay regarding Vitamin D Levels
	Prospective analysis of 37 critical COVID-19 patients, showing mechanical ventilation associated with lower vitamin D levels.	
Jun 7 2021	Dror et al., PLOS ONE, doi:10.1371/journal.pone.0263069 (date from preprint)	Pre-infection 25-hydroxyvitamin D3 levels and association with severity of COVID-19 illness
	85% lower severe cases (p=0.001). Retrospective 253 hospitalized patients in Israel showing higher mortality and higher risk of severe cases with vitamin D deficiency. Vitamin D levels were measured 14 to 730 days before the COVID-19 test. Adjusted results are only provided.	

Jun 6 2021	Diaz-Curiel et al., Journal of Steroid Biochemistry and Molecular Biology, doi:10.1016/j.jsbmb.2021.105928	The relationship between 25(OH) vitamin D levels and COVID-19 onset and disease course in Spanish patients
	73% lower ICU admission (p=0.02). Retrospective 1,549 patients in Spain showing that the frequency of vitamin D deficiency was higher in admitted patients compared to the overall Spanish population, and that vitamin D deficiency was associated with increased risk of ICU a..	
Jun 4 2021	Kotur et al., Frontiers in Nutrition, doi:10.3389/fnut.2021.689419	Association of Vitamin D, Zinc and Selenium Related Genetic Variants With COVID-19 Disease Severity
	Analysis of variants in genes significant for the status of vitamin D in 120 Serbian COVID-19 patients, showing that vitamin D related genetic variants DHCR7/NADSYN rs12785878 and CYP2R1 rs10741657 were associated with severe COVID-19 in ..	
Jun 2 2021	Fasano et al., Movement Disorders, doi:10.1002/mds.28176	COVID-19 in Parkinson's Disease Patients Living in Lombardy, Italy
	42% fewer cases (p=0.05). Retrospective phone survey of 1,486 Parkinson's disease patients in Italy, showing lower risk of COVID-19 cases with vitamin D supplementation. This paper also presents a case control study of PD patients and family member control patients.	
Jun 1 2021	Butler-Laporte et al., PLOS Medicine, doi:10.1371/journal.pmed.1003605	Vitamin D and COVID-19 susceptibility and severity in the COVID-19 Host Genetics Initiative: A Mendelian randomization study
	Mendelian randomization study not finding significant differences in COVID-19 outcomes based on vitamin D level. This study does not compare patients with deficiency/insufficiency/sufficiency, only providing ORs for increase in D levels. Au..	

<p>May 31 2021</p>	<p>Pimental et al., Clinical Nutrition ESPEN, doi:10.1016/ j.clnesp.2021.05.021</p>	<p>Low vitamin D levels and increased neutrophil in patients admitted at ICU with COVID-19</p>
<p>29% lower mortality (p=1). Retrospective 25 ICU patients in Brazil, showing vitamin D deficiency associated with higher neutrophil-lymphocyte ratio. There appears to be a typo in the mortality percentage for vitamin D deficiency (20% is not valid for the group size..</p>		
<p>May 29 2021</p>	<p>Sooriyaarachchi et al., Clinical Nutrition ESPEN, doi:10.1016/ j.clnesp.2021.05.011</p>	<p>Impact of vitamin D deficiency on COVID-19</p>
<p>Analysis of vitamin D deficiency and COVID-19 cases and deaths in 47 countries, showing vitamin D deficiency significantly associated with mortality.</p>		
<p>May 28 2021</p>	<p>Sánchez-Zuno, J. Clinical Medicine, doi:10.3390/ jcm10112378</p>	<p>Vitamin D Levels in COVID-19 Outpatients from Western Mexico: Clinical Correlation and Effect of Its Supplementation</p>
<p>89% lower severe cases (p=0.04) and 81% improved recovery (p=0.22). Very small 42 PCR+ outpatient RCT in Mexico, 22 treated with vitamin D. Most patients had insufficient vitamin D levels, there were more symptoms in those with insufficient levels, and there were less cases with fever or with >3 symptoms ..</p>		
<p>May 28 2021</p>	<p>Galaznik et al., Journal of Clinical Oncology, doi:10.1200/ JCO.2021.39.15_suppl.6 589</p>	<p>Assessment of vitamin D deficiency and COVID-19 diagnosis in patients with breast or prostate cancer using electronic medical records</p>
<p>35% fewer cases (p=0.01). Retrospective 16,287 breast cancer and 14,919 prostate cancer showing increased risk of COVID-19 cases with vitamin D deficiency.</p>		

<p>May 26 2021</p>	<p>Al-Mazaideh et al., Journal of Pharmaceutical Research International, doi:10.9734/jpri/2021/ v33i29B31603</p>	<p>Vitamin D is a New Promising Inhibitor to the Main Protease (Mpro) of COVID-19 by Molecular Docking</p> <p>In Silico study showing vitamin D binding with Mpro of SARS-CoV-2. Among the compounds tested, vitamin D had the highest potential interaction in terms of total H-bond, van der Waal, torsional, and desolvation energy. Authors recommend ad..</p>
<p>May 25 2021</p>	<p>Papadimitriou et al., World J. Virology, doi:10.5501/ wjv.v10.i3.111]</p>	<p>Association between population vitamin D status and SARS-CoV-2 related serious-critical illness and deaths: An ecological integrative approach</p> <p>Country analysis showing negative correlations between population vitamin D level and severe cases and death (but not with cases overall). Authors conclude that higher vitamin D levels may protect from severe cases and death, even more so..</p>
<p>May 22 2021</p>	<p>Asimi et al., Endocrine Abstracts, doi:10.1530/ endoabs.73.PEP14.2</p>	<p>Selenium, zinc, and vitamin D supplementation affect the clinical course of COVID-19 infection in Hashimoto's thyroiditis</p> <p>97% lower ventilation (p<0.0001), 99% lower hospitalization (p<0.0001), and 100% lower severe cases (p<0.0001). Retrospective 356 Hashimoto's thyroiditis outpatients, 270 taking vitamin D, zinc, and selenium, showing significantly lower hospitalization with treatment. Authors adjust for age, gender, BMI, and smoking status, reporting statistically ..</p>
<p>May 21</p>	<p>Reis et al., The American Journal of Clinical Nutrition, doi:10.1093/ ajcn/nqab151</p>	<p>Influence of vitamin D status on hospital length of stay and prognosis in hospitalized patients with moderate to severe COVID-19: a multicenter prospective cohort study</p>

21 2021			23% lower mortality (p=0.82), 45% higher ventilation (p=0.77), 33% higher hospital discharge (p=0.18), and 22% shorter hospitalization (p=0.06). Prospective study of 220 hospitalized patients in Brazil, showing no significant differences based on vitamin D levels. There was a trend (p=0.057) towards longer hospital stay for patients with levels <10ng/mL.
May 21 2021	Alcala-Diaz et al., Nutrients, doi:10.3390/ nu13061760	Calcifediol Treatment and Hospital Mortality Due to COVID-19: A Cohort Study	81% lower mortality (p=0.04). Retrospective 537 patients in Spain, 79 treated with calcifediol, showing significantly lower mortality with treatment. The treated group had a higher risk of comorbidity, whereas the control group had lower O2 saturation, higher CURB-65,..
May 19 2021	AlSafar et al., Nutrients, doi:10.3390/nu13051714	COVID-19 Disease Severity and Death in Relation to Vitamin D Status among SARS-CoV-2-Positive UAE Residents	59% lower mortality (p=0.05) and 33% lower severe cases (p=0.005). Retrospective 464 patients in United Arab Emirates showing low D levels at first hospital visit associated with higher COVID-19 severity and mortality.
May 19 2021	Li et al., JAMA Network Open, doi:10.1001/ jamanetworkopen.2021.1 1634	Assessment of the Association of Vitamin D Level With SARS-CoV-2 Seropositivity Among Working-Age Adults	9% fewer cases (p=0.24). Cohort study of 18,148 patients in the USA showing low vitamin D associated with COVID-19 PCR+ status before adjustments but not after. Authors state that "low vitamin D levels were not independently associated with the risk of..
May 18 2021	Davoudi et al., BMC Infectious Diseases, doi:10.1186/ s12879-021-06168-7	Lack of association between vitamin D insufficiency and clinical outcomes of patients with COVID-19 infection	12% higher mortality (p=1), 16% lower ventilation (p=1), 28% lower ICU admission (p=0.74), and 68% higher severe cases (p=0.3). Retrospective 153 hospitalized patients in Iran, showing no significant difference in outcomes based on vitamin D levels. Adjusted results are only provided for vitamin D as a continuous variable.

<p>May 18 2021</p>	<p>Dudley et al., BJPsych Bulletin, doi:10.1192/ bjb.2021.55</p>	<p>Revisiting vitamin D status and supplementation for in-patients with intellectual and developmental disability in the North of England, UK</p>
<p>22% fewer symptomatic cases (p=0.65). Retrospective 64 patients with intellectual and developmental disability in the UK, showing no significant difference in COVID-19 status with vitamin D supplementation. Only 6 patients were not on vitamin D supplementation.</p>		
<p>May 11 2021</p>	<p>Aldwihi et al., International Journal of Environmental Research and Public Health, doi:10.3390/ ijerph18105086</p>	<p>Patients' Behavior Regarding Dietary or Herbal Supplements before and during COVID-19 in Saudi Arabia</p>
<p>49% higher hospitalization (p=0.002). Retrospective survey-based analysis of 738 COVID-19 patients in Saudi Arabia, showing lower hospitalization with vitamin C, turmeric, zinc, and nigella sativa, and higher hospitalization with vitamin D. For vitamin D, most patients contin..</p>		
<p>May 8 2021</p>	<p>Savitri et al., Annals of the Romanian Society for Cell Biology, 25:6</p>	<p>Comparison between Vitamin D Level of Asymptomatic Confirmed Covid-19 Patients with Symptomatic Confirmed Covid-19 Patients in Makassar</p>
<p>88% fewer symptomatic cases (p<0.0001). Retrospective 42 PCR+ patients in Indonesia, showing significantly higher risk of symptomatic cases with vitamin D deficiency.</p>		
<p>May 7 2021</p>	<p>Bychinin et al., Journal of Clinical Practice, doi:10.17816/ clinpract64976</p>	<p>Prevalence of hypovitaminosis D in COVID-19 patients in the intensive care unit</p>
<p>36% lower mortality (p=0.03). Retrospective 103 COVID-19 ICU patients in Russia, showing higher mortality with low vitamin D levels in unadjusted results.</p>		
<p>May 3 2021</p>	<p>Levitus et al., Journal of the Endocrine Society, doi: 10.1210/jendso/ bvab048.567</p>	<p>The Effect of Vitamin D Supplementation on Severe COVID-19 Outcomes in Patients With Vitamin D Insufficiency</p>

		<p>31% lower severe cases (p=0.25). Retrospective 129 hospitalized patients with vitamin D levels measured within 90 days prior to admission, showing lower, but not statistically significant, risk of severe cases with vitamin D supplementation among patients with levels <20..</p>
Apr 30 2021	<p>Elhadi et al., PLOS ONE, doi:10.1371/ journal.pone.0251085</p>	<p>Epidemiology, outcomes, and utilization of intensive care unit resources for critically ill COVID-19 patients in Libya: A prospective multi-center cohort study</p>
		<p>23% lower mortality (p=0.29). Prospective study of 465 COVID-19 ICU patients in Libya showing no significant differences with treatment.</p>
Apr 30 2021	<p>Azadeh et al., J. Mazandaran Univ. Med. Sci. 31:195</p>	<p>Serum Vitamin D Concentrations in CoVID19 Patients</p>
		<p>Retrospective 80 COVID-19 patients in Iran and 70 healthy controls, showing significantly lower vitamin D levels in COVID-19 patients.</p>
Apr 29 2021	<p>Loucera et al., Scientific Reports, doi:10.1038/ s41598-021-02701-5 (date from preprint)</p>	<p>Real world evidence of calcifediol or vitamin D prescription and mortality rate of COVID-19 in a retrospective cohort of hospitalized Andalusian patients</p>
		<p>33% lower mortality (p=0.009). Retrospective 15,968 hospitalized patients in Spain showing a significant reduction in mortality associated with the prescription of vitamin D, especially calcifediol, within 15-30 days prior to hospitalization.</p>
Apr 26 2021	<p>Al-Daghri et al., Journal of Translational Medicine, doi:10.1186/ s12967-021-02838-x</p>	<p>Vitamin D status of Arab Gulf residents screened for SARS-CoV-2 and its association with COVID-19 infection: a multi-centre case–control study</p>
		<p>Case control study with 220 adults showing significantly lower vitamin D levels in PCR+ patients.</p>
Apr 18 2021	<p>Elham et al., Clinical Nutrition ESPEN, doi:10.1016/ j.clnesp.2021.03.040</p>	<p>Serum vitamin D, calcium, and zinc levels in patients with COVID-19</p>

	Case control study with 93 hospitalized patients in Iran and 186 control patients, showing significantly lower vitamin D, zinc, and calcium levels in cases. IR.SHOUSHTAR.REC.1399.017.	
Apr 17 2021	Shah Alam et al., International Immunopharmacology, doi:10.1016/ j.intimp.2021.107686	The role of vitamin D in reducing SARS-CoV-2 infection: An update
	Review of vitamin D for COVID-19 noting that infections are likely to be more prevalent in the winter season; clinical trials show vitamin D as a potential therapeutic agent; vitamin D is beneficial against COVID-19 by reducing inflammato..	
Apr 8 2021	Abdulateef et al., Open Medicine, doi:10.1515/ med-2021-0273	COVID-19 severity in relation to sociodemographics and vitamin D use
	41% lower hospitalization (p=0.3). Survey of 428 recovered COVID-19 patients in Iraq, showing fewer hospital visits for patients on prophylactic vitamin C or D. Hospitalization was lower for those on vitamin C, D, or zinc, without statistical significance.	
Apr 6 2021	Oristrell et al., Biomedicines, doi:10.3390/ biomedicines9050509 (date from preprint)	Association of Calcitriol Supplementation with Reduced COVID-19 Mortality in Patients with Chronic Kidney Disease: A Population-based Study
	43% lower mortality (p=0.001), 43% lower severe cases (p=0.0008), and 22% fewer cases (p=0.01). Retrospective study of calcitriol supplementation with chronic kidney disease patients in Catalonia showing lower cases, severe cases, and mortality with supplementation. A dose-response relationship was found for severe cases and mortali..	
Apr 5 2021	Ünsal et al., Journal of Endocrinological Investigation, doi:10.1007/ s40618-021-01566-9	Retrospective analysis of vitamin D status on inflammatory markers and course of the disease in patients with COVID-19 infection

		<p>81% lower mortality (p=0.23) and 73% lower need for oxygen therapy (p=0.07). Retrospective 56 patients in Turkey showing greater need for oxygen therapy and higher mortality with vitamin D deficiency, and significantly lower risk of pneumonia with vitamin D supplementation.</p>
Apr 2 2021	<p>Livingston et al., Int. J. Clinical Practice, doi:10.1111/ijcp.14166</p>	<p>Detectable respiratory SARS-CoV-2 RNA is associated with low vitamin D levels and high social deprivation</p>
		<p>51% fewer cases (p=0.02). Retrospective 104 consecutive patients tested for COVID-19 in a hospital in the UK, showing lower vitamin D and higher social deprivation associated with COVID-19 positive results.</p>
Mar 31 2021	<p>Bayramoğlu et al., European Journal of Pediatrics, doi:10.1007/s00431-021-04030-1</p>	<p>The association between vitamin D levels and the clinical severity and inflammation markers in pediatric COVID-19 patients: single-center experience from a pandemic hospital</p>
		<p>70% lower severe cases (p=0.03). Retrospective 103 pediatric hospitalized COVID-19 patients, showing an association between vitamin D deficiency and clinical severity.</p>
Mar 30 2021	<p>Holt et al., Thorax, doi:10.1136/thoraxjnl-2021-217487</p>	<p>Risk factors for developing COVID-19: a population-based longitudinal study (COVIDENCE UK)</p>
		<p>7% fewer cases (p=0.53). Prospective survey-based study with 15,227 people in the UK, showing lower risk of COVID-19 cases with vitamin A, vitamin D, zinc, selenium, probiotics, and inhaled corticosteroids; and higher risk with metformin and vitamin C. Statistica..</p>
Mar 29 2021	<p>Akbar et al., Front. Nutr. 8:660420, doi:10.3389/fnut.2021.660420</p>	<p>Low Serum 25-hydroxyvitamin D (Vitamin D) Level Is Associated With Susceptibility to COVID-19, Severity, and Mortality: A Systematic Review and Meta-Analysis</p>
		<p>Systematic review and meta analysis showing that low vitamin D levels was associated with COVID-19 cases, severity, and mortality.</p>

Mar 27 2021	Gaudio et al., International Journal of Environmental Research and Public Health, doi:10.3390/ ijerph18073491	Vitamin D Levels Are Reduced at the Time of Hospital Admission in Sicilian SARS-CoV-2-Positive Patients
	79% fewer cases ($p<0.0001$). Retrospective 50 COVID-19 hospitalized patients in Italy with vitamin D levels measured on admission, and 100 matched control patients, showing significantly lower vitamin D levels in COVID-19 patients. Vitamin D levels were also lower in..	
Mar 27 2021	Freitas et al., medRxiv, doi:10.1101/2021.03.22.2 1254032	Vitamin D-related polymorphisms and vitamin D levels as risk biomarkers of COVID-19 infection severity
	41% lower mortality ($p=0.02$). Analysis of 491 hospitalized patients in Portugal showing that polymorphisms in the vitamin D binding protein encoded by the GC gene are related to COVID-19 severity ($p = 0.005$). There was an association between vitamin D polygenic risk s..	
Mar 26 2021	Petrelli et al., The Journal of Steroid Biochemistry and Molecular Biology, doi:10.1016/ j.jsbmb.2021.105883	Therapeutic and prognostic role of vitamin D for COVID-19 infection: A systematic review and meta-analysis of 43 observational studies
	Meta analysis showing vitamin D deficiency associated with higher risk of COVID-19, worse severity, and higher mortality. Supplementation with vitamin D reduced the risk of severe cases and mortality.	
Mar 22 2021	Kohlmeier et al., BMJ Nutrition, Prevention & Health, doi:10.1136/ bmjnph-2021-000265	When Mendelian randomisation fails
	Analysis of why Mendelian randomization may fail in vitamin D studies. Authors suggest that it may come down to the use of 25(OH)D concentration in serum as a less than ideal proxy for vitamin D status of cells involved in the immune resp..	

<p>Mar 19 2021</p>	<p>Meltzer et al., JAMA Netw Open., doi:10.1001/ jamanetworkopen.2021.4 117</p>	<p>Association of Vitamin D Levels, Race/Ethnicity, and Clinical Characteristics With COVID-19 Test Results</p>
<p>35% fewer cases (p=0.11). Retrospective 4,638 individuals with vitamin D levels within 1 year before COVID-19 testing, showing higher risk of COVID-19 PCR+ for vitamin D deficient individuals, and lower (but not statistically significant) cases for individuals usi..</p>		
<p>Mar 15 2021</p>	<p>Pugach et al., Wiener klinische Wochenschrift, doi:10.1007/ s00508-021-01833-y</p>	<p>Strong correlation between prevalence of severe vitamin D deficiency and population mortality rate from COVID-19 in Europe</p>
<p>Analysis of COVID-19 in European countries, finding a correlation between the prevalence of severe vitamin D deficiency and the mortality rate.</p>		
<p>Mar 14 2021</p>	<p>Vanegas-Cedillo et al., medRxiv, doi:10.1101/2021.03.12.2 1253490</p>	<p>Serum Vitamin D Levels Are Associated With Increased COVID-19 Severity and Mortality Independent of Whole-Body and Visceral Adiposity</p>
<p>53% lower mortality (p=0.006). Retrospective 551 moderate to severe COVID-19 patients in Mexico showing vitamin D ≤ 12ng/mL independently associated with COVID-19 mortality. No association was found between vitamin D levels and the need for intubation. Vitamin D deficie..</p>		
<p>Mar 13 2021</p>	<p>Jayawardena et al., Diabetes & Metabolic Syndrome: Clinical Research & Reviews, doi:10.1016/ j.dsx.2021.03.006</p>	<p>Impact of the vitamin D deficiency on COVID-19 infection and mortality in Asian countries</p>
<p>Analysis of Asian countries finding that prevalence of vitamin D deficiency and lower vitamin D levels were associated with COVID-19 infection and mortality. Positive correlations were observed for prevalence of vitamin D deficiency with ..</p>		

Mar 12 2021	Ahmad et al., medRxiv, doi:10.1101/2021.03.11.21253361	Mean Vitamin D levels in 19 European Countries & COVID-19 Mortality over 10 months
	54% lower mortality (p=0.03). Retrospective 19 European countries showing countries with mean vitamin D levels > 50nmol/L have a 2.2 times lower risk of mortality (p = 0.032) compared to those with mean levels < 50 nmol/L.	
Mar 9 2021	Nikniaz et al., Pharmaceutical Sciences, doi:10.34172/PS.2021.13	The impact of vitamin D supplementation on mortality rate and clinical outcomes of COVID-19 patients: A systematic review and meta-analysis
	74% lower mortality (p=0.008). Meta analysis of 4 supplementation studies, finding that vitamin D supplementation "seems to decrease the mortality rate, the severity of the disease, and serum levels of the inflammatory markers". Mortality odds ratio OR 0.264,..	
Mar 8 2021	Charoenngam et al., Endocrine Practice, doi:10.1016/j.eprac.2021.02.013	Association of vitamin D status with hospital morbidity and mortality in adult hospitalized COVID-19 patients
	34% lower mortality (p=0.26), 37% lower ventilation (p=0.17), and 23% lower ICU admission (p=0.28). Retrospective 287 hospitalized patients in the USA showing significantly lower mortality with vitamin D sufficiency in elderly patients and patients without obesity; and lower mortality for all patients but not reaching statistical signif..	
Mar 7 2021	Notz et al., Clinical Nutrition, doi:10.1016/j.clnu.2021.03.001	Vitamin D deficiency in critically ill COVID-19 ARDS patients
	Retrospective 26 ICU patients showing that the majority of patients had vitamin D deficiency. There was no statistically significant association of 25-hydroxyvitamin D status and clinical course, however low levels of 1,25-dihydroxyvitami..	
Mar 5	Kralj et al., Critical Case Reports, doi:10.1002/ccr3.4010	Vitamin D and COVID-19 in an immunocompromised patient with multiple comorbidities— A Case Report

2021	Case report of a high-risk immunocompromised patient with multiple comorbidities that had a mild case of COVID-19. The patient had UVB phototherapy three months earlier and had normal vitamin D levels (92.2 nmol/L, normal range 50-125).	
Mar 5 2021	Mazziotti et al., J Endocrinol. Invest., doi:10.1007/ s40618-021-01535-2	Vitamin D deficiency, secondary hyperparathyroidism and respiratory insufficiency in hospitalized patients with COVID-19
	19% lower mortality (p=0.49) and 67% higher ventilation (p=0.08). Retrospective 348 hospitalized patients in Italy showing vitamin D deficiency associated with acute hypoxemic respiratory failure. Vitamin D supplementation during hospitalization was not significantly associated with mortality or ventila..	
Mar 4 2021	Ullah et al., Pancreatology, doi:10.1016/ j.pan.2020.10.005	COVID-19 in patients with hepatobiliary and pancreatic diseases in East London: a single-centre cohort study
	42% higher mortality (p=0.35) and 146% more cases (p<0.0001). Retrospective 15,440 patients with hepatobiliary and pancreatic diseases in the United Kingdom, 226 with confirmed COVID-19, showing higher risk with vitamin D supplementation. Results are likely confounded by impaired vitamin D processin..	
Mar 4 2021	Lohia et al., American Journal of Physiology- Endocrinology and Metabolism, doi:10.1152/ ajpendo.00517.2020	Exploring the link between vitamin D and clinical outcomes in COVID-19
	15% lower mortality (p=0.56), 19% lower ventilation (p=0.48), and 28% lower ICU admission (p=0.17). Retrospective 270 patients with vitamin D levels measured in the last year, showing no significant difference in outcomes based on vitamin D levels or vitamin D supplementation.	
Mar 3	Ricci et al., Respiratory Research, doi:10.1186/ s12931-021-01666-3	Circulating Vitamin D levels status and clinical prognostic indices in COVID-19 patients

2021	<p>88% lower mortality (p=0.07). Retrospective 52 hospitalized COVID-19 patients showing that vitamin D deficiency is associated with compromised inflammatory responses and higher pulmonary involvement. Vitamin D deficient patients also showed higher mortality, although ..</p>	
Feb 28 2021	<p>Karen et al., International Journal of Progressive Science and Technologies, doi:10.52155/ijpsat.v27.2.3269</p>	<p>Vitamin D Associated Peculiarities in Women with Mild Covid-19 and Effect of Calcifediol on the Level of Vitamin D and Possibly, on Disease Outcome - Prospective Pilot Study</p>
<p>Prospective study of 30 female COVID-19 patients, all treated with calcifediol on admission, showing significantly increased vitamin D levels with treatment. There was no mortality.</p>		
Feb 24 2021	<p>Sulli et al., Nutrients, doi:10.3390/nu13030717</p>	<p>Vitamin D and Lung Outcomes in Elderly COVID-19 Patients</p>
<p>76% fewer cases (p=0.0002). Retrospective 65 elderly COVID-19 patients and 65 matched controls, showing lower vitamin D levels associated with more severe lung involvement, longer disease duration, and higher mortality. Vitamin D supplementation was less common in t..</p>		
Feb 19 2021	<p>Gavioli et al., Journal of the American College of Nutrition, doi:10.1080/07315724.2020.1869626</p>	<p>An Evaluation of Serum 25-Hydroxy Vitamin D Levels in Patients with COVID-19 in New York City</p>
<p>5% higher mortality (p=0.83), 55% lower need for oxygen therapy (p=0.0002), and 4% lower hospitalization (p=0.41). Retrospective 437 mostly serious condition (85% hospitalized) patients in New York, showing vitamin D deficiency associated with increased likelihood of oxygen support, but no association with mortality and hospitalization. Multivariate a..</p>		
Feb 18 2021	<p>Infante et al., Journal of the American College of Nutrition, doi:10.1080/07315724.2021.1877580</p>	<p>Low Vitamin D Status at Admission as a Risk Factor for Poor Survival in Hospitalized Patients With COVID-19: An Italian Retrospective Study</p>

		<p>55% lower mortality (p=0.05). Retrospective 137 hospitalized patients in Italy. All patients had low vitamin D levels, and lower levels were associated with higher mortality. In multivariate logistic regression, vitamin D levels were significantly inversely associated..</p>
Feb 17 2021	<p>Burahee et al., SICOT-J, doi:10.1051/sicotj/ 2021001</p>	<p>Older patients with proximal femur fractures and SARS-CoV-2 infection – An observational study</p>
		<p>93% lower mortality (p=0.01). Small retrospective study of 29 hip fracture patients in the UK, 14 with COVID-19. All COVID-19 patients were treated with vitamin D except for 2 where testing and supplementation was missed due to a clerical error. The two COVID-19 patie..</p>
Feb 12 2021	<p>Basaran et al., Bratislava Medical Journal, doi:10.4149/bll_2021_034</p>	<p>The relationship between vitamin D and the severity of COVID-19</p>
		<p>69% lower severe cases (p=0.005). Prospective study of 204 patients with COVID-19-like pneumonia in Turkey, 42 outpatients (mild cases), and 162 inpatients (serious cases), showing significantly higher risk of severe cases with vitamin D deficiency.</p>
Feb 12 2021	<p>Susianti et al., Journal of Medical Biochemistry, doi:10.5937/jomb0-30228</p>	<p>Low levels of vitamin D were associated with coagulopathy among hospitalized coronavirus disease-19 (COVID-19) patients: A single-centered study in Indonesia</p>
		<p>91% lower mortality (p=0.32), 90% lower ICU admission (p=0.32), and 81% lower progression (p=0.04). Retrospective 50 hospitalized PCR+ patients in Indonesia showing ICU admission, mortality, ISTH DIC (Disseminated Intravascular Coagulation) score\geq5, and increased D-dimer significantly associated with lower vitamin D levels.</p>
Feb 9 2021	<p>Hancock et al., SSRN, doi:10.2139/ssrn.3779211</p>	<p>Case Cluster of RT-PCR COVID-19 Positive Patients with an Unexpected Benign Clinical Course With Vitamin D, Melatonin, Vitamin C, and Viscum Album</p>
		<p>Case series of 24 COVID-19 patients (12 confirmed PCR+) treated with vitamin D, vitamin C, and melatonin, showing positive outcomes with no patient having worse than a mild case, including 7 high risk patients.</p>

Feb 8 2021	Ersöz et al., International Journal of Clinical Practice, doi:10.1111/ijcp.14078	The association between micronutrient and hemogram values and prognostic factors in COVID-19 patients: A single-center experience from Turkey
	Retrospective 310 hospitalized COVID-19 patients in Turkey, showing patients that were admitted to the ICU, intubated, or died had lower vitamin D levels compared to those that were not (statistically significant for ICU admission).	
Feb 3 2021	Yadav et al., Indian Journal of Clinical Biochemistry, doi:10.1007/s12291-020-00950-1	Association of Vitamin D Status with COVID-19 Infection and Mortality in the Asia Pacific region: A Cross-Sectional Study
	Analysis of vitamin D levels and COVID-19 in 37 Asia Pacific countries, finding a significant association with the number of cases/million ($r = -0.394$, $p = 0.016$) and a weak association with the number of deaths/ million ($r = -0.280$, $p = .$	
Feb 2 2021	Söbü et al., The Journal of Current Pediatrics, doi:10.4274/jcp.2021.0002	Vitamin D Levels of COVID-19 Positive Symptomatic Pediatric Cases
	Retrospective 30 hospitalized pediatric COVID-19 patients and 82 healthy controls, showing significantly lower vitamin D levels in COVID-19 patients.	
Feb 1 2021	Patchen et al., BMJ Nutrition, Prevention & Health, doi:10.1136/bmjnph-2021-000255	Genetically predicted serum vitamin D and COVID-19: a Mendelian randomization study
	2% lower severe cases ($p = 0.11$), no change in hospitalization ($p = 1$), and no change in cases ($p = 1$). UK Biobank Mendelian randomization study not finding significant differences in COVID-19 risk. The number of people predicted to have vitamin D deficiency does not appear to be provided.	

Jan 31 2021	Nadiger et al., Critical Care Medicine, doi:10.1097/01.ccm.0000726440.30551.47	Vitamin D Levels in Children With COVID-19 Admitted to the PICU Retrospective 14 pediatric COVID-19 ICU patients showing that the majority were vitamin D deficient.
Jan 29 2021	Demir et al., Journal of Medical Virology, doi:10.1002/jmv.26832	Vitamin D deficiency is associated with COVID-19 positivity and the severity of the disease 89% lower severe cases (p=0.001), 87% shorter hospitalization (p=0.001), and 24% fewer cases (p=0.18). Retrospective cohort study of 487 patients finding that lower vitamin D levels is associated with more severe cases as measured by affected lung segments and increased hospitalization time for COVID-19 positive patients, and that lower vi..
Jan 29 2021	Ma et al., The American Journal of Clinical Nutrition, doi:10.1093/ajcn/nqaa381	Habitual use of vitamin D supplements and risk of coronavirus disease 2019 (COVID-19) infection: a prospective study in UK Biobank 30% fewer cases (p=0.03). Retrospective 8,297 adults from the UK Biobank showing the habitual use of vitamin D supplements significantly associated with lower risk of COVID-19 cases. Note that the information on vitamin D supplement use was collected a median of 1..
Jan 29 2021	Bakaloudi et al., Nutrition, doi:10.1016/j.nut.2021.111441	A critical update on the role of mild and serious vitamin D deficiency prevalence and the COVID-19 epidemic in Europe Analysis of vitamin D deficiency and COVID-19 cases and mortality in European countries showing significant correlation between mortality and prevalence of both mild vitamin D deficiency (r = 0.634, p = 0.003) and severe vitamin D deficie..
Jan 29 2021	Brenner, H., Nutrients, doi:10.3390/nu13020411	Vitamin D Supplementation to Prevent COVID-19 Infections and Deaths— Accumulating Evidence from Epidemiological and Intervention Studies Calls for Immediate Action

28 2021	Summary of epidemiological and intervention studies for vitamin D supplementation. Author concludes that despite limitations, evidence strongly supports widespread supplementation, in particular for high-risk populations, as well as high-..	
Jan 25 2021	Tehrani et al., Clinical Nutrition, doi:10.1016/j.clnesp.2021.01.014	Evaluation of vitamin D levels in COVID-19 patients referred to Labafinejad hospital in Tehran and its relationship with disease severity and mortality
48% lower mortality (p=0.07). Retrospective 205 patients in Iran, showing higher mortality with vitamin D deficiency, not quite reaching statistical significance.		
Jan 25 2021	Barassi et al., Panminerva Med., doi:10.23736/S0031-0808.21.04277-4	Vitamin D in severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) patients with non-invasive ventilation support
65% lower ventilation (p=0.15). Retrospective 118 consecutive hospitalized PCR+ patients in Italy showing higher ventilation and mortality with vitamin D deficiency.		
Jan 22 2021	Nogués et al., The Journal of Clinical Endocrinology & Metabolism, doi:10.1210/clinem/dgab405	Calcifediol Treatment and COVID-19-Related Outcomes
79% lower mortality (p=0.001) and 87% lower ICU admission (p<0.0001). Quasi-randomized trial with 930 hospitalized patients, 447 treated with calcifediol, showing significantly lower ICU admission and death with treatment. Note that the randomization in this trial is by ward. Authors report that patients we..		
Jan 21 2021	Walrand, S., Nature, doi:10.1038/s41598-021-81419-w	Autumn COVID-19 surge dates in Europe correlated to latitudes, not to temperature-humidity, pointing to vitamin D as contributing factor
Analysis of the increase in COVID-19 cases in European countries, showing no correlation with temperature, but a significant correlation with country latitude. Since UV radiation decreases earlier for higher latitudes, this supports the t..		

<p>Jan 19 2021</p>	<p>Orchard et al., Clin Chem Lab Med, doi:10.1515/cclm-2020-1567</p>	<p>Vitamin-D levels and intensive care unit outcomes of a cohort of critically ill COVID-19 patients</p> <p>59% lower ICU admission (p=0.001) and 9% lower ventilation (p=0.7). Retrospective 165 hospitalized patients with known vitamin D levels, showing an associated between vitamin D deficiency and ICU admission. There was no statistically significant difference in clinical outcomes for ICU patients. It's uncle..</p>
<p>Jan 18 2021</p>	<p>Vasheghani et al., Scientific Reports, doi:10.1038/s41598-021-97017-9 (date from preprint)</p>	<p>The relationship between serum 25-hydroxyvitamin D levels and the severity of COVID-19 disease and its mortality</p> <p>30% lower mortality (p=0.45) and 64% lower ICU admission (p=0.009). Retrospective 508 hospitalized COVID-19 patients in Iran showing lower mortality with vitamin D supplementation (not reaching statistical significance), and an association between lower vitamin D levels and disease severity, ICU admission..</p>
<p>Jan 16 2021</p>	<p>Hutchings et al., Endocrine, doi:10.1007/s12020-020-02597-7</p>	<p>Patients hospitalized with COVID-19 have low levels of 25-hydroxyvitamin D</p> <p>Retrospective 330 hospitalized COVID-19 patients in Armenia, showing significantly higher prevalence of vitamin D deficiency (<12ng/mL) compared to health controls (45% vs. 13%).</p>
<p>Jan 14 2021</p>	<p>Giannini et al., Nutrients, doi:10.3390/nu13010219</p>	<p>Effectiveness of In-Hospital Cholecalciferol Use on Clinical Outcomes in Comorbid COVID-19 Patients: A Hypothesis-Generating Study</p> <p>37% lower combined mortality/ICU admission (p=0.13). Retrospective 91 hospitalized patients, 36 treated with high-dose cholecalciferol, showing lower combined death/ICU admission with treatment. Authors also analyze the relationship with comorbidity burden, finding that the positive effect ..</p>
<p>Jan 12 2021</p>	<p>Bennouar et al., Journal of the American College of Nutrition, doi:10.1080/07315724.2020.1856013</p>	<p>Vitamin D Deficiency and Low Serum Calcium as Predictors of Poor Prognosis in Patients with Severe COVID-19</p>

		<p>86% lower mortality (p=0.002). Prospective study of 120 severe cases of COVID-19 in Algeria finding low vitamin D and low calcium both associated with increased mortality.</p>
Jan 11 2021	<p>Li et al., Aging and Disease, doi:10.14336/AD.2020.1108</p>	<p>Metabolic Healthy Obesity, Vitamin D Status, and Risk of COVID-19</p>
		<p>36% lower hospitalization (p<0.0001) and 29% fewer cases (p<0.0001). UK Biobank retrospective 353,299 patients showing that vitamin D insufficiency and deficiency are associated with increased COVID-19 risk. This study also analyzes metabolic/obesity phenotypes and the combination with vitamin D status. No..</p>
Jan 9 2021	<p>Angelidi et al., Mayo Clinic Proceedings, doi:10.1016/j.mayocp.2021.01.001</p>	<p>Vitamin D Status is Associated With In-hospital Mortality and Mechanical Ventilation: A Cohort of COVID-19 Hospitalized Patients</p>
		<p>88% lower mortality (p=0.01). Retrospective 144 patients in the USA showing significantly lower mortality for vitamin D levels >=30ng/mL.</p>
Jan 7 2021	<p>Pal et al., Frontiers in Medicine, doi:10.3389/fmed.2020.590805</p>	<p>High Prevalence of Hypocalcemia in Non-severe COVID-19 Patients: A Retrospective Case-Control Study</p>
		<p>Retrospective 72 non-severe COVID-19 patients in India, showing very high levels of vitamin D deficiency (70 of 72 patients).</p>
Jan 7 2021	<p>Amin et al., BMJ Nutrition, Prevention & Health, doi:10.1136/bmjnph-2020-000151</p>	<p>No evidence that vitamin D is able to prevent or affect the severity of COVID-19 in individuals with European ancestry: a Mendelian randomisation study of open data</p>
		<p>32% higher progression (p=0.2) and 8% more cases (p=0.14). Analysis of vitamin D levels and COVID-19 cases and severity based on genetic predisposition to higher vitamin D levels or lower vitamin D deficiency, finding no significant association.</p>
Dec 21	<p>Ansari et al., Pakistan J. Med. Heal. Sci., 14:4</p>	<p>Frequency of Severe Vitamin D Deficiency and its Association with Mortality in Patients with Corona virus Disease</p>

31 2020			86% lower mortality (p=0.02). Prospective study of 125 severe COVID-19 patients in Pakistan, showing significantly higher mortality with vitamin D deficiency.
Dec 31 2020	Karonova et al., Infectology, doi:10.22625/2072-6732- 2020-12-3-21-27	Serum 25(OH)D level in patients with CoVID-19	79% lower mortality (p=0.11) and 71% lower severe cases (p=0.05). Retrospective 80 COVID-19 patients showing low vitamin D levels associated with severity and mortality.
Dec 30 2020	Szeto et al., Endocrine Research, doi:10.1080/07435800.20 20.1867162	Vitamin D Status and COVID-19 Clinical Outcomes in Hospitalized Patients	6% higher mortality (p=1), 40% lower ventilation (p=0.21), and 27% lower hospital discharge (p=0.5). Retrospective 93 hospitalized patients with vitamin D levels 1-365 days before admission, not showing significant differences with vitamin D deficiency or vitamin D levels. Vitamin D levels may vary significantly throughout the year creat..
Dec 30 2020	McCullough et al., Reviews in Cardiovascular Medicine, doi:10.31083/ j.rcm.2020.04.264	Multifaceted highly targeted sequential multidrug treatment of early ambulatory high-risk SARS-CoV-2 infection (COVID-19)	Review urging early treatment of COVID-19 with sequential multidrug treatment that has been shown to be safe and effective. Proposed treatment includes zinc, vitamin D & C, quercetin, and depending on age, comorbidities, and symptoms may ..
Dec 30 2020	Jevalikar et al., Scientific Reports, doi:10.1038/ s41598-021-85809-y (date from preprint)	Lack of association of baseline 25-hydroxyvitamin D levels with disease severity and mortality in Indian patients hospitalized for COVID-19	

28 2020	<p>82% lower mortality (p=0.12), 34% lower ICU admission (p=0.29), and 32% lower need for oxygen therapy (p=0.06). Prospective study of 410 hospitalized patients in India showing lower mortality and ICU admission with cholecalciferol treatment, although not statistically significant with the small number of cases. The median total dose was 60,000IU. N..</p>	
Dec 26 2020	<p>Sistanizad et al., European Journal of Integrative Medicine, doi:10.1016/ j.eujim.2020.101271</p>	<p>High dose vitamin D improves total serum antioxidant capacity and ICU outcome in critically ill patients - a randomized, double-blind clinical trial</p>
<p>64% lower mortality (p=0.004). RCT of 30 ventilated ICU patients showing lower mortality with vitamin D treatment, RR 0.36, p = 0.004. Authors do not indicate why the patients were hospitalized or if any of the patients were COVID-19 patients. 300,000 IU intramuscular ..</p>		
Dec 22 2020	<p>Cangiano et al., Aging, doi:10.18632/ aging.202307</p>	<p>Mortality in an Italian nursing home during COVID-19 pandemic: correlation with gender, age, ADL, vitamin D supplementation, and limitations of the diagnostic tests</p>
<p>70% lower mortality (p=0.04). 70% lower mortality with vitamin D supplementation. Analysis of 98 PCR+ nursing home residents in Italy, mean age 90, vitamin D supplementation RR 0.30, p = 0.04. The paper provides the p value for regression but not the effect size. Trea..</p>		
Dec 12 2020	<p>Abdollahi et al., Journal of Medical Virology, doi:10.1002/jmv.26726</p>	<p>The Association Between the Level of Serum 25(OH) Vitamin D, Obesity, and underlying Diseases with the risk of Developing COVID-19 Infection: A case-control study of hospitalized patients in Tehran, Iran</p>
<p>54% fewer cases (p=0.001). Case control study with 201 patients and 201 matched controls in Iran showing vitamin D deficiency associated with COVID-19.</p>		
Dec 11 2020	<p>Ling et al., Nutrients, doi:10.3390/nu12123799</p>	<p>High-Dose Cholecalciferol Booster Therapy is Associated with a Reduced Risk of Mortality in Patients with COVID-19: A Cross-Sectional Multi-Centre Observational Study</p>
<p>80% lower mortality (p=0.001). 80% lower mortality with cholecalciferol booster therapy. Retrospective 986 hospitalized patients in the UK finding that cholecalciferol booster therapy, regardless of baseline serum levels, was associated with a reduced risk of mortality..</p>		

Dec 10 2020	Rosenthal et al., JAMA Network Open, doi:10.1001/ jamanetworkopen.2020.2 9058	Risk Factors Associated With In-Hospital Mortality in a US National Sample of Patients With COVID-19
11% lower mortality (p=0.005). Retrospective database analysis of 64,781 hospitalized patients in the USA, showing lower mortality with vitamin C or vitamin D (authors do not distinguish between the two), and higher mortality with zinc and HCQ, statistically significant..		
Dec 10 2020	VitaminDForAll	Over 100 Scientists, Doctors, & Leading Authorities Call For Increased Vitamin D Use To Combat COVID-19
Over 100 scientists and doctors call for efforts to increase vitamin D levels. Recommendations include reaching 75 nmol/L serum levels, 2000-4000IU daily supplementation (in the absence of testing), and measurement and treatment in hospital..		
Dec 9 2020	Vassiliou et al., Hellenic Journal of Cardiology, doi:10.1016/ j.hjc.2020.11.011	Vitamin D deficiency correlates with a reduced number of natural killer cells in intensive care unit (ICU) and non-ICU patients with COVID-19 pneumonia
Observational study of 29 ICU patients and 10 non-ICU patients showing vitamin D levels positively correlated with cytotoxic T cells, natural killer (NK) cells, NK-T cells, and regulatory T cells.		
Dec 9 2020	Vassiliou et al., Nutrients, doi:10.3390/nu12123773	Low 25-Hydroxyvitamin D Levels on Admission to the Intensive Care Unit May Predispose COVID-19 Pneumonia Patients to a Higher 28-Day Mortality Risk: A Pilot Study on a Greek ICU Cohort
91% lower mortality (p=0.04). Small prospective study of 30 ICU patients, showing higher mortality risk for low vitamin D levels. When divided into two groups at the median level, there was 5 of 15 deaths for the low vitamin D group compared to 0 of 15 in the high vit..		
Dec 5 2020	Alguwaihes et al., Cardiovascular Diabetology, doi:10.1186/ s12933-020-01184-4	Diabetes and Covid-19 among hospitalized patients in Saudi Arabia: a single-centre retrospective study

		86% lower mortality (p=0.007). Retrospective 439 diabetic hospitalized patients in Saudi Arabia showing lower mortality with vitamin D >12.5 nmol/L, adjusted hazard ratio aHR 0.14, p=0.007.
Dec 4 2020	Katz et al., Nutrition, doi:10.1016/ j.nut.2020.111106	Increased risk for Covid-19 in patients with Vitamin D deficiency
		78% fewer cases (p=0.001). Retrospective database analysis showing patients with vitamin D deficiency were 4.6 times more likely to be COVID-19 positive, p<0.001.
Nov 30 2020	Louca et al., BMJ Nutrition, Prevention & Health, doi:10.1136/ bmjnph-2021-000250 (date from preprint)	Modest effects of dietary supplements during the COVID-19 pandemic: insights from 445 850 users of the COVID-19 Symptom Study app
		8% fewer cases (p=0.0007). Survey analysis of dietary supplements showing vitamin D usage associated with lower incidence of COVID-19. These results are for PCR+ cases only, they do not reflect potential benefits for reducing the severity of cases. A number of bias..
Nov 25 2020	De Smet et al., American Journal of Clinical Pathology, doi:10.1093/ ajcp/aqaa252	Serum 25(OH)D Level on Hospital Admission Associated With COVID-19 Stage and Mortality
		70% lower mortality (p=0.02). Retrospective 186 hospitalized patients in Belgium showing that 59% of patients were vitamin D deficient, and that non-vitamin D deficient patients had significantly lower mortality risk, RR 0.26, p = 0.015.
Nov 19 2020	Jain et al., Nature, doi:10.1038/ s41598-020-77093-z	Analysis of vitamin D level among asymptomatic and critically ill COVID-19 patients and its correlation with inflammatory markers
		85% lower mortality (p=0.001) and 95% lower ICU admission (p<0.0001). Prospective study of 91 asymptomatic and 63 ICU patients showing significantly higher vitamin D deficiency in the ICU patients (97% vs. 33%).

<p>Nov 17 2020</p>	<p>Murai et al., JAMA, doi:10.1001/ jama.2020.26848 (date from preprint)</p>	<p>Effect of a Single High Dose of Vitamin D3 on Hospital Length of Stay in Patients With Moderate to Severe COVID-19: A Randomized Clinical Trial</p> <p>49% higher mortality (p=0.43), 48% lower ventilation (p=0.09), 25% lower ICU admission (p=0.3), and 7% higher hospital discharge (p=0.63). Very late stage (mean 10 days from symptom onset, 90% on oxygen at baseline) vitamin D supplementation RCT not showing significant differences. Ethnicity was poorly matched between arms, and diabetes was 41% in the treatment arm vs. 29% i..</p>
<p>Nov 13 2020</p>	<p>Luo et al., The Journal of Nutrition, doi:10.1093/jn/ nxaa332</p>	<p>Vitamin D Deficiency Is Associated with COVID-19 Incidence and Disease Severity in Chinese People</p> <p>63% lower progression (p=0.01). Retrospective 335 patients in China compared to 560 matched controls showing significantly lower risk of severe COVID-19 with vitamin D sufficiency (>=30 nmol/L) OR 0.37, p = 0.014.</p>
<p>Nov 12 2020</p>	<p>Jungreis et al., medRxiv, doi:10.1101/2020.11.08.2 0222638</p>	<p>Mathematical analysis of Córdoba calcifediol trial suggests strong role for Vitamin D in reducing ICU admissions of hospitalized COVID-19 patients</p> <p>Analysis of Castillo et al. confirming efficacy of calcifediol treatment. Authors find that issues related to imperfect blinding and comorbidities can not explain the result found. See [compbio.mit.edu] for a response to issues raised on ..</p>
<p>Nov 12 2020</p>	<p>Rastogi et al., Postgraduate Medical Journal, doi:10.1136/ postgradmedj-2020-1390 65</p>	<p>Short term, high-dose vitamin D supplementation for COVID-19 disease: a randomised, placebo-controlled, study (SHADE study)</p> <p>53% improved viral clearance (p=0.02). 53% reduction in PCR+ with high-dose cholecalciferol supplementation. RCT with 16 treatment patients and 24 control patients. 25(OH)D levels at day 14 were 52 ng/ml vs. 15 ng/ml in the intervention and control group.</p>
<p>Nov 11</p>	<p>Cereda et al., Nutrition, doi:10.1016/ j.nut.2020.111055</p>	<p>Vitamin D supplementation and outcomes in coronavirus disease 2019 (COVID-19) patients from the outbreak area of Lombardy, Italy</p>

11 2020	<p>73% higher mortality (p=0.14) and 17% higher hospitalization (p=0.68). Retrospective 105 Parkinson's disease patients, 92 caregivers, and 127 hospital inpatients, showing higher, but not statistically significant mortality and hospitalization with treatment. Supplementation was defined as $\geq 25,000$ IU/month fo..</p>	
Nov 9 2020	<p>Walk et al., medRxiv, doi:10.1101/2020.11.07.2 0227512</p>	<p>Vitamin D - contrary to vitamin K - does not associate with clinical outcome in hospitalized COVID-19 patients</p>
<p>no change in combined mortality/intubation (p=1). Small retrospective study of 135 patients not finding a significant difference in vitamin D status. Patients with good outcomes had a median of 45.0 nmol/L versus 37.7 nmol/L for bad outcomes, p = 0.85. Authors found that vitamin D suffic..</p>		
Nov 2 2020	<p>Annweiler et al., Nutrients, doi:10.3390/ nu12113377</p>	<p>Vitamin D Supplementation Associated to Better Survival in Hospitalized Frail Elderly COVID-19 Patients: The GERIA-COVID Quasi-Experimental Study</p>
<p>93% lower mortality (p=0.02). Retrospective study finding that regular bolus vitamin D supplementation was associated with less severe COVID-19 and better survival in frail elderly. For those receiving regular supplementation: Adjusted mortality hazard ratio with supp..</p>		
Nov 1 2020	<p>Cereda et al., Clinical Nutrition (Edinburgh, Scotland), doi:10.1016/ j.clnu.2020.10.055</p>	<p>Vitamin D 25OH deficiency in COVID-19 patients admitted to a tertiary referral hospital</p>
<p>120% higher mortality (p=0.04). Prospective cohort study of 129 adult hospitalized COVID-19 patients finding patients with vitamin D levels >20 ng/mL had increased mortality after adjustment. This study does not account for the risk of having a serious enough case to be..</p>		
Oct 31 2020	<p>Ohaegbulam et al., American Journal of Therapeutics, doi:10.1097/ MJT.0000000000001222</p>	<p>Vitamin D Supplementation in COVID-19 Patients: A Clinical Case Series</p>
<p>Small case study of 4 vitamin D deficient patients with 2 patients treated with cholecalciferol 1,000 IU daily and two patients treated with ergocalciferol 50,000 IU daily for 5 days (high dose), showing that patients receiving high dose ..</p>		

Oct 31 2020	Mercola et al., <i>Nutrients</i> 2020, 12:11, 3361, doi:10.3390/nu12113361	Evidence Regarding Vitamin D and Risk of COVID-19 and Its Severity
	Review of vitamin D and COVID-19 concluding that the evidence seems strong enough that people and physicians can use or recommend vitamin D supplements to prevent or treat COVID-19 in light of their safety and wide therapeutic window.	
Oct 30 2020	Abrishami et al., <i>European Journal of Nutrition</i> , doi:10.1007/ s00394-020-02411-0	Possible association of vitamin D status with lung involvement and outcome in patients with COVID-19: a retrospective study
	76% lower mortality (p=0.04). Retrospective 73 hospitalized patients showing the probability of death in patients with vitamin D deficiency (< 25ng/mL) was 34.6% compared with 6.4% in patients with sufficient vitamin D levels.	
Oct 27 2020	Hernández et al., <i>The Journal of Clinical Endocrinology & Metabolism</i> , doi:10.1210/ clinem/dgaa733	Vitamin D Status in Hospitalized Patients with SARS-CoV-2 Infection
	83% lower combined mortality/ICU admission (p=0.0001), 81% lower hospitalization (p=0.0001), 76% lower ventilation (p=0.13), and 79% lower ICU admission (p=0.05). Retrospective 216 COVID-19 patients and 197 population controls, showing vitamin D deficiency in 82.2% of COVID-19 cases and 47.2% of population-based controls (P < .0001). Authors note: "We did not find any relationship between vita..	
Oct 26 2020	Tomas-Irriguible et al., <i>Metabolites</i> , doi:10.3390/ metabo11090565 (date from preprint)	Low Levels of Few Micronutrients May Impact COVID-19 Disease Progression: An Observational Study on the First Wave
	35% lower ventilation (p=0.21) and 17% lower ICU admission (p=0.58). Retrospective 120 hospitalized patients in Spain showing no significant differences for vitamin D deficiency.	

<p>Oct 24 2020</p>	<p>Sainz-Amo et al., Journal of Neurology, doi:10.1007/s00415-020-10272-0</p>	<p>COVID-19 in Parkinson's disease: what holds the key?</p>
<p>33% lower severe cases (p=0.45) and 44% fewer cases (p=0.23). Case control study with 39 COVID+ and 172 COVID- Parkinson's disease patients in Spain, showing positive and severe cases being less likely to use vitamin D supplementation compared to negative or mild/negative cases respectively. These d..</p>		
<p>Oct 21 2020</p>	<p>Basha et al., Clinical Epidemiology and Global Health, doi:10.1016/j.cegh.2020.10.005</p>	<p>Is the shielding effect of cholecalciferol in SARS CoV-2 infection dependable? An evidence based unraveling</p>
<p>Review of vitamin D for COVID-19, concluding that the available evidence is very suggestive of protective and preventive effect of vitamin D. Authors note that strict lockdown (longer time indoors and home quarantine) may increase the ris..</p>		
<p>Oct 21 2020</p>	<p>Macaya et al., Nutr. Hosp., doi:10.20960/nh.03193</p>	<p>Interaction between age and vitamin D deficiency in severe COVID-19 infection</p>
<p>55% lower severe cases (p=0.07). Retrospective 80 hospitalized patients in Spain showing higher risk of severe COVID-19 with vitamin D deficiency.</p>		
<p>Oct 20 2020</p>	<p>Blanch-Rubió et al., Aging, doi:10.18632/aging.104117</p>	<p>Influence of anti-osteoporosis treatments on the incidence of COVID-19 in patients with non-inflammatory rheumatic conditions</p>
<p>8% fewer cases (p=0.68). Retrospective 2,102 rheumatology patients in Spain showing no significant difference in cases with vitamin D supplementation. Details of vitamin D supplementation are not provided - other patients may have also independently taken vitamini..</p>		

Oct 13 2020	Annweiler et al., The Journal of Steroid Biochemistry and Molecular Biology, doi:10.1016/j.jsbmb.2020.105771	Vitamin D and survival in COVID-19 patients: A quasi-experimental study
	89% lower mortality (p=0.002). Vitamin D3 supplementation during or just before COVID-19 was associated with 68% lower mortality and less severe COVID-19 in frail elderly. Retrospective 66 French nursing home residents, mean age 87.7, 9 control patients, and 57 that re..	
Oct 13 2020	Ye et al., Journal of the American College of Nutrition, doi:10.1080/07315724.2020.182600	Does Serum Vitamin D Level Affect COVID-19 Infection and Its Severity? A Case-Control Study
	93% lower hospitalization (p=0.03). Case control study in China comparing 62 patients with 80 healthy controls showing vitamin D deficiency is a risk factor for COVID-19, especially for severe/critical cases.	
Oct 6 2020	Faniyi et al., medRxiv, doi:10.1101/2020.10.05.20206706	Vitamin D status and seroconversion for COVID-19 in UK healthcare workers who isolated for COVID-19 like symptoms during the 2020 pandemic
	29% lower seropositivity (p=0.003). Analysis of vitamin D status and anti-SARS-Cov-2 antibodies in UK healthcare workers finding that Vitamin D deficiency is a risk factor for COVID-19 seroconversion.	
Oct 5 2020	Yilmaz et al., Pediatric Pulmonology, doi:10.1002/ppul.25106	Is vitamin D deficiency a risk factor for COVID-19 in children?
	73% lower severe cases (p=1). Retrospective 40 hospitalized pediatric COVID-19 patients and 45 healthy controls showing significantly lower vitamin D levels for COVID-19 patients (13.1 vs. 34.8µg/L), and that, within the hospitalized patients, there was more moderate ..	

Oct 5 2020	Karahan et al., J. Nutr. Health Aging, doi:10.1007/s12603-020-1479-0	Impact of Serum 25(OH) Vitamin D Level on Mortality in Patients with COVID-19 in Turkey
	83% lower mortality (p<0.0001). Retrospective 149 COVID-19 patients, 69.1% with vitamin D deficiency, showing lower vitamin D levels associated with higher mortality.	
Sep 30 2020	Kerget et al., Tuberk Toraks, doi:10.5578/tt.70027	Evaluation of the relationship of serum vitamin D levels in COVID-19 patients with clinical course and prognosis
	Prospective study of 88 hospitalized PCR+ COVID-19 patients and 20 asymptomatic PCR- medical personnel, showing lower vitamin D levels correlated with COVID-19 and with the development of ARDS and MAS.	
Sep 29 2020	Pepkowitz et al., Research Square, doi:10.21203/rs.3.rs-83262/v1	Vitamin D Deficiency is Associated with Increased COVID-19 Severity: Prospective Screening of At-Risk Groups is Medically Indicated
	56% lower ICU admission (p=0.01). Retrospective 37 hospitalized patients in the USA, showing higher risk of ICU admission with vitamin D deficiency.	
Sep 25 2020	Maghbooli et al., PLOS One, doi:10.1371/journal.pone.0239799	Vitamin D sufficiency, a serum 25-hydroxyvitamin D at least 30 ng/mL reduced risk for adverse clinical outcomes in patients with COVID-19 infection
	52% lower mortality (p=0.08), 32% lower ventilation (p=0.49), and 32% lower ICU admission (p=0.33). Retrospective 235 hospitalized patients showing a significant association between vitamin D sufficiency and reduction in clinical severity. For patients over 40, mortality was 9.7% with 25(OH)D levels >30ng/mL, versus 20% for <30ng/mL. A ..	
Sep 23 2020	Tomasa-Irriguible et al., MDPI AG, doi:10.20944/preprints202009.0555.v1	Up to 40% of COVID-19 Critically Ill Patients Have Vitamin D Deficiency
	Retrospective 35 ICU patients in Spain showing 71% of patients had vitamin D levels <20 ng/mL, and 40% <10 ng/mL.	

Sep 17 2020	Kaufman et al., PLOS One, doi:10.1371/ journal.pone.0239252	SARS-CoV-2 positivity rates associated with circulating 25-hydroxyvitamin D levels
	53% fewer cases (p=0.001). Analysis of 191,779 patients in the US finding COVID-19 positivity strongly and inversely associated with circulating 25(OH)D levels. The relationship persists across latitudes, races/ethnicities, gender, and age ranges. COVID-19 adjusted..	
Sep 10 2020	Radujkovic et al., Nutrients 2020, 12:9, 2757, doi:10.3390/ nu12092757	Vitamin D Deficiency and Outcome of COVID-19 Patients
	93% lower mortality (p=0.001) and 84% lower combined mortality/intubation (p=0.001). Observational study 185 patients in Germany shows an association between vitamin D status and severity and mortality. Adjusted hazard ratio of vitamin D sufficiency for combined mechanical ventilation and death was HR 0.16, p < 0.001, and..	
Sep 8 2020	Galmés et al., Nutrients, doi:10.3390/nu12092738	Current State of Evidence: Influence of Nutritional and Nutrigenetic Factors on Immunity in the COVID-19 Pandemic Framework
	Ecological study of European countries analyzing 10 vitamins and minerals endorsed by the European Food Safety Authority as having sufficient evidence for a causal relationship between intake and optimal immune system function: vitamins D..	
Sep 3 2020	Meltzer et al., JAMA network open, 3:9, doi:10.1001/ jamanetworkopen.2020.1 9722	Association of Vitamin D Status and Other Clinical Characteristics With COVID-19 Test Results
	44% fewer cases (p=0.02). Retrospective 489 patients showing 44% lower risk for COVID-19 with vitamin D sufficiency, relative risk RR = 0.56, p = 0.02.	

<p>Aug 29 2020</p>	<p>Castillo et al., Journal of Steroid Biochemistry and Molecular Biology, 203, October 2020, doi:10.1016/j.jsbmb.2020.105751</p>	<p>Effect of calcifediol treatment and best available therapy versus best available therapy on intensive care unit admission and mortality among patients hospitalized for COVID-19: A pilot randomized clinical study</p> <p>85% lower mortality (p=0.11) and 94% lower ICU admission (p=0.008). RCT on calcifediol (25-hydroxyvitamin D) treatment for hospitalized COVID-19 patients showing significantly reduced intensive care unit admissions. All patients received standard care including HCQ+AZ. Significantly lower ICU admission wi..</p>
<p>Aug 28 2020</p>	<p>Mardani et al., Virus Research, doi:10.1016/j.virusres.2020.198148</p>	<p>Association of vitamin D with the modulation of the disease severity in COVID-19</p> <p>Prospective study of 123 outpatients in Iran, showing mortality associated with significantly lower vitamin D levels. IR.SBMU.RETECH.REC.1399.131.</p>
<p>Aug 27 2020</p>	<p>Baktash et al., Postgraduate Medical Journal, doi:10.1136/postgradmedj-2020-138712</p>	<p>Vitamin D status and outcomes for hospitalised older patients with COVID-19</p> <p>29% lower mortality (p=0.5). Prospective study of 105 hospitalized patients, showing lower vitamin D levels in the COVID-19 positive group (27.0 nmol/L vs 52.0 nmol/L, p=0.0008), and non-statistically significant higher mortality with vitamin D deficiency.</p>
<p>Aug 26 2020</p>	<p>Xu et al., Journal of Translational Medicine, doi:10.1186/s12967-020-02488-5</p>	<p>The importance of vitamin d metabolism as a potential prophylactic, immunoregulatory and neuroprotective treatment for COVID-19</p> <p>Review of vitamin D for the prevention and treatment of COVID-19, focusing on preventing SARS-CoV-2 infection, acting as an immunosuppressant inhibiting cytokine release syndrome, and preventing loss of neural sensation by stimulating exp..</p>

<p>Aug 26 2020</p>	<p>Afshar et al., Journal of Contemporary Medical Sciences, 10.22317/jcms.v6i4.822</p>	<p>Suggested role of Vitamin D supplementation in COVID-19 severity</p>
<p>Brief report noting that there was a dramatic and complete resolution of ICU admissions after adding routine vitamin D supplementation to standard of care.</p>		
<p>Aug 26 2020</p>	<p>Hastie et al., Diabetes and Metabolic Syndrome: Clinical Research and Reviews, 14:4, 561–565, doi:10.1016/j.dsx.2020.04.050</p>	<p>Vitamin D concentrations and COVID-19 infection in UK Biobank</p>
<p>17% lower mortality (p=0.31) and 9% lower hospitalization (p=0.4). Database analysis of 341,484 patients in the UK with 656 hospitalized confirmed COVID-19 patients and 203 deaths, not showing a statistically significant difference after adjustment. Since adjustment factors may be correlated with vitamin..</p>		
<p>Aug 15 2020</p>	<p>Espitia-Hernandez et al., Biomedical Research, 31:5</p>	<p>Effects of Ivermectin-azithromycin-cholecalciferol combined therapy on COVID-19 infected patients: A proof of concept study</p>
<p>70% faster recovery (p=0.0001) and 97% improved viral clearance (p<0.0001). Small study with 28 patients treated with ivermectin + AZ + cholecalciferol and 7 control patients. All treated patients were PCR- at day 10 while all control patients remained PCR+. The mean duration of symptoms was 3 days in the treatme..</p>		
<p>Aug 11 2020</p>	<p>Im et al., Int. J. Infect. Dis., doi:10.1016/j.ijid.2020.08.018</p>	<p>Nutritional status of patients with COVID-19</p>
<p>73% fewer cases (p=0.0003). Analysis of 50 hospitalized COVID-19 patients in South Korea showing that 76% of patients were vitamin D deficient. Comparison with 150 matched controls showed a higher probability of cases with vitamin D deficiency.</p>		

Aug 9 2020	Carpagnano et al., J. Endocrinol. Invest., 2020, Aug 9, 1-7, doi:10.1007/s40618-020-01370-x	Vitamin D deficiency as a predictor of poor prognosis in patients with acute respiratory failure due to COVID-19
	71% lower mortality (p=0.05). Retrospective study 42 patients with acute respiratory failure, 81% with low vitamin D levels. After 10 days, patients with severe vitamin D deficiency had a 50% probability of dying, while those with vitamin D ≥ 10 ng/mL had a 5% mortality.	
Jul 31 2020	Anjum et al., Pakistan J. Med. Heal. Sci., 14:3	Examine the association between severe vitamin D deficiency and mortality in patients with Covid-19
	62% lower mortality (p=0.02). Prospective study of 140 COVID-19 patients in Pakistan, showing significantly higher mortality with vitamin D deficiency.	
Jul 23 2020	Merzon et al., The FEBS Journal, doi:doi.org/10.1111/febs.15495	Low plasma 25(OH) vitamin D level is associated with increased risk of COVID-19 infection: an Israeli population-based study
	46% lower hospitalization (p=0.06) and 28% fewer cases (p=0.001). Analysis of 7,807 patients finding that low vitamin D levels are correlated with increased risk of cases and hospitalization. Adjusted odds ratio OR for sufficient vitamin D level for cases 0.69, p < 0.001, and for hospitalization 0.51, p..	
Jul 23 2020	Lansiaux et al., Spat. Spatiotemporal Epidemiol, doi:10.1016/j.sste.2020.100362	Covid-19 and vit-d: Disease mortality negatively correlates with sunlight exposure
	Analysis of COVID-19 mortality and sunlight exposure in continental metropolitan France, showing that average annual sunlight hours were significantly correlated with COVID-19 mortality, with a Pearson coefficient of -0.636. Also see the ..	
Jul 20 2020	Krishnan et al., J Clin Anesth., doi:10.1016/j.jclinane.2020.110005	Clinical comorbidities, characteristics, and outcomes of mechanically ventilated patients in the State of Michigan with SARS-CoV-2 pneumonia
	19% lower mortality (p=0.42). Retrospective 152 mechanically ventilated patients in the USA showing unadjusted lower mortality with vitamin C, vitamin D, HCQ, and zinc treatment, statistically significant only for vitamin C.	

Jul 17 2020	Jolliffe et al., medRxiv, doi:10.1101/2020.07.14.2 0152728	Vitamin D supplementation to prevent acute respiratory infections: systematic review and meta-analysis of aggregate data from randomised controlled trials
	Meta analysis of 40 RCTs showing that vitamin D supplementation is safe and reduced risk of acute respiratory infections, odds ratio OR 0.89 [0.81-0.98].	
Jun 30 2020	Hamza et al., Pakistan Journal of Medical & Health Sciences	Role of Vitamin D in Pathogenesis and Severity of Coronavirus Disease 2019 (COVID-19) Infection
	Prospective study of 168 patients in Pakistan reporting an association between vitamin D deficiency and symptomatic cases. Details of the association are not provided.	
Jun 30 2020	Faul et al., Irish Medical Journal, 113:5, 84	Vitamin D Deficiency and ARDS after SARS-CoV-2 Infection
	69% lower ventilation (p=0.03). Analysis of 33 hospitalized COVID-19 patients with respiratory failure requiring FiO2 greater than 0.4. Intubation hazard ratio for vitamin D sufficiency HR 0.31, p = 0.03.	
Jun 30 2020	Panagiotou et al., medRxiv, doi:10.1101/2020.06.21.2 0136903	Low serum 25-hydroxyvitamin D (25[OH]D) levels in patients hospitalised with COVID-19 are associated with greater disease severity: results of a local audit of practice
	52% lower ICU admission (p=0.02). Retrospective analysis 134 hospitalized patients. 19% of ICU patients had 25(OH)D levels > 50 nmol/L vs. 39.1% of non-ICU patients, p=0.02	
Jun 27 2020	Mendy et al., medRxiv, doi:10.1101/2020.06.25.2 0137323	Factors Associated with Hospitalization and Disease Severity in a Racially and Ethnically Diverse Population of COVID-19 Patients
	7% lower mortality (p=0.89), 17% lower combined mortality/ICU admission (p=0.001), 55% lower ICU admission (p=0.008), and 15% lower hospitalization (p=0.001). Retrospective 689 patients showing vitamin D deficiency associated with hospitalization and disease severity.	

Jun 26 2020	Whittemore et al., American Journal of Infection Control, doi:10.1016/ j.ajic.2020.06.193	COVID-19 fatalities, latitude, sunlight, and vitamin D
	Analysis of 88 countries, showing a significant correlation between death rates and latitude, suggesting that sunlight exposure and vitamin D levels influence mortality.	
Jun 24 2020	Andrade et al., SciELO preprints, doi:10.1590/ SciELOPreprints.839	Vitamin A and D deficiencies in the prognosis of respiratory tract infections: A systematic review with perspectives for COVID-19 and a critical analysis on supplementation
	Systematic review showing deficiencies of vitamins A and D negatively affecting the prognosis of respiratory tract infections.	
Jun 22 2020	Mok et al., bioRxiv, doi:10.1101/2020.06.21.1 62396	Calcitriol, the active form of vitamin D, is a promising candidate for COVID-19 prophylaxis
	In Vitro study showing that the active form of Vitamin D, calcitriol, exhibits significant potent activity against SARS-CoV-2.	
Jun 19 2020	Raisi-Estabragh et al., J. Public Health, doi:10.1093/pubmed/ fdaa095	Greater risk of severe COVID-19 in Black, Asian and Minority Ethnic populations is not explained by cardiometabolic, socioeconomic or behavioural factors, or by 25(OH)-vitamin D status: study of 1326 cases from the UK Biobank
	UK Biobank retrospective not finding a significant association between vitamin D levels and the risk of PCR+ after adjustment. Since adjustment factors may be correlated with vitamin D deficiency, the extent of any causal contribution of ..	
Jun 14 2020	Rhodes et al., BMJ Nutr. Prev. Health, doi:10.1136/ bmjnph-2020-000110	COVID-19 mortality increases with northerly latitude after adjustment for age suggesting a link with ultraviolet and vitamin D
	Analysis of COVID-19 mortality and latitude as of May 18, 2020, showing that latitude was significantly associated with mortality (p=0.031), with an estimated 4.4% [0.4%-8.5%] increase in mortality for each 1° further north.	

Jun 13 2020	Davies et al., medRxiv, doi:10.1101/2020.05.01.20087965	Evidence Supports a Causal Role for Vitamin D Status in Global COVID-19 Outcomes
	Causal inference analysis of COVID-19 severity and latitude concluding that vitamin D status plays a key role in COVID-19 outcome.	
Jun 10 2020	Tan et al., Nutrition, doi:10.1016/j.nut.2020.111017 (date from preprint)	Cohort study to evaluate the effect of combination Vitamin D, Magnesium and Vitamin B12 (DMB) on progression to severe outcome in older COVID-19 patients
	80% lower need for oxygen therapy (p=0.04) and 81% lower ICU admission (p=0.07). Observational study of 43 patients >= 50 years old, with 17 patients receiving vitamin D, magnesium, and vitamin B12 (DMB); and 26 control patients, showing a significantly lower need for oxygen therapy and ICU admission with treatment. D..	
Jun 2 2020	Li et al., Research Square, doi:10.21203/rs.3.rs-32499/v1	Sunlight and vitamin D in the prevention of coronavirus disease (COVID-19) infection and mortality in the United States
	Analysis of COVID-19 cases in the USA reporting a potential relationship between latitude and the number of COVID-19 cases (p = 0.08) and deaths (p=0.06). Authors note that sunlight and vitamin D may reduce risk for COVID-19 cases and dea..	
May 27 2020	Skutsch et al., medRxiv, doi:10.1101/2020.05.25.20112805	The association of UV with rates of COVID-19 transmission and deaths in Mexico: the possible mediating role of vitamin D
	Analysis of UV, temperature, humidity and COVID-19 in 45 Mexican cities, showing that UV was negatively correlated with rates of transmission (statistically significant) and mortality (not statistically significant).	
May 14 2020	Chodick et al., Journal of Travel Medicine, doi:10.1093/jtm/taaa069	Angiotensin-converting enzyme inhibitors and angiotensin-receptor blockers are not associated with increased risk of SARS-CoV-2 infection
	Retrospective 14,520 patients in Israel, 1,317 testing positive, showing no significant difference in vitamin D levels (23.6ng/mL and 24.1ng/mL for positive and negative cases respectively).	

May 9 2020	D'Avolio et al., <i>Nutrients</i> , 12:5, 1–7, doi:10.3390/ nu12051359	25-hydroxyvitamin D concentrations are lower in patients with positive PCR for SARS-CoV-2
	Retrospective 107 patients in Switzerland showing lower vitamin D levels (11.1 ng/mL) in PCR positive patients compared with negative patients (24.6 ng/mL), p = 0.004.	
Apr 30 2020	Reyes Pérez et al., <i>Revista de Sanidad Militar</i> , doi:10.35366/93773	Deficiency of vitamin D is a risk factor of mortality in patients with COVID-19
	62% lower mortality (p=0.006). Retrospective 172 hospitalized COVID-19 patients in Mexico, reporting a very high prevalence of vitamin D deficiency, and significantly higher mortality with low vitamin D levels in unadjusted results.	
Apr 28 2020	Marik et al., <i>Med Drug Discov.</i> , doi:10.1016/ j.medidd.2020.100041	Does vitamin D status impact mortality from SARS-CoV-2 infection?
	Analysis of case fatality rates showing that the CFR was significantly greater for Northern states (>40° latitude) compared to Southern States (6.0% vs. 3.5%, p < 0.001), although there were some exceptions with individual states.	
Apr 28 2020	Lau et al., medRxiv, doi:10.1101/2020.04.24.2 0075838	Vitamin D Insufficiency is Prevalent in Severe COVID-19
	45% lower ICU admission (p=0.29). Analysis of 20 hospitalized COVID-19 patients, 13 requiring ICU admission. 84.6% of the ICU patients had low vitamin D levels versus 57.1% of the non-ICU patients.	
Apr 2 2020	Grant et al., <i>Nutrients</i> , 12:4, 988, doi:10.3390/ nu12040988	Evidence that Vitamin D Supplementation Could Reduce Risk of Influenza and COVID-19 Infections and Deaths
	Review of the evidence that vitamin D supplementation could reduce COVID-19 risk.	

Jan 4 2019	McCullough et al., The Journal of Steroid Biochemistry and Molecular Biology, doi:10.1016/j.jsbmb.2018.12.010	Daily oral dosing of vitamin D3 using 5000 TO 50,000 international units a day in long-term hospitalized patients: Insights from a seven year experience
	Report on the long-term use of vitamin D in hospitalized patients with daily dosing from 5,000 to 50,000IU over 7 years. There were no cases of hypercalcemia or any adverse events related to vitamin D supplementation. Authors conclude tha..	
Jan 6 2018	Carlberg et al., The Journal of Steroid Biochemistry and Molecular Biology, doi:10.1016/j.jsbmb.2018.01.002	In vivo response of the human epigenome to vitamin D: A Proof-of-principle study
	Epigenome-wide chromatin accessibility study before and after vitamin D supplementation (calcitriol), showing significant changes at hundreds of sites within the epigenome of human leukocytes (part of the immune system).	
Feb 15 2017	Martineau et al., BMJ 2017, 356, doi:10.1136/bmj.i6583	Vitamin D supplementation to prevent acute respiratory tract infections: systematic review and meta-analysis of individual participant data
	7% fewer cases (p=0.003). Meta analysis of 25 RCTs showing vitamin D supplementation was safe and it protected against acute respiratory tract infection overall. Patients who were very vitamin D deficient and those not receiving bolus doses experienced the most be..	
Feb 1 2014	Quraishi et al., JAMA Surgery, doi:10.1001/jamasurg.2013.3176	Association Between Preoperative 25-Hydroxyvitamin D Level and Hospital-Acquired Infections Following Roux-en-Y Gastric Bypass Surgery
	Retrospective 770 gastric bypass surgery patients showing a strong relationship between pre-operative vitamin D levels and the risk of hospital acquired infections.	

Oct 1 2014	Palacios et al., J Steroid Biochem Mol Biol., 2014, 144PA, 138–145, doi:10.1016/ j.jsbmb.2013.11.003	Is vitamin D deficiency a major global public health problem?
Review showing vitamin D deficiency is common worldwide in all age groups.		
Jun 19 2013	Bergman et al., PLoS ONE, 2013, 8:6, doi:10.1371/ journal.pone.0065835	Vitamin D and Respiratory Tract Infections: A Systematic Review and Meta- Analysis of Randomized Controlled Trials
Meta analysis of 11 placebo-controlled studies of 5660 patients. Vitamin D showed a protective effect against RTI (OR 0.64 [0.49-0.84]). The protective effect was larger in studies using once-daily dosing compared to bolus doses (OR=0.5..		
Nov 1 2012	Mitchell et al., Endocr. Pract., 2012, 18:6, 914– 923, doi:10.4158/ EP12072.OR	Prevalence and predictors of vitamin D deficiency in healthy adults
Study of 634 healthy volunteers showing 64% had 25(OH)D ≤ 30 ng/mL. Gender, ethnicity, and multivitamin use were significantly associated with 25(OH)D levels.		
Mar 10 2010	Urashima et al., Am. J. Clin. Nutr. 2010, 91:5, 1255-60, doi:10.3945/ ajcn.2009.29094	Randomized trial of vitamin D supplementation to prevent seasonal influenza A in schoolchildren
RCT for vitamin D supplementation and seasonal influenza A in schoolchildren, showing 10.8% incidence in children in the vitamin D3 group compared with 18.6% in the placebo group, relative risk RR 0.58 [0.34-0.99], p = 0.04. The reduction..		
Jul 31 2009	Grant et al., Dermato- Endocrinology, doi:10.4161/ derm.1.4.9063	The possible roles of solar ultraviolet-B radiation and vitamin D in reducing case- fatality rates from the 1918–1919 influenza pandemic in the United States

	<p>Analysis of the 1918–1919 influenza pandemic for 12 US states, showing estimated UVB dose correlated with case fatality rates ($p = 0.009$) and with pneumonia as a complication of influenza ($p = 0.005$).</p>	
<p>Sep 7 2006</p>	<p>Cannell et al., Epidemiol Infect., 2006, 134:6. 1129-40, doi:10.1017/S0950268806007175</p>	<p>Epidemic influenza and vitamin D</p>
	<p>Review article on the mechanisms of action and seasonality of vitamin D levels, concluding that varying vitamin D levels may be the reason for the seasonality of epidemic influenza.</p>	

Peer reviewed and other studies on zinc

Chart courtesy c19early.org/z. For more charts, full analysis and more information, visit their website.

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Oct 5	Covid Analysis	Zinc for COVID-19: real-time meta analysis of 58 studies (43 treatment studies and 15 sufficiency studies)
	Statistically significant lower risk is seen for mortality, ventilation, hospitalization, progression, recovery, and viral clearance. 17 studies from 17 independent teams in 9 countries show statistically significant improvements. • Met..	
Sep 22	Seely et al., BMJ Open, doi:10.1136/ bmjopen-2023-073 761	Dietary supplements to reduce symptom severity and duration in people with SARS-CoV-2: a double-blind randomised controlled trial
	14% improved recovery (p=0.41). Early terminated low-risk population (no hospitalization) very late treatment (mean 8 days) RCT with 44 patients treated with vitamin C, D, K, and zinc, and 46 control patients, showing no significant differences. Authors acknowledge that..	
Aug 9	Herrera- Quintana et al., Metabolites, doi:10.3390/ metabo13080931	Evolution of Status of Trace Elements and Metallothioneins in Patients with COVID-19: Relationship with Clinical, Biochemical, and Inflammatory Parameters
	Prospective study of 86 critical COVID-19 patients in Spain showing that low zinc levels were predictive of severity. There was a high prevalence of zinc deficiency.	
Jul 26	Wozniak et al., Nutrients, doi:10.3390/ nu15153308	Association of Trace Element Levels with Outcomes in Critically Ill COVID-19 Patients

		<p>47% lower mortality (p=0.3) and 62% lower progression (p=0.06). Retrospective 345 COVID-19 patients in Switzerland, showing significantly different zinc levels with ICU patients < hospitalized patients < outpatients. For ICU patients, there was higher mortality, septic shock, and mechanical ventilatio..</p>
Jul 18	<p>İşler et al., Life and Medical Sciences, doi:10.54584/lms.2023.39</p>	<p>Evaluation of the Serum Zinc Level in Patients Followed in Hospital with the Diagnosis of COVID-19 in Samsun Province, Türkiye</p>
		<p>88% fewer cases (p=0.04). Retrospective 51 COVID-19 patients and 26 healthy controls in Turkey, showing significantly lower zinc levels in COVID-19 patients, and zinc deficiency associated with COVID-19 in unadjusted results.</p>
Jul 18	<p>Ali et al., American Journal of Medical and Physical Education, 1:1</p>	<p>Biochemical changes of electrolytes and trace elements among patient with coronavirus disease-19 (COVID-19) in Khartoum state</p>
		<p>Retrospective 50 COVID-19 patients and 50 healthy controls in Sudan, showing significantly lower zinc levels in COVID-19 patients, and an inverse correlation between zinc levels and COVID-19 severity.</p>
Jul 15	<p>Graydon et al., Current Research in Immunology, doi:10.1016/j.crimmu.2023.100064</p>	<p>High baseline frequencies of natural killer cells are associated with asymptomatic SARS-CoV-2 infection</p>
		<p>Analysis of 88 COVID+ patients in the USA showing that a higher frequency of natural killer (NK) cells was associated with asymptomatic infection. Improved NK cell numbers and functioning has been shown for exercise [Oh], better sleep [lr..</p>
Jul 14	<p>Lupi et al., Frontiers in Immunology, doi:10.3389/fimmu.2023.1148595</p>	<p>Persistent and transient olfactory deficits in COVID-19 are associated to inflammation and zinc homeostasis</p>

		Analysis of gene expression in the olfactory epithelium of 21 COVID-19 patients with persistent, transient, or no loss of smell. Authors find: - Patients with persistent smell loss had higher expression of metallothionein genes involved i..
Jul 11	Partap et al., Current Developments in Nutrition, doi:10.1016/ j.cdnut.2023.10197 1	Vitamin D and zinc supplementation to improve treatment outcomes among COVID-19 patients in India: results from a double-blind randomized placebo-controlled trial
		5% higher ventilation (p=0.82), 6% higher hospital discharge (p=0.8), and 10% improved recovery (p=0.67). Early terminated factorial RCT with 46 vitamin D, 48 zinc, 44 vitamin D + zinc, and 43 placebo patients in India. The most serious outcome (ventilation) numbers do not seem realistic. Authors do not specify outcomes per group, but with on..
Jul 1	Ibrahim et al., Pakistan Journal of Pharmaceutical Sciences, doi:10.36721/ PJPS.2023.36.4.R EG.1031-1043.1	Clinical importance of zinc as monotherapy in modulating RT-PCR cycle threshold values and antibody levels in cases of COVID 19 patients
		Analysis of 75 patients in Saudi Arabia showing that zinc treatment increased salivary zinc levels and lowered the viral burden in COVID-19 cases. COVID-19 patients had lower salivary zinc levels compared to healthy controls. Salivary zin..
Jun 29	Wu et al., Journal of Infection, doi:10.1016/ j.jinf.2023.06.021	The association between zinc deficiency, and clinical outcomes of COVID-19

	<p>71% lower mortality (p=0.005), 27% lower combined mortality/hospitalization (p=0.03), and 18% lower hospitalization (p=0.21). TriNetX PSM retrospective 10,935 COVID-19 patients, showing higher mortality with zinc deficiency.</p>	
Jun 27	<p>Tran et al., In Vivo, doi:10.21873/ invivo.13262</p>	<p>Therapeutic Efficacy of AFree Oral Spray on the Symptoms and Course of Moderate and Severe COVID-19 in the Field Hospital</p>
	<p>84% improved recovery (p<0.0001) and 78% improved viral clearance (p=0.06). RCT 200 hospitalized patients in Vietnam, showing faster recovery with an oral spray containing zinc, propolis, xylitol, ginger, and DMSO.</p>	
Jun 20	<p>Mahjoub et al., Explore, doi:10.1016/ j.explore.2023.06.0 09</p>	<p>Melatonin, vitamins and minerals supplements for the treatment of Covid-19 and Covid-like illness: a prospective, randomized, double-blind multicenter study.</p>
	<p>67% improved recovery (p=0.32). RCT 164 low-risk (no hospitalizations) patients in Tunisia, showing improved recovery with zinc, melatonin, and vitamins A-E. This study includes COVID-19 and COVID-like illness, with 49% of 128 patients receiving a PCR test being COVID-1..</p>	
Jun 14	<p>Orellana- Manzano et al., Frontiers in Pharmacology, doi:10.3389/ fphar.2023.1197973</p>	<p>A report on SARS-CoV-2 first wave in Ecuador: drug consumption dynamics</p>
	<p>Retrospective 10,175 people PCR tested in Ecuador, showing lower risk of PCR+ with multivitamin use and suggesting higher risk with acetaminophen use. The study analyzed drug consumption for COVID-19 symptoms during the 14 days before the..</p>	

Jun 13	Al-Fartusie et al., Journal of Trace Elements in Medicine and Biology, doi:10.1016/ j.jtemb.2023.12724 2	A Comparative Study of Serum Zn, Cu, Mg, Mn, Cr, and Fe Levels and Their Association with the Vulnerability of Iraqi COVID-19 Patients
	Retrospective 40 COVID-19 patients, 40 patients post COVID-19 recovery, and 40 healthy controls in Iraq, showing significantly lower zinc levels in COVID-19 patients.	
Jun 10	Rheingold et al., Cureus, doi:10.7759/ cureus.40231	Zinc Supplementation Associated With a Decrease in Mortality in COVID-19 Patients: A Meta-Analysis
	37% lower mortality (p<0.0001). Meta analysis showing lower mortality in COVID-19 patients with zinc treatment.	
May 21	Chen et al., Nutrition, doi:10.1016/ j.nut.2023.112087	Early oral nutritional supplement improves COVID-19 outcomes among hospitalized older patients during the omicron wave
	PSM retrospective 1,181 COVID-19 patients ≥60 years old in China, showing significantly lower mortality with a nutritional supplement. Hospitalization time and viral clearance time was improved with earlier initiation of treatment. The su..	

May 13	<p>Jiménez et al., Journal of Trace Elements in Medicine and Biology, doi:10.1016/ j.jtemb.2023.12720 0</p>	<p>Zinc Levels of Patients With A Moderate to Severe COVID-19 Infection at Hospital Admission and After 4th Days of Ward Hospitalization and Their Clinical Outcome</p>
	<p>55% lower progression (p=0.22). Prospective analysis of 100 hospitalized COVID-19 patients in Spain, showing higher risk of death/mechanical ventilation/ICU admission with zinc levels <79µg/dL, without statistical significance.</p>	
May 11	<p>Kyagambiddwa et al., Infection and Drug Resistance, doi:10.2147/ idr.s405256</p>	<p>Thirty-Day Outcomes of Young and Middle-Aged Adults Admitted with Severe COVID-19 in Uganda: A Retrospective Cohort Study</p>
	<p>25% lower mortality (p=0.28). Retrospective 246 severe COVID-19 patients in Uganda, showing lower mortality with zinc treatment in unadjusted results, without statistical significance.</p>	
May 3	<p>Abuhelwa, Z., Translation: The University of Toledo Journal of Medical Sciences, doi:10.46570/ utjms.vol11-2023-7 49</p>	<p>Do Zinc Supplements Reduce Mortality in Patients with COVID-19?</p>
	<p>34% lower mortality (p<0.0001). Systematic review and meta analysis of 6 studies showing lower mortality with zinc treatment.</p>	

Apr 20	Fan et al., BioMetals, doi:10.1007/ s10534-023-00501- 0	Zinc and selenium status in coronavirus disease 2019
	Meta analysis showing increased risk of COVID-19 with zinc deficiency and selenium deficiency. Zinc deficiency was also associated with severity, while there was no significant association for mortality.	
Apr 19	Beheshti et al., Clinical Nutrition ESPEN, doi:10.1016/ j.clnesp.2023.04.01 2	Correlation of vitamin D levels with serum parameters in Covid-19 patients
	Retrospective 140 COVID-19 patients in Iran showing no significant difference in zinc levels between outpatients, hospitalized patients, and ICU patients.	
Apr 18	Equey et al., Clinical Nutrition, doi:10.1016/ j.clnu.2023.04.007	Association of plasma zinc levels with anti-SARS-CoV-2 IgG and IgA seropositivity in the general population: a case-control study
	Case control study with 199 COVID-19 cases and 447 controls in Switzerland, showing lower zinc levels associated with higher SARS-CoV-2 IgG and IgA seropositivity.	
Apr 1	Reino-Gelardo et al., Nutrients, doi:10.3390/ nu15071736	Effect of an Immune-Boosting, Antioxidant and Anti-Inflammatory Food Supplement in Hospitalized COVID-19 Patients: A Prospective Randomized Pilot Study
	61% lower mortality (p=0.05). RCT 162 late stage (65% on oxygen) patients in Spain, 78 treated with probiotics, prebiotics, vitamin D, zinc, and selenium, showing lower mortality with treatment, statistically significant only within the patients with high severity at ..	

Apr 1	Abbas et al., Biochemical and Cellular Archives, 22:1	Effectiveness of Zinc and ROS on Testosterone Hormone Levels for Recovering COVID-19 Patients
	Analysis of 70 recovered COVID-19 patients and 50 controls in Iraq, showing significantly lower zinc levels in COVID-19 patients.	
Mar 31	Alfawaz et al., Heliyon, doi:10.1016/ j.heliyon.2023.e150 42	The relation between dietary zinc and immune status in Saudi adults
	Survey of 252 adults in Saudi Arabia, showing higher zinc intake associated with an improved immune status score.	
Mar 21	Lahaye et al., Nutrients, doi:10.3390/ nu15061516	Minerals and Antioxidant Micronutrients Levels and Clinical Outcome in Older Patients Hospitalized for COVID-19 during the First Wave of the Pandemic
	28% lower mortality (p=0.26) and 53% lower severe cases (p=0.02). Retrospective 235 hospitalized COVID-19 patients in France, showing lower zinc levels associated with severe cases. Results are provided for zinc levels as a continuous value.	
Mar 21	Asoudeh et al., Clinical Nutrition ESPEN, doi:10.1016/ j.clnesp.2023.03.01 3	The association between dietary intakes of zinc, vitamin C and COVID-19 severity and related symptoms: A cross-sectional study
	57% lower severe cases (p=0.03). Retrospective 250 recovered COVID-19 patients, showing lower risk of severe cases with higher zinc intake.	

Mar 21	Young et al., Research Square, doi:10.21203/ rs.3.rs-2702282/v1	Novel Protocol Using a Comprehensive Training 'N' Treatment (TNT) Approach Rapidly Reverses Olfactory and Gustatory Dysfunction in Patients with Acute Loss of Taste and Smell Induced by SARS-CoV-2 Infection
	Retrospective 5 patients in the USA, showing 100% recovery of post-COVID-19 taste and smell disorders with a treatment protocol including zinc, vitamin A, B-complex, vitamin D, and alpha lipoic acid in addition to saline nasal irrigation,...	
Mar 15	Schloss et al., Inflammopharmacol ogy, doi:10.1007/ s10787-023-01183- 3	Nutritional deficiencies that may predispose to long COVID
	Review of 22 nutritional factors that have been linked to COVID-19 outcomes, the role of nutrients in COVID-19 infection, and the prevalence of multiple nutritional deficiencies in the population.	
Mar 4	Ibrahim Alhajjaji et al., Saudi Pharmaceutical Journal, doi:10.1016/ j.jsps.2023.02.011	Effect of zinc supplementation on symptom reduction and length of hospital stay among pediatric patients with Coronavirus Disease 2019 (COVID-19)
	88% lower mortality (p=0.13), 26% lower ventilation (p=0.75), 3% lower ICU admission (p=1), and 73% lower progression (p=0.004). Retrospective 101 hospitalized pediatric patients in Saudi Arabia, showing zinc treatment associated with lower respiratory failure and shorter hospitalization in unadjusted results. Patients receiving zinc were older. Authors note elevat..	
Feb 28	Boukef et al., NCT05670444	Melatonin, Vitamins and Minerals Supplements for the Treatment of Covid-19 and Covid-like Illness: Results of a Prospective, Randomised, Double-blinded Multicentre Study
	150 patient zinc early treatment RCT with results not reported over 7 months after completion.	

Feb 15	<p>Xie et al., Critical Reviews in Food Science and Nutrition, doi:10.1080/10408398.2023.2174948</p>	<p>Micronutrient perspective on COVID-19: Umbrella review and reanalysis of meta-analyses</p>
<p>Systematic review and meta analysis of micronutrient supplementation, showing zinc supplementation associated with lower mortality. Note that forest plots have OR>1 favoring supplementation.</p>		
Feb 2	<p>Arora et al., Nutrients, doi:10.3390/nu15030771</p>	<p>Global Dietary and Herbal Supplement Use during COVID-19—A Scoping Review</p>
<p>Review of 14 global studies showing that the most frequently used dietary supplements during COVID-19 were vitamin C, vitamin D, zinc, and multivitamins. The most common reason was for improved immune system functioning or reduced COVID-1..</p>		
Jan 30	<p>Sallam et al., Journal of Food and Nutrition Research, doi:10.12691/jfnr-11-1-10</p>	<p>Dietary Supplement Use among Children Whose Parents Work at National Research Centre: A Pilot Study</p>
<p>Survey of dietary supplementation showing high usage, and greater use by more highly educated people. The survey covered 200 children whose parents were employees of a research center in Egypt, showing 50% prevalence of supplementation du..</p>		
Jan 16	<p>Viglione et al., The Gazette of Medical Sciences, doi:10.46766/thegms.pubheal.22120905</p>	<p>Intravenous high dose vitamin C and ozonated saline effective treatment for Covid-19: The Evolution of Local Standard of Care</p>

		Retrospective 479 high risk outpatients in the USA treated with a protocol including intravenous vitamin C, vitamin D, zinc, quercetin, bromelain, lactoferrin, HCQ, ivermectin, ozonated saline, azithromycin, ceftriaxone, methylprednisolon..
Jan 10	Almasaud et al., Nutrients, doi:10.3390/ nu15020340	Association of Serum Zinc and Inflammatory Markers with the Severity of COVID-19 Infection in Adult Patients
		Prospective study of 123 COVID+ patients and 48 controls, showing significantly lower zinc levels in COVID-19 patients, and a negative correlation between zinc levels and COVID-19 severity. Moderate and severe cases were significantly old..
Jan 3	Ram et al., Research Square, doi:10.21203/ rs.3.rs-2418159/v1	Analysis of trace elements (Zn and Cu) levels in COVID-19 patients with ICU and Non-ICU hospitalization
		Prospective analysis of 122 hospitalized COVID-19 patients, showing significantly lower zinc levels in ICU patients compared with non-ICU patients. Zinc levels were lower in non-survivors compared with survivors, without statistical signi..
Nov 28 2022	Demircan et al., Frontiers in Immunology, doi:10.3389/ fimmu.2022.102267 3	Association of COVID-19 mortality with serum selenium, zinc and copper: Six observational studies across Europe
		Retrospective 551 COVID-19 patients in Europe, showing an inverse association between selenium or zinc levels and mortality.
Nov 26 2022	Sharif et al., Nutrients, doi:10.3390/ nu14235029	Impact of Zinc, Vitamins C and D on Disease Prognosis among Patients with COVID-19 in Bangladesh: A Cross-Sectional Study

	<p>40% lower severe cases (p=0.0001). Retrospective 962 COVID-19 patients in Bangladesh, showing significantly lower severity with vitamin C, vitamin D, and zinc supplementation, and improved results from the combination of all three.</p>	
<p>Nov 4 2022</p>	<p>Abdallah et al., Clinical Infectious Diseases, doi:10.1093/cid/ ciac807</p>	<p>Twice daily oral zinc in the treatment of patients with Coronavirus Disease-19: A randomized double-blind controlled trial</p>
	<p>30% lower mortality (p=0.27), 38% lower combined mortality/ICU admission (p=0.04), 54% lower ICU admission (p=0.01), and 42% lower need for oxygen therapy (p=0.009). RCT 470 patients with symptoms ≤7 days, showing significantly lower ICU admission and combined mortality/ICU admission with zinc treatment. Greater benefit was seen for patients treated within 3 days. 25mg elemental zinc bid for 15 days.</p>	
<p>Nov 3 2022</p>	<p>Olczak-Pruc et al., Annals of Agricultural and Environmental Medicine, doi:10.26444/aaem/ 155846</p>	<p>The effect of zinc supplementation on the course of COVID-19 – A systematic review and meta-analysis</p>
	<p>39% lower mortality (p=0.08). Systematic review and meta analysis of 9 zinc studies, showing significantly lower in-hospital mortality with treatment.</p>	
<p>Oct 31 2022</p>	<p>Maradi et al., Reports of Biochemistry & Molecular Biology, 11:3</p>	<p>Importance of Microminerals for Maintaining Antioxidant Function After COVID-19-induced Oxidative Stress</p>
	<p>Retrospective 100 COVID-19 patients and 100 healthy controls in India, showing significantly lower zinc levels in COVID-19 patients.</p>	

<p>Oct 30 2022</p>	<p>Adrean et al., Cureus, doi:10.7759/ cureus.30881</p>	<p>Does Prophylactic Oral Zinc Reduce the Risk of Contracting COVID-19?</p> <p>12% more cases (p=0.58). Retrospective 8,426 patients in the USA, showing no significant difference in cases with zinc prophylaxis. Severity results were not reported due to the small number of events.</p>
<p>Oct 19 2022</p>	<p>Doocy et al., PLOS Global Public Health, doi:10.1371/ journal.pgph.00009 24</p>	<p>Clinical progression and outcomes of patients hospitalized with COVID-19 in humanitarian settings: A prospective cohort study in South Sudan and Eastern Democratic Republic of the Congo</p> <p>41% lower mortality (p=0.41). Prospective study of 144 hospitalized COVID-19 patients in the DRC and South Sudan, showing lower mortality with zinc treatment, without statistical significance.</p>
<p>Oct 18 2022</p>	<p>Cosentino et al., Journal of Clinical Medicine, doi:10.3390/ jcm11206138</p>	<p>Early Outpatient Treatment of COVID-19: A Retrospective Analysis of 392 Cases in Italy</p> <p>Retrospective 392 outpatients in Italy showing 0.2% mortality with early treatment, compared with >3% in Italy at the time. Treatment varied for individual patients and included HCQ, vitamin D, vitamin C, vitamin A, zinc, quercetin, bromh..</p>
<p>Oct 7 2022</p>	<p>Jabbar et al., Journal of Pharmaceutical Negative Results, doi:10.47750/ pnr.2022.13.04.044</p>	<p>Assessment of Some Physiological Parameters and Trace Elements in Covid 19 Patients, Iraq</p> <p>Analysis of 100 COVID-19 and 100 healthy patients in Iraq, showing significantly lower zinc levels for COVID-19 patients.</p>

Sep 24 2022	Mansour et al., The Egyptian Journal of Internal Medicine, doi:10.1186/s43162-022-00159-z	Association of serum zinc level and clinical outcome in Egyptian COVID-19 patients
	Retrospective 30 ICU patients and 30 non-ICU hospitalized patients in Egypt, showing lower zinc levels in ICU patients. All patients received zinc supplementation.	
Sep 19 2022	Mosadegh et al., Microbial Pathogenesis, doi:10.1016/j.micpath.2022.105792	The effect of Nutrition Bio-shield superfood (NBS) on disease severity and laboratory biomarkers in patients with COVID-19: A randomized clinical trial
	61% lower mortality (p=0.002) and 28% shorter hospitalization (p=0.001). RCT 70 hospitalized severe COVID-19 patients in Iran, showing lower mortality and improved clinical markers with treatment combining vitamins A, B1–B3, B5, B6, B9, C, D, K, and magnesium, potassium, phosphorus, sulfur, manganese, calcium,...	
Sep 2 2022	Foshati et al., Food Science & Nutrition, doi:10.1002/fsn3.3034	Antioxidants and clinical outcomes of patients with coronavirus disease 2019: A systematic review of observational and interventional studies
	Systematic review showing that vitamin C, vitamin D, selenium, and zinc can improve COVID-19 clinical outcomes.	
Aug 24 2022	Bayraktar et al., Biological Trace Element Research, doi:10.1007/s12011-022-03400-6	Evaluation of the Relationship Between Aquaporin-1, Hepsidin, Zinc, Copper, and Iron Levels and Oxidative Stress in the Serum of Critically Ill Patients with COVID-19

	Analysis of 45 COVID-19 ICU patients and 45 healthy controls, showing significantly lower zinc levels in COVID-19 patients.	
Aug 23 2022	Mahmoud et al., International journal of health sciences, doi:10.53730/ ijhs.v6nS5.12091	Relationship of contactin-1 with a number of trace elements in Iraqi rheumatoid arthritis patients with and without COVID-19
	Retrospective 56 rheumatoid arthritis patients, 28 with COVID-19, showing lower zinc levels in COVID-19 patients.	
Aug 9 2022	Kladnik et al., Journal of Enzyme Inhibition and Medicinal Chemistry, doi:10.1080/147563 66.2022.2108417	Zinc pyrithione is a potent inhibitor of PLPro and cathepsin L enzymes with ex vivo inhibition of SARS-CoV-2 entry and replication
	Ex Vivo study showing zinc pyrithione to be a potent inhibitor of SARS-CoV-2 entry and replication.	
Aug 9 2022	Vásquez- Procopio et al., Frontiers in Cell and Developmental Biology, doi:10.3389/ fcell.2022.935363	Inflammatory-Metal Profile as a Hallmark for COVID-19 Severity During Pregnancy
	Prospective study of 163 COVID+ and 34 COVID- pregnant women in Mexico, showing significantly lower zinc levels in patients with severe COVID-19.	

<p>Aug 4 2022</p>	<p>Doğan et al., Journal of Tropical Pediatrics, doi:10.1093/tropej/ fmac072</p>	<p>The Clinical Significance of Vitamin D and Zinc Levels with Respect to Immune Response in COVID-19 Positive Children</p>
<p>77% fewer cases (p=0.003). Prospective study of 88 pediatric COVID-19 patients and 88 healthy controls, showing significantly lower zinc and vitamin D levels in COVID-19 patients.</p>		
<p>Aug 4 2022</p>	<p>Bego et al., Journal of Trace Elements in Medicine and Biology, doi:10.1016/ j.jtemb.2022.12705 5</p>	<p>Association of Trace Element Status in COVID-19 Patients with Disease Severity</p>
<p>Analysis of 210 hospitalized patients in Bosnia and Herzegovina with serum levels measured on admission, showing significantly lower zinc and selenium levels in patients that died or had severe cases, compared to mild cases.</p>		
<p>Jul 25 2022</p>	<p>Balmforth et al., Journal of Clinical Virology, doi:10.1016/ j.jcv.2022.105248</p>	<p>Evaluating the efficacy and safety of a novel prophylactic nasal spray in the prevention of SARS-CoV-2 infection: A multi-centre, double blind, placebo-controlled, randomised trial.</p>
<p>47% fewer symptomatic cases (p<0.0001) and 63% lower IgG positivity (p<0.0001). 648 patient RCT pHOXWELL nasal spray in India, showing significantly lower IgGS+ and significantly lower symptomatic cases with treatment. pHOXWELL includes a combination of natural virucidal agents and is designed to mimic the fluid surr..</p>		

<p>Jun 27 2022</p>	<p>Alahmari et al., Healthcare, doi:10.3390/ healthcare1007120 1</p>	<p>Factors Associated with Length of Hospital Stay among COVID-19 Patients in Saudi Arabia: A Retrospective Study during the First Pandemic Wave</p>
<p>30% shorter hospitalization ($p<0.0001$). Retrospective 977 hospitalized patients in Saudi Arabia, showing significantly shorter hospitalization with zinc treatment.</p>		
<p>Jun 17 2022</p>	<p>Stambouli et al., International Journal of Infectious Diseases, doi:10.1016/ j.ijid.2022.06.016</p>	<p>COVID-19 prophylaxis with Doxycycline and Zinc in Health Care Workers: A prospective randomized double-blind clinical trial</p>
<p>68% fewer symptomatic cases ($p=0.36$), 5% fewer cases ($p=1$), and 21% improved viral load ($p<0.0001$). Prophylaxis RCT with 59 zinc + doxycycline, 56 doxycycline, and 57 placebo healthcare workers, showing lower symptomatic cases and significantly improved Ct values with the addition of zinc to doxycycline treatment. Doxycycline 100mg/day ..</p>		
<p>May 31 2022</p>	<p>Abdulla et al., Archives of Razi Institute, doi:10.22092/ ARI.2022.358363.2 208</p>	<p>Haematological parameters in COVID-19 patients: association with severity of the disease</p>
<p>Retrospective 76 COVID-19 patients in Iraq, showing no significant difference in zinc levels based on severity.</p>		
<p>May 30 2022</p>	<p>Kumar et al., Cureus, doi:10.7759/ cureus.25467</p>	<p>Efficacy and Safety of Aspirin, Promethazine, and Micronutrients for Rapid Clinical Recovery in Mild to Moderate COVID-19 Patients: A Randomized Controlled Clinical Trial</p>

		<p>89% improved recovery (p=0.05). RCT 260 patients in India, 130 treated with aspirin, promethazine, vitamin C, D, B3, zinc, and selenium, showing faster recovery with treatment. There was no hospitalization, ICU admission, or supplemental oxygen requirements in either gr..</p>
May 27 2022	<p>Galmés et al., Nutrients, doi:10.3390/ nu14112254</p>	<p>Suboptimal Consumption of Relevant Immune System Micronutrients Is Associated with a Worse Impact of COVID-19 in Spanish Populations</p>
		<p>Ecological study in Spain, showing lower intake of vitamin D, A, B9, and zinc in regions with the highest COVID-19 incidence and mortality. Vitamin D intake was associated with lower prevalence, incidence, and a combined incidence+mortality..</p>
May 23 2022	<p>Tabatabaeizadeh, S., European Journal of Medical Research, doi:10.1186/ s40001-022-00694- z</p>	<p>Zinc supplementation and COVID-19 mortality: a meta-analysis</p>
		<p>43% lower mortality (p=0.0002). Meta analysis of five zinc treatment studies for COVID-19, showing significantly lower mortality.</p>
May 13 2022	<p>Zangeneh et al., Obesity Medicine, doi:10.1016/ j.obmed.2022.1004 20</p>	<p>Survival analysis based on body mass index in patients with Covid-19 admitted to the intensive care unit of Amir Al-Momenin Hospital in Arak – 2021</p>
		<p>21% higher mortality (p=0.66). Retrospective 193 ICU patients in Iran, showing no significant difference with zinc treatment.</p>
Apr 30 2022	<p>Voelkle et al., Nutrients, doi:10.3390/ nu14091862</p>	<p>Prevalence of Micronutrient Deficiencies in Patients Hospitalized with COVID-19: An Observational Cohort Study</p>

			<p>77% lower combined mortality/ICU admission (p=0.007). Prospective study of 57 consecutive hospitalized COVID-19 patients in Switzerland, showing higher risk of mortality/ICU admission with vitamin A, vitamin D, and zinc deficiency, with statistical significance only for vitamin A and zinc. A..</p>
Mar 31 2022	Arora et al., Journal of Infection, doi:10.1016/j.jinf.2021.12.039	Risk factors for Coronavirus disease-associated mucormycosis	
			<p>95% lower progression (p<0.0001). Retrospective 152 COVID-associated mucormycosis cases and 200 controls, showing lower risk of COVID-associated mucormycosis with zinc treatment.</p>
Mar 30 2022	Citu et al., Nutrients, doi:10.3390/nu14071445	Calcium, Magnesium, and Zinc Supplementation during Pregnancy: The Additive Value of Micronutrients on Maternal Immune Response after SARS-CoV-2 Infection	
			<p>18% lower severe cases (p=1). Retrospective 448 pregnant women with COVID-19. Patients with calcium, zinc, and magnesium supplementation, or magnesium only, had a significantly higher titer of SARS-CoV-2 anti-RBD antibodies. There was no statistically significant diff..</p>
Mar 28 2022	Maares et al., Nutrients, doi:10.3390/nu14071407	Free Zinc as a Predictive Marker for COVID-19 Mortality Risk	
			<p>Analysis of 33 COVID-19 patients and 86 control patients in Germany, showing lower free serum zinc levels associated with COVID-19 and mortality.</p>
Mar 23 2022	Ghanei et al., European Journal of Clinical Nutrition, doi:10.1038/s41430-022-01095-5	Low serum levels of zinc and 25-hydroxyvitmain D as potential risk factors for COVID-19 susceptibility: a pilot case-control study	
			<p>Case control study with 90 COVID-19 cases and 95 matched controls in Iran, showing significantly lower zinc levels for cases.</p>

Mar 10 2022	DiGuilio et al., International Journal of Molecular Sciences, doi:10.3390/ ijms23062995	Micronutrient Improvement of Epithelial Barrier Function in Various Disease States: A Case for Adjuvant Therapy
	Review of epithelial and endothelial barrier compromise and associated disease risk including COVID-19, and the potential benefits of vitamin A, vitamin D, and zinc for improving barrier function.	
Feb 28 2022	Shehab et al., Tropical Journal of Pharmaceutical Research, doi:10.4314/ tjpr.v21i2.13	Immune-boosting effect of natural remedies and supplements on progress of, and recovery from COVID-19 infection
	47% lower severe cases (p=0.24). Retrospective survey-based analysis of 349 COVID-19 patients, showing a lower risk of severe cases with vitamin D, zinc, turmeric, and honey prophylaxis in unadjusted analysis, without statistical significance. REC/UG/2020/03.	
Feb 28 2022	Nimer et al., Bosnian Journal of Basic Medical Sciences, doi:10.17305/ bjbms.2021.7009	The impact of vitamin and mineral supplements usage prior to COVID-19 infection on disease severity and hospitalization
	25% higher hospitalization (p=0.21) and 13% higher severe cases (p=0.46). Retrospective 2,148 COVID-19 recovered patients in Jordan, showing no significant differences in the risk of severity and hospitalization with zinc prophylaxis.	
Feb 26 2022	Hajdrik et al., Foods, doi:10.3390/ foods11050694	In Vitro Determination of Inhibitory Effects of Humic Substances Complexing Zn and Se on SARS-CoV-2 Virus Replication

	In Vitro study of a humic substance containing vitamin C, selenium ions, and zinc ions, showing 50% SARS-CoV-2 inhibition at picomolar concentrations.	
Feb 24 2022	Kory et al., Journal of Clinical Medicine Research, doi:10.14740/jocmr4658	"MATH+" Multi-Modal Hospital Treatment Protocol for COVID-19 Infection: Clinical and Scientific Rationale
	Review of the data supporting the MATH+ hospital treatment protocol for COVID-19.	
Feb 23 2022	Kumar et al., Cureus, doi:10.7759/cureus.22528	Role of Zinc and Clinicopathological Factors for COVID-19-Associated Mucormycosis (CAM) in a Rural Hospital of Central India: A Case-Control Study
	20% lower mortality (p=0.71). Case control study of 105 COVID-19 patients in India, 55 with mucormycosis and 50 without, showing zinc prophylaxis and diabetes both associated with mucormycosis in unadjusted results. This is likely confounded because zinc supplementati..	
Feb 12 2022	Nedić et al., JBIC Journal of Biological Inorganic Chemistry, doi:10.1007/s00775-022-01931-w	Major trace elements and their binding proteins in the early phase of Covid-19 infection
	Analysis of 60 COVID-19 patients and 60 matched controls, showing higher zinc levels in COVID-19 patients. The concentration of zinc was close to the lower reference limit in healthy people, and above the reference limit in 20 out of 60 C..	

Feb 8 2022	Ivanova et al., Journal of Trace Elements in Medicine and Biology, doi:10.1016/ j.jtemb.2022.12694 4	Evaluation of zinc, copper, and Cu:Zn ratio in serum, and their implications in the course of COVID-19
	Retrospective 75 COVID-19 hospitalized patients and 68 healthy controls in Bulgaria, showing mortality associated with lower zinc levels.	
Jan 30 2022	Chen et al., Environmental Geochemistry and Health, doi:10.1007/ s10653-022-01204- 0	Geographical distribution of trace elements (selenium, zinc, iron, copper) and case fatality rate of COVID-19: a national analysis across conterminous USA
	Analysis of the geographical association between concentrations of selenium, zinc, iron, and copper in surface soils and COVID-19 case fatality rates, showing low zinc levels associated with higher case fatality rates.	
Jan 29 2022	Mohajeri et al., Mediterranean Journal of Nutrition and Metabolism, doi:10.3233/ MNM-211521	The difference in the dietary inflammatory index, functional food, and antioxidants intake between COVID-19 patients and healthy persons
	Retrospective dietary survey analysis of 500 COVID-19 patients and 500 healthy matched controls in Iran, showing that COVID-19 patients had lower daily consumption of vitamin C, vitamin D, vitamin E, zinc, and selenium. IR.ARUMS.REC.1400...	

Jan 22 2022	PVSN et al., Biological Trace Element Research, doi:10.1007/ s12011-022-03124- 7	Comparative Analysis of Serum Zinc, Copper and Magnesium Level and Their Relations in Association with Severity and Mortality in SARS-CoV-2 Patients
	Analysis of 150 COVID+ hospitalized patients in India, showing lower zinc levels associated with higher severity.	
Jan 22 2022	Ekemen Keleş et al., European Journal of Pediatrics, doi:10.1007/ s00431-021-04348- w	Serum zinc levels in pediatric patients with COVID-19
	75% lower hospitalization (p=0.01). Prospective study of 100 COVID+ pediatric patients in Turkey, showing significantly increased risk of hospitalization for patients with zinc deficiency.	
Jan 7 2022	Al-Saleh et al., BioMetals, doi:10.1007/ s10534-021-00355- 48	Essential metals, vitamins and antioxidant enzyme activities in COVID-19 patients and their potential associations with the disease severity
	Prospective study of 155 COVID-19 patients in Saudi Arabia, showing that 25% of patients were zinc deficient (<0.693 µg/mL). There were no significant differences in zinc levels between the asymptomatic, mild, moderate and severe COVID-19..	

Dec 16 2021	Mayberry et al., Critical Care Medicine, doi:10.1097/01.ccm .0000807104.8265 0.d6	Zinc use is associated with improved outcomes in COVID-19: results from the CRUSH-COVID registry
	53% lower mortality (p<0.0001), 64% lower ventilation (p<0.0001), 60% lower ICU admission (p<0.0001), and 58% lower combined mortality/ICU admission (p<0.0001). Retrospective 2,028 COVID patients in the USA, showing significantly lower mortality, ventilation, ICU admission, and progression to ARDS with zinc use, defined as at least one dose from one week prior to admission to 48 hours after admis..	
Dec 13 2021	Gordon et al., Frontiers in Medicine, doi:10.3389/ fmed.2021.756707	A Case-Control Study for the Effectiveness of Oral Zinc in the Prevention and Mitigation of COVID-19
	85% fewer symptomatic cases (p=0.02). Prospective study of zinc supplementation with 104 patients randomized to receive 10mg, 25mg, or 50mg of zinc picolinate daily, and a matched sample of 96 control patients from the adjacent clinic that did not routinely recommend/use zinc..	
Nov 15 2021	Ramos et al., Global Journal of Health Science, doi:10.5539/ gjhs.v14n1p1	Vitamin D, Zinc and Iron in Adult Patients with Covid-19 and Their Action in the Immune Response as Biomarkers
	24% fewer cases (p=0.64). Retrospective 13 COVID-19 patients and 7 controls in Brazil, showing no significant difference in zinc deficiency.	
Oct 30 2021	Correa et al., NCT04902976	Evaluation of SARS-COV-2 Viral Load of Covid-19 Patients After Rinsing With Oral Antimicrobial Mouthwashes
	105 patient zinc late treatment RCT with results not reported over 1.5 years after completion.	

<p>Oct 25 2021</p>	<p>Leal-Martínez et al., International Journal of Environmental Research and Public Health, doi:10.3390/ ijerph19031172 (date from preprint)</p>	<p>Effect of a Nutritional Support System to Increase Survival and Reduce Mortality in Patients with COVID-19 in Stage III and Comorbidities: A Blinded Randomized Controlled Clinical Trial</p>
<p>86% lower mortality (p=0.03) and 57% lower ventilation (p=0.31). 80 patient RCT with 40 patients treated with a comprehensive regimen of nutritional support, showing significantly lower mortality with treatment. Treatment contained cholecalciferol, vitamin C, zinc, spirulina maxima, folic acid, glutami..</p>		
<p>Oct 12 2021</p>	<p>Worcel et al., Annals of Palliative Medicine, doi:10.21037/ apm-21-1707</p>	<p>Low mortality from COVID-19 at a nursing facility in France following a combined preventive and active treatment protocol</p>
<p>Report on the relatively low mortality and relatively mild COVID-19 symptoms at a French nursing facility that has adopted several treatments including vitamin D, zinc, anticoagulants, corticosteroids, and a multivitamin.</p>		
<p>Oct 11 2021</p>	<p>Majeed et al., Evidence-Based Complementary and Alternative Medicine, doi:10.1155/2021/8 447545</p>	<p>A Randomized, Double-Blind, Placebo-Controlled Study to Assess the Efficacy and Safety of a Nutritional Supplement (ImmuActive) for COVID-19 Patients</p>
<p>43% improved recovery (p=0.004) and 6% faster viral clearance (p=0.47). RCT 100 patients in India, 50 treated with ImmuActive (curcumin, andrographolides, resveratrol, zinc, selenium, and piperine), showing improved recovery with treatment.</p>		

<p>Oct 4 2021</p>	<p>Kocak et al., Biological Trace Element Research, doi:10.1007/ s12011-021-02946- 1</p>	<p>Evaluation of Serum Trace Element Levels and Biochemical Parameters of COVID-19 Patients According to Disease Severity https://link.springer.com/10.1007/s12011-021-02946-1</p>
<p>Analysis of 60 COVID-19 patients and 32 healthy controls, showing that zinc and selenium levels were significantly lower in COVID-19 patients compared to controls. Zinc levels decreased with increasing disease severity from asymptomatic t..</p>		
<p>Oct 1 2021</p>	<p>Kaplan et al., SSRN, 10.2139/ ssrn.3934228</p>	<p>Resveratrol and Zinc in the Treatment of Outpatients With COVID-19 – The Reszinate Study - A Phase 1/2 Randomized Clinical Trial Utilizing Home Patient-Obtained Nasal and Saliva Viral Sampling</p>
<p>14% higher ventilation (p=1), 14% higher ICU admission (p=1), and 14% higher hospitalization (p=1). Small RCT of zinc plus resveratrol in COVID-19+ outpatients, showing no significant differences in viral clearance or symptoms. Although the treatment group was older (46.3 vs. 38.5) and had more severe baseline symptoms, they had similar..</p>		
<p>Sep 22 2021</p>	<p>Du Laing et al., Nutrients, doi:10.3390/ nu13103304</p>	<p>Course and Survival of COVID-19 Patients with Comorbidities in Relation to the Trace Element Status at Hospital Admission</p>
<p>79% lower mortality (p=0.01). Retrospective 73 hospitalized COVID-19 patients in Belgium, showing higher risk of mortality with selenium deficiency and zinc deficiency.</p>		
<p>Sep 17 2021</p>	<p>Singh et al., Frontiers in Immunology, doi:10.3389/ fimmu.2021.699389</p>	<p>Nutritional Immunity, Zinc Sufficiency, and COVID-19 Mortality in Socially Similar European Populations</p>
<p>Analysis of zinc sufficiency showing a positive correlation between sufficiency and COVID-19 within European countries. Unmeasured confounders are likely to be significant, for example the higher sufficiency countries also have significan..</p>		

Sep 3 2021	Razeghi Jahromi et al., BMC Infectious Diseases, doi:10.1186/s12879-021-06617-3	The correlation between serum selenium, zinc, and COVID-19 severity: an observational study
	Prospective analysis of 84 patients in Iran, showing higher selenium and zinc levels associated with a decrease in serum CRP level. There was no statistically significant association between selenium/zinc levels and disease severity.	
Sep 1 2021	Bagheri et al., Journal of Family & Reproductive Health, doi:10.18502/jfrh.v14i3.4668	Supplement Usage Pattern in a Group of COVID-19 Patients in Tehran
	60% lower severe cases (p=0.41) and 41% lower hospitalization (p=0.37). Retrospective 510 patients in Iran, showing lower risk of severity with vitamin D (statistically significant) and zinc (not statistically significant) supplementation. IR.TUMS.VCR.REC.1398.1063.	
Aug 31 2021	Arrieta et al., Nutrition, doi:10.1016/j.nut.2021.111467	Serum zinc and copper in people with COVID-19 and zinc supplementation in parenteral nutrition
	Retrospective 35 COVID-19 patients on parenteral nutrition on Spain, showing serum zinc levels inversely associated with length of hospital stay. There was no significant association between zinc and mortality (p>0.1, actual results are n..	
Aug 28 2021	Assiri et al., Journal of Infection and Public Health, doi:10.1016/j.jiph.2021.08.030	COVID-19 related treatment and outcomes among COVID-19 ICU patients: A retrospective cohort study

		<p>81% higher mortality (p=0.44). Retrospective 118 ICU patients in Saudi Arabia showing no significant differences in unadjusted results with zinc, vitamin D, and favipiravir treatment.</p>
Aug 26 2021	<p>Golabi et al., Nutrients, doi:10.3390/ nu13103368 (date from preprint)</p>	<p>The Association between Vitamin D and Zinc Status and the Progression of Clinical Symptoms among Outpatients Infected with SARS-CoV-2 and Potentially Non-Infected Participants: A Cross-Sectional Study</p>
		<p>Analysis of vitamin D and zinc levels in 53 PCR+ outpatients and 53 matched controls, showing lower zinc levels in COVID-19 patients, and increased risk of cases and symptoms with vitamin D deficiency. There was no significant difference ..</p>
Aug 25 2021	<p>Bagher Pour et al., International Journal of Infectious Diseases, doi:10.1016/ j.ijid.2021.08.053</p>	<p>Serum trace elements levels and clinical outcomes among Iranian COVID-19 patients</p>
		<p>Prospective analysis of 114 ICU patients and 112 matched non-ICU patients in Iran, showing mortality associated with lower zinc levels. There was no significant difference in zinc levels between ICU and non-ICU patients. IR.TBZMED.REC.139..</p>
Aug 18 2021	<p>Shakeri et al., Journal of Medical Virology, doi:10.1002/ jmv.27277</p>	<p>Evaluation of the relationship between serum levels of zinc, vitamin B12, vitamin D, and clinical outcomes in patients with COVID-19</p>
		<p>Retrospective 293 hospitalized patients in Iran showing lower levels of zinc, vitamin B12, and vitamin D in patients that died, with statistical significance reached only for zinc.</p>

<p>Aug 17 2021</p>	<p>Capone et al., Cureus, doi:10.7759/ cureus.9809</p>	<p>Characterization of Critically Ill COVID-19 Patients at a Brooklyn Safety-Net Hospital</p>
<p>Retrospective 102 ICU patients in the USA, 73 receiving vitamin C and zinc, showing a negative correlation of treatment with mortality, but not reaching statistical significance (p = 0.31).</p>		
<p>Aug 12 2021</p>	<p>Elavarasi et al., medRxiv, doi:10.1101/2021.0 8.10.21261855</p>	<p>Clinical features, demography and predictors of outcomes of SARS-CoV-2 infection in a tertiary care hospital in India - a cohort study</p>
<p>65% lower mortality (p<0.0001). Retrospective 2017 hospitalized patients in India, showing lower mortality with zinc treatment.</p>		
<p>Aug 4 2021</p>	<p>Hosseini et al., Infectious Diseases in Clinical Practice, doi:10.1097/ IPC.000000000000 1051</p>	<p>Comparing Serum Levels of Vitamin D and Zinc in Novel Coronavirus–Infected Patients and Healthy Individuals in Northeastern Iran, 2020</p>
<p>Analysis of 56 COVID-19 patients and 46 healthy control patients in Iran. Severe cases had lower levels of zinc compared with non-severe cases and healthy controls.</p>		
<p>Jul 27 2021</p>	<p>Israel et al., Epidemiology and Global Health Microbiology and Infectious Disease, doi:10.7554/ eLife.68165</p>	<p>Identification of drugs associated with reduced severity of COVID-19: A case-control study in a large population</p>
<p>100% lower hospitalization (p=0.04). Case control study examining medication usage with a healthcare database in Israel, showing lower risk of hospitalization with calcium + zinc supplements (defined as being picked up within 35 days prior to PCR+), however only 10 patients ..</p>		

Jul 9 2021	Rabail et al., Food Science & Nutrition, doi:10.1002/fsn3.2458	Nutritional and lifestyle changes required for minimizing the recovery period in home quarantined COVID-19 patients of Punjab, Pakistan
	Survey of 80 recovered COVID-19 patients in Pakistan, showing faster recovery with vitamin C, vitamin D, and zinc supplementation.	
Jul 6 2021	Margolin et al., Journal of Evidence-Based Integrative Medicine, doi:10.1177/2515690X211026193	20-Week Study of Clinical Outcomes of Over-the-Counter COVID-19 Prophylaxis and Treatment
	94% fewer cases (p=0.003). Retrospective 113 outpatients, 53 (patient choice) treated with zinc, quercetin, vitamin C/D/E, l-lysine, and quina, showing lower cases with treatment. Results are subject to selection bias and limited information on the groups is provid..	
Jun 24 2021	Beigmohammadi et al., Nutrition, doi:10.1016/j.nut.2021.111400	The association between serum levels of micronutrients and the severity of disease in patients with COVID-19
	Retrospective 60 ICU patients in Iran, showing that lower levels of vitamin D, magnesium, and zinc were significantly associated with higher APACHE scores (P = 0.001, 0.028, and <0.001, respectively) and higher lung involvement (P = 0.002..	
Jun 20 2021	Notz et al., Nutrients, doi:10.3390/nu13062113	Clinical Significance of Micronutrient Supplementation in Critically Ill COVID-19 Patients with Severe ARDS
	Retrospective 22 ICU patients, showing most patients had low selenium status biomarkers and low zinc levels, and reporting on treatment with nutrient supplementation including selenium and zinc. Authors conclude that sufficient selenium a..	

<p>Jun 15 2021</p>	<p>Panchariya et al., Chemical Communications, doi:10.1039/ D1CC03563K</p>	<p>Zinc²⁺ ion inhibits SARS-CoV-2 main protease and viral replication in vitro</p>
<p>In Silico and In Vitro study showing that ionic zinc inhibits SARS-CoV-2 main protease (Mpro) and inhibits viral replication. Zinc acetate inhibited viral replication in Vero E6 cells, while zinc glycinate and zinc gluconate did not at no..</p>		
<p>Jun 12 2021</p>	<p>Verschelden et al., medRxiv, doi:10.1101/2021.0 6.09.21258271</p>	<p>Plasma zinc status and hyperinflammatory syndrome in hospitalized COVID-19 patients: an observational study</p>
<p>Prospective study of 139 hospitalized COVID-19 patients, showing 96% had zinc deficiency. Higher zinc levels were associated with a shorter length of hospitalization. Mortality and ventilation was lower with higher zinc levels, but not re..</p>		
<p>Jun 7 2021</p>	<p>Al Sulaiman et al., Critical Care, doi:10.1186/ s13054-021-03785- 1 (date from preprint)</p>	<p>Evaluation of Zinc Sulfate as an Adjunctive Therapy in COVID-19 Critically Ill Patients: a Two Center Propensity-score Matched Study</p>
<p>36% lower mortality (p=0.11), 25% longer ICU admission (p=0.28), and 6% longer hospitalization (p=0.61). Retrospective 266 ICU patients showing lower mortality with zinc treatment (very close to statistical significance), and higher odds of acute kidney injury. NRC21R/287/07.</p>		
<p>May 22 2021</p>	<p>Asimi et al., Endocrine Abstracts, doi:10.1530/ endoabs.73.PEP14 .2</p>	<p>Selenium, zinc, and vitamin D supplementation affect the clinical course of COVID-19 infection in Hashimoto's thyroiditis</p>

		<p>97% lower ventilation ($p<0.0001$), 99% lower hospitalization ($p<0.0001$), and 100% lower severe cases ($p<0.0001$). Retrospective 356 Hashimoto's thyroiditis outpatients, 270 taking vitamin D, zinc, and selenium, showing significantly lower hospitalization with treatment. Authors adjust for age, gender, BMI, and smoking status, reporting statistically ..</p>
May 11 2021	<p>Aldwihi et al., International Journal of Environmental Research and Public Health, doi:10.3390/ ijerph18105086</p>	<p>Patients' Behavior Regarding Dietary or Herbal Supplements before and during COVID-19 in Saudi Arabia</p>
		<p>24% lower hospitalization ($p=0.16$). Retrospective survey-based analysis of 738 COVID-19 patients in Saudi Arabia, showing lower hospitalization with vitamin C, turmeric, zinc, and nigella sativa, and higher hospitalization with vitamin D. For vitamin D, most patients contin..</p>
May 3 2021	<p>Fromonot et al., Clinical Nutrition, doi:10.1016/ j.clnu.2021.04.042</p>	<p>Hypozincemia in the early stage of COVID-19 is associated with an increased risk of severe COVID-19</p>
		<p>89% lower hospitalization ($p=0.002$) and 28% fewer cases ($p=0.003$). Analysis of 240 consecutive patients in France, showing significantly higher zinc deficiency in COVID-19 patients, and significantly greater risk of hospitalization for COVID-19 patients with zinc deficiency. 2020PI087.</p>
Apr 18 2021	<p>Elham et al., Clinical Nutrition ESPEN, doi:10.1016/ j.clnesp.2021.03.04 0</p>	<p>Serum vitamin D, calcium, and zinc levels in patients with COVID-19</p>
		<p>Case control study with 93 hospitalized patients in Iran and 186 control patients, showing significantly lower vitamin D, zinc, and calcium levels in cases. IR.SHOUSHTAR.REC.1399.017.</p>

<p>Apr 15 2021</p>	<p>Skalny et al., Metabolites, doi:10.3390/ metabo11040244</p>	<p>Serum Zinc, Copper, and Other Biometals Are Associated with COVID-19 Severity Markers</p>
<p>Analysis of serum metal levels in 150 COVID-19 patients and 44 controls, finding that COVID-19 severity was associated with lower serum Ca, Fe, Se, Zn levels when compared to controls.</p>		
<p>Apr 14 2021</p>	<p>Seet et al., International Journal of Infectious Diseases, doi:10.1016/ j.ijid.2021.04.035</p>	<p>Positive impact of oral hydroxychloroquine and povidone-iodine throat spray for COVID-19 prophylaxis: an open-label randomized trial</p>
<p>50% fewer symptomatic cases (p=0.0007) and 27% fewer cases (p=0.03). Prophylaxis RCT in Singapore with 3,037 low risk patients, showing lower serious cases, lower symptomatic cases, and lower confirmed cases of COVID-19 with all treatments (ivermectin, HCQ, PVP-I, and Zinc + vitamin C) compared to vitamin ..</p>		
<p>Apr 8 2021</p>	<p>Abdulateef et al., Open Medicine, doi:10.1515/ med-2021-0273</p>	<p>COVID-19 severity in relation to sociodemographics and vitamin D use</p>
<p>13% lower hospitalization (p=0.83). Survey of 428 recovered COVID-19 patients in Iraq, showing fewer hospital visits for patients on prophylactic vitamin C or D. Hospitalization was lower for those on vitamin C, D, or zinc, without statistical significance.</p>		
<p>Apr 8 2021</p>	<p>Gadhiya et al., BMJ Open, doi:10.1136/ bmjopen-2020-042 549</p>	<p>Clinical characteristics of hospitalised patients with COVID-19 and the impact on mortality: a single-network, retrospective cohort study from Pennsylvania state</p>

		<p>41% higher mortality (p=0.33). Retrospective 283 patients in the USA showing higher mortality with all treatments (not statistically significant). Confounding by indication is likely. In the supplementary appendix, authors note that the treatments were usually given fo..</p>
Apr 7 2021	<p>Mulhem et al., BMJ Open, doi:10.1136/ bmjopen-2020-042 042</p>	<p>3219 hospitalised patients with COVID-19 in Southeast Michigan: a retrospective case cohort study</p>
		<p>46% lower mortality (p<0.0001). Retrospective database analysis of 3,219 hospitalized patients in the USA. Very different results in the time period analysis (Table S2), and results significantly different to other studies for the same medications (e.g., heparin OR 3.06..</p>
Mar 30 2021	<p>Holt et al., Thorax, doi:10.1136/ thoraxjnl-2021-217 487</p>	<p>Risk factors for developing COVID-19: a population-based longitudinal study (COVIDENCE UK)</p>
		<p>7% fewer cases (p=0.77). Prospective survey-based study with 15,227 people in the UK, showing lower risk of COVID-19 cases with vitamin A, vitamin D, zinc, selenium, probiotics, and inhaled corticosteroids; and higher risk with metformin and vitamin C. Statistica..</p>
Feb 28 2021	<p>Bejan et al., Clinical Pharmacology & Therapeutics, doi:10.1002/ cpt.2376 (date from preprint)</p>	<p>DrugWAS: Drug-wide Association Studies for COVID-19 Drug Repurposing</p>
		<p>18% lower ventilation (p=0.78) and 30% lower ICU admission (p=0.6). Retrospective 9,748 COVID-19 patients in the USA showing lower ventilation and ICU admission with zinc prophylaxis, without statistical significance.</p>
Feb 25 2021	<p>Patel et al., Journal of Medical Virology, doi:10.1002/ jmv.26895</p>	<p>A pilot double-blind safety and feasibility randomized controlled trial of high-dose intravenous zinc in hospitalized COVID-19 patients</p>

		<p>20% lower mortality (p=1). Small early terminated RCT with 33 hospitalized patients in Australia, 15 treated with zinc, showing no significant difference in clinical outcomes. Treatment increased zinc levels above the deficiency cutoff. Intravenous zinc 0.5mg/kg/da..</p>
Feb 15 2021	<p>Mahto et al., American Journal of Blood Research, 11:1</p>	<p>Seroprevalence of IgG against SARS-CoV-2 and its determinants among healthcare workers of a COVID-19 dedicated hospital of India</p>
		<p>37% lower IgG positivity (p=0.35). Retrospective 689 healthcare workers in India, showing no significant difference in IgG positivity with zinc prophylaxis.</p>
Feb 13 2021	<p>Dubourg et al., Journal of Microbiology, Immunology and Infection, doi:10.1016/j.jmii.2021.01.012</p>	<p>Low blood zinc concentrations in patients with poor clinical outcome during SARS-CoV-2 infection: is there a need to supplement with Zinc COVID-19 patients?</p>
		<p>Retrospective 275 patients showing zinc levels significantly lower in patients with poor outcomes, 840 vs. 970 µg/L, p< 0.0001.</p>
Feb 12 2021	<p>Thomas et al., JAMA Network Open, doi:10.1001/jamanetworkopen.2021.0369</p>	<p>Effect of High-Dose Zinc and Ascorbic Acid Supplementation vs Usual Care on Symptom Length and Reduction Among Ambulatory Patients With SARS-CoV-2 Infection: The COVID A to Z Randomized Clinical Trial</p>
		<p>44% higher hospitalization (p=0.72) and 12% faster recovery (p=0.38). Small 214 low-risk outpatient RCT showing non-statistically significant faster recovery with zinc and with vitamin C. Study performed in the USA where zinc deficiency is relatively uncommon. The zinc dosage is relatively low, 50mg zinc gl..</p>

<p>Feb 1 2021</p>	<p>Muhammad et al., SAGE Open Medicine, doi:10.1177/205031 2121991246</p>	<p>Deficiency of antioxidants and increased oxidative stress in COVID-19 patients: A cross-sectional comparative study in Jigawa, Northwestern Nigeria</p>
<p>Case control study with 50 symptomatic COVID-19 patients and 21 healthy controls in Nigeria, showing that COVID-19 patients had significantly lower levels of selenium and zinc, and vitamins A, C, and E. Control patients were younger than ..</p>		
<p>Jan 7 2021</p>	<p>Abdelmaksoud et al., Biological Trace Element Research, doi:10.1007/ s12011-020-02546- 5</p>	<p>Olfactory Disturbances as Presenting Manifestation Among Egyptian Patients with COVID-19: Possible Role of Zinc</p>
<p>134 COVID-19 patients, 49 treated with zinc, showing faster recovery of olfactory function in patients treated with zinc (median 7 vs. 18 days). There was no difference in overall recovery time. There were 4 deaths but authors do not indi..</p>		
<p>Jan 7 2021</p>	<p>Sethuram et al., Reproductive Sciences, doi:10.1007/ s43032-020-00400- 6</p>	<p>Potential Role of Zinc in the COVID-19 Disease Process and its Probable Impact on Reproduction</p>
<p>Review of zinc deficiency and supplementation for COVID-19, including potential impacts on reproductive health.</p>		

<p>Jan 4 2021</p>	<p>Joachimiak et al., PLOS Neglected Tropical Diseases, doi:10.1371/ journal.pntd.000889 5</p>	<p>Zinc against COVID-19? Symptom surveillance and deficiency risk groups</p>
<p>Literature review concluding that zinc should be included as part of preventative supplementation for COVID-19, in general for support of immune health, and should also be considered in the context of zinc deficiency acquired during a vir..</p>		
<p>Jan 1 2021</p>	<p>Alkattan et al., Alexandria Journal of Medicine, doi:10.1080/209050 68.2020.1870788</p>	<p>Correlation between Micronutrient plasma concentration and disease severity in COVID-19 patients</p>
<p>Analysis of 80 hospitalized COVID-19 patients in Saudi Arabia, showing lower zinc levels for severe patients, without statistical significance.</p>		
<p>Dec 30 2020</p>	<p>McCullough et al., Reviews in Cardiovascular Medicine, doi:10.31083/ j.rcm.2020.04.264</p>	<p>Multifaceted highly targeted sequential multidrug treatment of early ambulatory high-risk SARS-CoV-2 infection (COVID-19)</p>
<p>Review urging early treatment of COVID-19 with sequential multidrug treatment that has been shown to be safe and effective. Proposed treatment includes zinc, vitamin D & C, quercetin, and depending on age, comorbidities, and symptoms may ..</p>		
<p>Dec 23 2020</p>	<p>Gonçalves et al., Nutrition in Clinical Practice, doi:10.1002/ ncp.10612</p>	<p>Association Between Low Zinc Levels and Severity of Acute Respiratory Distress Syndrome by New Coronavirus SARS-CoV-2</p>

		<p>82% lower severe cases (p=0.001). Retrospective 169 ICU patients in Brazil, 214 with low zinc levels, showing an association between low zinc levels and severe ARDS. CAAE 30608,020.9.0000.8114.</p>
Dec 15 2020	<p>Darban et al., Journal of Cellular & Molecular Anesthesia, doi:10.22037/ jcma.v6i2.32182</p>	<p>Efficacy of High Dose Vitamin C, Melatonin and Zinc in Iranian Patients with Acute Respiratory Syndrome due to Coronavirus Infection: A Pilot Randomized Trial</p>
		<p>33% lower progression (p=1) and 6% shorter ICU admission (p=0.3). Small RCT in Iran with 20 ICU patients, 10 treated with high-dose vitamin C, melatonin, and zinc, not showing significant differences.</p>
Dec 10 2020	<p>Rosenthal et al., JAMA Network Open, doi:10.1001/ jamanetworkopen.2 020.29058</p>	<p>Risk Factors Associated With In-Hospital Mortality in a US National Sample of Patients With COVID-19</p>
		<p>16% higher mortality (p=0.003). Retrospective database analysis of 64,781 hospitalized patients in the USA, showing lower mortality with vitamin C or vitamin D (authors do not distinguish between the two), and higher mortality with zinc and HCQ, statistically significant..</p>
Nov 30 2020	<p>Louca et al., BMJ Nutrition, Prevention & Health, doi:10.1136/ bmjnph-2021-0002 50 (date from preprint)</p>	<p>Modest effects of dietary supplements during the COVID-19 pandemic: insights from 445 850 users of the COVID-19 Symptom Study app</p>
		<p>1% fewer cases (p=0.8). Survey analysis of dietary supplements showing no significant difference in PCR+ cases with zinc usage. These results are for PCR+ cases only, they do not reflect potential benefits for reducing the severity of cases. A number of biases c..</p>

<p>Nov 29 2020</p>	<p>Abd-Elsalam et al., Biological Trace Element Research, doi:10.1007/ s12011-020-02512- 1</p>	<p>Do Zinc Supplements Enhance the Clinical Efficacy of Hydroxychloroquine?: a Randomized, Multicenter Trial</p> <p>1% lower mortality (p=0.99), 34% lower ventilation (p=0.54), 6% improved recovery (p=0.97), and 4% shorter hospitalization (p=0.55). 191 patient RCT in Egypt comparing the addition of zinc to HCQ, not showing a significant difference. No information on baseline zinc values was recorded. Egypt has a low rate of zinc deficiency so supplementation may be less likely to be..</p>
<p>Nov 18 2020</p>	<p>Pormohammad et al., International Journal of Molecular Medicine, doi:10.3892/ijmm.2020.4790</p>	<p>Zinc and SARS-CoV-2: A molecular modeling study of Zn interactions with RNA-dependent RNA-polymerase and 3C-like proteinase enzymes</p> <p>In Silico analysis supporting the hypothesis that Zn would bind and regulate the enzymatic activities of 3CLpro and RdRp of SARS-CoV-2 and therefore inhibit viral replication. Since Zn has established immune health benefits, is readily av..</p>
<p>Oct 26 2020</p>	<p>Frontera et al., Research Square, doi:10.21203/ rs.3.rs-94509/v1</p>	<p>Treatment with Zinc is Associated with Reduced In-Hospital Mortality Among COVID-19 Patients: A Multi-Center Cohort Study</p> <p>37% lower mortality (p=0.02). Retrospective 3,473 hospitalized patients showing 37% lower mortality with HCQ+zinc. PSM aHR 0.63, p=0.015 regression aHR 0.76, p = 0.023</p>

<p>Oct 26 2020</p>	<p>Tomasa-Irriguible et al., Metabolites, doi:10.3390/metabo11090565 (date from preprint)</p>	<p>Low Levels of Few Micronutrients May Impact COVID-19 Disease Progression: An Observational Study on the First Wave</p>
<p>49% lower ventilation (p=0.06) and 52% lower ICU admission (p=0.02). Retrospective 120 hospitalized patients in Spain showing zinc deficiency associated with higher ICU admission.</p>		
<p>Oct 20 2020</p>	<p>Heller et al., Redox Biology, doi:10.1016/j.redox.2020.101764</p>	<p>Prediction of Survival Odds in COVID-19 by Zinc, Age and Selenoprotein P as Composite Biomarker</p>
<p>Analysis of 35 COVID-19 patients showing a significant correlation for serum zinc levels between COVID-19 patients and controls, and between COVID-19 survivors and non-survivors.</p>		
<p>Oct 11 2020</p>	<p>Vogel-González et al., Nutrients, doi:10.3390/nu13020562 (date from preprint)</p>	<p>Low Zinc Levels at Admission Associates with Poor Clinical Outcomes in SARS-CoV-2 Infection</p>
<p>77% lower mortality (p=0.0005), 71% lower ICU admission (p<0.0001), and 68% faster recovery (p=0.001). Retrospective 249 PCR+ hospitalized patients in Spain, 58 with zinc levels on admission <50 µg/dL, showing higher mortality and ICU admission, and slower recovery with low zinc levels.</p>		
<p>Sep 10 2020</p>	<p>Jothimani et al., International Journal of Infectious Diseases, doi:10.1016/j.ijid.2020.09.014</p>	<p>COVID-19: Poor outcomes in patients with zinc deficiency</p>

		<p>90% lower mortality (p=0.06) and 92% lower ICU admission (p=0.02). Prospective study of zinc levels in 47 hospitalized COVID-19 patients and 45 healthy controls. COVID-19 patients had significantly lower zinc levels (74.5 vs. 105.8 median µg/dl, p < 0.001). 57.4% of COVID-19 patients were zinc deficient, ..</p>
Sep 8 2020	<p>Galmés et al., Nutrients, doi:10.3390/ nu12092738</p>	<p>Current State of Evidence: Influence of Nutritional and Nutrigenetic Factors on Immunity in the COVID-19 Pandemic Framework</p>
		<p>Ecological study of European countries analyzing 10 vitamins and minerals endorsed by the European Food Safety Authority as having sufficient evidence for a causal relationship between intake and optimal immune system function: vitamins D..</p>
Sep 7 2020	<p>Yasui et al., International Journal of Infectious Diseases, doi:10.1016/ j.ijid.2020.09.008</p>	<p>Analysis of the predictive factors for a critical illness of COVID-19 during treatment – relationship between serum zinc level and critical illness of COVID-19</p>
		<p>92% lower ventilation (p=0.001). Retrospective 62 hospitalized patients, 29 with serum zinc data, showing significantly lower serum zinc levels for severe COVID-19 cases (intubation) compared with mild and moderate cases, p = 0.005. Authors recommend zinc supplementation.</p>
Jul 22 2020	<p>Yao et al., Chest, doi:10.1016/ j.chest.2020.06.082</p>	<p>The Minimal Effect of Zinc on the Survival of Hospitalized Patients With COVID-19</p>
		<p>34% lower mortality (p=0.09). Retrospective 242 hospitalized patients in the USA showing adjusted hazard ratio for zinc treatment, aHR 0.66 [0.41-1.07]. [ncbi.nlm.nih.gov] notes that the study would be more informative if baseline serum zinc levels were known.</p>

Jul 20 2020	Krishnan et al., J Clin Anesth., doi:10.1016/ j.jclinane.2020.1100 05	Clinical comorbidities, characteristics, and outcomes of mechanically ventilated patients in the State of Michigan with SARS-CoV-2 pneumonia
	18% lower mortality (p=0.18). Retrospective 152 mechanically ventilated patients in the USA showing unadjusted lower mortality with vitamin C, vitamin D, HCQ, and zinc treatment, statistically significant only for vitamin C.	
Jul 3 2020	Derwand et al., International Journal of Antimicrobial Agents, doi:10.1016/ j.ijantimicag.2020.1 06214 (date from preprint)	COVID-19 Outpatients – Early Risk-Stratified Treatment with Zinc Plus Low Dose Hydroxychloroquine and Azithromycin: A Retrospective Case Series Study
	79% lower mortality (p=0.12) and 82% lower hospitalization (p=0.001). 79% lower mortality and 82% lower hospitalization with early HCQ+AZ+Z. Retrospective 518 patients (141 treated, 377 control).	
Jun 6 2020	Finzi et al., International Journal of Infectious Diseases, doi:10.1016/ j.ijid.2020.06.006	Treatment of SARS-CoV-2 with high dose oral zinc salts: A report on four patients
	Case report on 4 patients treated with high dose zinc. All patients experienced significant improvement after one day.	

May 8 2020	<p>Carlucci et al., J. Med. Microbiol., Sep 15, 2020, doi: 10.1099/ jmm.0.001250 (date from preprint)</p>	<p>Zinc sulfate in combination with a zinc ionophore may improve outcomes in hospitalized COVID-19 patients</p>
	<p>38% lower combined mortality/hospice (p=0.002), 18% lower ventilation (p=0.4), and 23% lower ICU admission (p=0.17). Retrospective 932 patients showing that the addition of zinc to HCQ+AZ reduced mortality / transfer to hospice, ICU admission, and the need for ventilation.</p>	
Apr 6 2020	<p>Derwand et al., Medical Hypotheses, doi:10.1016/ j.mehy.2020.10981 5 (date from preprint)</p>	<p>Does zinc supplementation enhance the clinical efficacy of chloroquine/hydroxychloroquine to win today's battle against COVID-19?</p>
	<p>Hypothesis that HCQ/CQ + zinc will be more effective than HCQ/CQ alone for COVID-19.</p>	
Sep 30 2018	<p>Rolles et al., Journal of Functional Foods, doi:10.1016/ j.jff.2018.07.027</p>	<p>Influence of zinc deficiency and supplementation on NK cell cytotoxicity</p>
	<p>In Vitro study showing improved natural killer (NK) cell function with zinc. showed that a lower frequency of natural killer cells was associated with symptomatic COVID-19 infection.</p>	
Nov 4 2010	<p>te Velthuis et al., PLOS Pathogens 2010, 6:11, doi:10.1371/ journal.ppat.100117 6</p>	<p>Zn²⁺ Inhibits Coronavirus and Arterivirus RNA Polymerase Activity In Vitro and Zinc Ionophores Block the Replication of These Viruses in Cell Culture</p>

	<p>Shows that the combination of Zn²⁺ and a zinc ionophore (pyrithione) at low concentrations inhibits the replication of SARS-CoV and equine arteritis virus (EAV) in cell culture. Recommends further study of the use of zinc ionophores as an..</p>	
<p>Oct 1 2009</p>	<p>EFSA, EFSA Journal, doi:10.2903/ j.efsa.2009.1229</p>	<p>Scientific Opinion on the substantiation of health claims related to zinc and function of the immune system (ID 291, 1757), DNA synthesis and cell division (ID 292, 1759), protection of DNA, proteins and lipids from oxidative damage (ID 294, 1758), maintenance of bone (ID 295, 1756), cognitive function (ID 296), fertility and reproduction (ID 297, 300), reproductive development (ID 298), muscle function (ID 299), metabolism of fatty acids (ID 302), maintenance of joints (ID 305), function of the heart and blood vessels (ID 306), prostate function (ID 307), thyroid function (ID 308), acid-base metabolism (ID 360), vitamin A metabolism (ID 361) and maintenance of vision (ID 361) pursuant to Article 13(1) of Regulation (EC) No 1924/2006</p>
<p>European Food Safety Administration review concluding that there is a causal relationship between the intake of zinc and immune system function.</p>		

Peer reviewed studies on quercetin

Chart courtesy c19early.org/q. For more charts, full analysis and more information, visit their website.

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Oct 5	Covid Analysis	Quercetin for COVID-19: real-time meta analysis of 11 studies
	Statistically significant lower risk is seen for ICU admission, hospitalization, recovery, cases, and viral clearance. 10 studies from 8 independent teams in 7 countries show statistically significant improvements. • Meta analysis using..	
Sep 26	Ziaei et al., Food Science & Nutrition, doi:10.1002/fsn3.3715	The effect of quercetin supplementation on clinical outcomes in COVID-19 patients: A systematic review and meta-analysis
	Systematic review and meta analysis of 5 studies, showing significantly lower mortality, ICU admission, and hospitalization with quercetin treatment.	
Sep 19	Thapa et al., Makara Journal of Science, doi:10.7454/mss.v27i3.1609	In-silico Approach for Predicting the Inhibitory Effect of Home Remedies on Severe Acute Respiratory Syndrome Coronavirus-2
	In Silico analysis showing that curcumin and quercetin may be beneficial for COVID-19 by binding to the main protease (Mpro), spike protein, and ACE2 receptor. Both compounds had suitable ADME properties and minimal predicted toxicity.	
Sep 5	Xu et al., Proceedings of the National Academy of Sciences, doi:10.1073/pnas.2309870120	Reply to Yan et al.: Quercetin possesses a fluorescence quenching effect but is a weak inhibitor against SARS-CoV-2 main protease
	In Vitro study [Yan] and associated response from the original authors [Xu], collectively showing that quercetin and echinatin had weak SARS-CoV-2 protease inhibition in SDS-PAGE assays [Xu], despite false positive FRET results from MCA-A..	

Sep 5	Yan et al., Proceedings of the National Academy of Sciences, doi:10.1073/pnas.2309289120	Reframing quercetin as a promiscuous inhibitor against SARS-CoV-2 main protease
	In Vitro study [Yan] and associated response from the original authors [Xu], collectively showing that quercetin and echinatin had weak SARS-CoV-2 protease inhibition in SDS-PAGE assays [Xu], despite false positive FRET results from MCA-A..	
Aug 3	Micek et al., Frontiers in Nutrition, doi:10.3389/fnut.2023.1241016	Association of dietary intake of polyphenols, lignans, and phytosterols with immune-stimulating microbiota and COVID-19 risk in a group of Polish men and women
	Dietary analysis of 95 adults in Poland, showing lower risk of COVID-19 with higher intake of polyphenols, lignans, and phytosterols. Results were statistically significant for total phytosterols, secoisolariciresinol, β -sitosterol, matai..	
Jul 13	Mandal et al., Journal of Traditional and Complementary Medicine, doi:10.1016/j.jtcme.2023.07.004	In silico anti-viral assessment of phytoconstituents in a traditional (Siddha Medicine) polyherbal formulation – Targeting Mpro and pan-coronavirus post-fusion Spike protein
	In Silico analysis of phytoconstituents of Kabasura Kudineer against SARS-CoV-2 spike protein and Mpro, showing that quercetin (Mpro) and gallic acid (spike) had the highest binding affinity and stability.	
Jun 30	Sai Ramesh et al., International Journal of Biological Macromolecules, doi:10.1016/j.ijbiomac.2023.125553	Computational analysis of the phytocompounds of Mimusops elengi against spike protein of SARS CoV2 – An Insilico model
	In Silico study finding that quercetin and hederagenin showed very high binding affinities for COVID-19 associated receptors MMP9 and IL6.	

Jun 22	Gérain et al., <i>Frontiers in Nutrition</i> , doi:10.3389/fnut.2023.1137407	<p>NASAFYTOL® supplementation in adults hospitalized with COVID-19 infection: results from an exploratory open-label randomized controlled trial</p> <p>91% lower combined mortality/ICU admission (p=0.02), 89% lower ventilation (p=0.05), 89% lower ICU admission (p=0.05), and 73% higher hospital discharge (p=0.07). RCT 49 hospitalized COVID-19 patients, 25 treated with curcumin and quercetin, showed lower mortality/ICU admission and improved recovery with treatment. All patients received vitamin D. 336mg curcumin, 520mg quercetin, and 18µg vitamin D..</p>
Jun 3	Corbo et al., <i>Biotechnology & Biotechnological Equipment</i> , doi:10.1080/13102818.2023.2222196	<p>Inhibitory potential of phytochemicals on five SARS-CoV-2 proteins: in silico evaluation of endemic plants of Bosnia and Herzegovina</p> <p>In Silico study of phytochemicals from 28 plants identifying hesperidin and quercetin as having the highest binding affinity for SARS-CoV-2 RdRp. The highest affinity for Mpro was observed for genistein and hesperidin, with both compounds..</p>
Jun 2	Azmi et al., 11th International Seminar on New Paradigm and Innovation on Natural Sciences and its Application, doi:10.1063/5.0140285	<p>Utilization of quercetin flavonoid compounds in onion (<i>Allium cepa</i> L.) as an inhibitor of SARS-CoV-2 spike protein against ACE2 receptors</p> <p>In Silico study showing high affinity binding between the SARS-CoV-2 spike protein and quercetin, and analysis of the quercetin content of onion.</p>
May 18	Yang et al., <i>Frontiers in Pharmacology</i> , doi:10.3389/fphar.2023.1188086	<p>In silico evidence implicating novel mechanisms of <i>Prunella vulgaris</i> L. as a potential botanical drug against COVID-19-associated acute kidney injury</p>

	In Silico study identifying quercetin, luteolin and kaempferol as potentially protective for COVID-19 acute kidney injury.	
May 15	Massimo Magro et al., Journal of Modern Biology and Drug Discovery, doi:10.53964/ jmbdd.2023004	Use of Quercetin for Therapeutic Purposes in COVID-19 Infections: The Opinion of the Geriatrician Doctor
	Review of the antiviral properties and potential benefits of quercetin for COVID-19.	
Apr 24	Xu et al., Proceedings of the National Academy of Sciences, doi:10.1073/ pnas.2301775120	Bioactive compounds from Huashi Baidu decoction possess both antiviral and anti-inflammatory effects against COVID-19
	In Vitro study of compounds from Huashi Baidu (Q-14), showing dose-dependent inhibition of SARS-CoV-2 with quercetin. Authors also perform a mouse study showing that Q-14 decreases SARS-CoV-2 viral load and reduces pulmonary inflammation...	
Mar 31	Wang et al., Society of Toxicology Conference, 2023	Computational Analysis of Lianhua Qingwen as an Adjuvant Treatment in Patients with COVID-19
	In Silico analysis of components of Lianhua Qingwen, identifying quercetin, luteolin, wogonin, and phillyrin as potentially beneficial for COVID-19. Authors note that quercetin bound to Mpro at the same inhibitory pocket as nirmatrelvir (..	
Mar 22	Ibeh et al., Informatics in Medicine Unlocked, doi:10.1016/ j.imu.2023.101230	Computational studies of potential antiviral compounds from some selected Nigerian medicinal plants against SARS-CoV-2 proteins
	In Silico study identifying quercetin and naringenin as potent multitarget-directed ligands for 3CLpro, PLpro, and ACE2 with favorable ADME properties.	

Feb 13	Cheema et al., Reviews in Medical Virology, doi:10.1002/rmv.2427	Quercetin for the treatment of COVID-19 patients: A systematic review and meta-analysis
	Systematic review and meta analysis of 6 quercetin RCTs, showing significantly lower hospitalization and ICU admission. Differences for mortality and recovery were not statistically significant.	
Jan 26	Pastor-Fernández et al., Aging Cell, doi:10.1111/ace.13771	Treatment with the senolytics dasatinib/quercetin reduces SARS-CoV-2 related mortality in mice
	K18-hACE2 mouse study showing reduced COVID-19 severity with quercetin and dasatinib, for both prophylaxis and early treatment.	
Jan 25	Turobkulovich et al., Emergent: Journal of Educational Discoveries and Lifelong Learning	Applications of quercetin for the prevention of COVID-19 in healthcare workers
	96% lower mortality (p<0.0001) and 98% fewer symptomatic cases (p<0.0001). Prospective study of healthcare workers in Uzbekistan showing lower mortality and cases with quercetin prophylaxis. Very minimal details are provided, there is no baseline information, and control mortality is very high.	
Jan 18	Aguado et al., bioRxiv, doi:10.1101/2023.01.17.524329	Senolytic therapy alleviates physiological human brain aging and COVID-19 neuropathology
	In Vitro and animal study showing that senolytics including dasatinib + quercetin improve survival and mitigate neuropathological sequelae of SARS-CoV-2. Authors show that SARS-CoV-2 can initiate cellular senescence in the brains of COVID..	
Jan 18	Din Ujjan et al., Frontiers in Nutrition, doi:10.3389/fnut.2022.1023997	The possible therapeutic role of curcumin and quercetin in the early-stage of COVID-19—Results from a pragmatic randomized clinical trial
	29% improved recovery (p=0.11) and 91% improved viral clearance (p=0.05). Small RCT with 50 outpatients, 25 treated with curcumin, quercetin, and vitamin D, showing improved recovery and viral clearance with treatment. 168mg curcumin, 260mg, 360IU vitamin D3 daily for 14 days.	

Jan 17	Shorobi et al., Molecules, doi:10.3390/ molecules28030938	Quercetin: A Functional Food-Flavonoid Incredibly Attenuates Emerging and Re-Emerging Viral Infections through Immunomodulatory Actions
	Review of the antiviral properties of quercetin and derivatives, and potential mechanisms of action.	
Jan 16	Viglione et al., The Gazette of Medical Sciences, doi:10.46766/ thegms.pubheal.221209 05	Intravenous high dose vitamin C and ozonated saline effective treatment for Covid-19: The Evolution of Local Standard of Care
	Retrospective 479 high risk outpatients in the USA treated with a protocol including intravenous vitamin C, vitamin D, zinc, quercetin, bromelain, lactoferrin, HCQ, ivermectin, ozonated saline, azithromycin, ceftriaxone, methylprednisolon..	
Jan 13	Di Pierro et al., Frontiers in Pharmacology, doi:10.3389/ fphar.2022.1096853	Quercetin as a possible complementary agent for early-stage COVID-19: Concluding results of a randomized clinical trial
	37% improved recovery (p=0.007) and 58% improved viral clearance (p<0.0001). RCT 100 outpatients in Pakistan, 50 treated with quercetin phytosome, showing faster viral clearance and improved recovery with treatment. Patients in the treatment group were significantly younger (41 vs. 54).	
Jan 12	Nguyen et al., Bioinformatics and Biology Insights, doi:10.1177/1177932222 1149622	The Potential of Ameliorating COVID-19 and Sequelae From Andrographis paniculata via Bioinformatics
	In Silico study of components of andrographis paniculata, identifying multiple components including quercetin as promising inhibitors of SARS-CoV-2. Authors note the potential synergistic effect with multiple compounds.	
Dec 12 2022	Wu et al., Molecular Therapy, doi:10.1016/ j.ymthe.2022.12.002	Treatment with Quercetin inhibits SARS-CoV-2 N protein-induced acute kidney injury by blocking Smad3-dependent G1 cell cycle arrest

	<p>Mouse study showing quercetin can significantly inhibit SARS-CoV-2 induced acute kidney injury via blocking of SARS-CoV-2 N-Smad3-mediated cell death.</p>	
<p>Nov 29 2022</p>	<p>Alavi et al., Biomedicines, doi:10.3390/ biomedicines10123074</p>	<p>Interaction of Epigallocatechin Gallate and Quercetin with Spike Glycoprotein (S-Glycoprotein) of SARS-CoV-2: In Silico Study</p>
<p>In Silico study suggesting efficacy of epigallocatechin gallate and quercetin for SARS-CoV-2.</p>		
<p>Oct 18 2022</p>	<p>Cosentino et al., Journal of Clinical Medicine, doi:10.3390/ jcm11206138</p>	<p>Early Outpatient Treatment of COVID-19: A Retrospective Analysis of 392 Cases in Italy</p>
<p>Retrospective 392 outpatients in Italy showing 0.2% mortality with early treatment, compared with >3% in Italy at the time. Treatment varied for individual patients and included HCQ, vitamin D, vitamin C, vitamin A, zinc, quercetin, bromh..</p>		
<p>Aug 25 2022</p>	<p>Gasmi et al., Pharmaceuticals, doi:10.3390/ph15091049</p>	<p>Quercetin in the Prevention and Treatment of Coronavirus Infections: A Focus on SARS-CoV-2</p>
<p>Review of the potential benefits of quercetin for COVID-19, including inhibitory effects on several stages of the viral life cycle, antioxidant, anti-inflammatory, and immunomodulatory effects, and synergistic effects with other treatments.</p>		
<p>Aug 10 2022</p>	<p>Chellasamy et al., Journal of King Saud University - Science, doi:10.1016/ j.jksus.2022.102277</p>	<p>Docking and molecular dynamics studies of human ezrin protein with a modelled SARS-CoV-2 endodomain and their interaction with potential invasion inhibitors</p>
<p>In Silico study of SARS-CoV-1&2 endodomains and ezrin docking, identifying ivermectin, quercetin, calcifediol, calcitriol, selamectin, and minocycline as potential therapeutic drugs with strong ezrin binding which may restrict viral endod..</p>		

Jun 16 2022	Ortore et al., International Journal of Translational Medicine, doi:10.3390/ijtm2020022	Evaluation of the Clinical Effects of an Antiviral, Immunostimulant and Antioxidant Phytotherapy in Patients Suffering from COVID-19 Infection: An Observational Pilot Study
	Retrospective case series of 240 patients in Italy in 2020, up to 96 years old, showing no mortality and 1.6% hospitalization with early treatment including vitamin C, quercetin, and green tea and red wine polyphenols. The formulation was..	
May 20 2022	Shah et al., medRxiv, doi:10.1101/2022.05.16. 22275074	Jinhua Qinggan Granules for Nonhospitalized COVID-19 Patients: a Double-Blind, Placebo-Controlled, Randomized Controlled Trial
	81% greater improvement (p<0.0001) and 8% worse viral clearance (p=0.48). RCT 300 outpatients in China, showing improved recovery with Jinhua Qinggan treatment, but no significant difference in viral clearance or radiographic findings. Jinhua Qinggan includes quercetin, rutin, luteolin, wogonin, myricetin, urso..	
May 15 2022	Rizky et al., Life Research, doi:10.53388/ life2022-0205-302	The pharmacological mechanism of quercetin as adjuvant therapy of COVID-19
	Review of in silico and clinical evidence supporting the use of quercetin for COVID-19.	
May 1 2022	Khan et al., Frontiers in Pharmacology, doi:10.3389/ fphar.2022.898062	Oral Co-Supplementation of Curcumin, Quercetin, and Vitamin D3 as an Adjuvant Therapy for Mild to Moderate Symptoms of COVID-19—Results From a Pilot Open-Label, Randomized Controlled Trial
	33% improved recovery (p=0.15) and 50% improved viral clearance (p=0.009). RCT 50 COVID+ outpatients in Pakistan, 25 treated with curcumin, quercetin, and vitamin D, showing significantly faster viral clearance, significantly improved CRP, and faster resolution of acute symptoms (p=0.154). 168mg curcumin, 260mg ..	
Apr 29 2022	Imran et al., Antioxidants, doi:10.3390/ antiox11050876	The Therapeutic and Prophylactic Potential of Quercetin against COVID-19: An Outlook on the Clinical Studies, Inventive Compositions, and Patent Literature
	Review of the evidence supporting the use of quercetin for COVID-19 from clinical studies and patents.	

Jan 21 2022	Goc et al., European Journal of Microbiology and Immunology, doi:10.1556/1886.2021.0022	Inhibitory effects of specific combination of natural compounds against SARS-CoV-2 and its Alpha, Beta, Gamma, Delta, Kappa, and Mu variants
	In Vitro study testing combinations of plant extracts and micronutrients with several variants of SARS-CoV-2. A combination of vitamin C, N-acetylcysteine, curcumin, quercetin, resveratrol, theaflavin, naringenin, baicalin, and broccoli e..	
Jan 4 2022	Rondanelli et al., Life, doi:10.3390/life12010066	Promising Effects of 3-Month Period of Quercetin Phytosome® Supplementation in the Prevention of Symptomatic COVID-19 Disease in Healthcare Workers: A Pilot Study
	93% fewer symptomatic cases (p=0.04). RCT 120 healthcare workers, 60 treated with quercetin phytosome, showing lower risk of cases with treatment. Quercetin phytosome 250mg twice a day.	
Dec 28 2021	Munafò et al., Research Square, doi:10.21203/rs.3.rs-1149846/v1	Quercetin and Luteolin Are Single-digit Micromolar Inhibitors of the SARS-CoV-2 RNA-dependent RNA Polymerase
	In Vitro and In Silico study showing quercetin and luteolin inhibiting SARS-CoV-2 RNA-dependent RNA polymerase (RdRp).	
Dec 14 2021	Singh et al., Biochimica et Biophysica Acta (BBA) - Molecular Basis of Disease, doi:10.1016/j.bbadis.2021.166322	The spike protein of SARS-CoV-2 virus induces heme oxygenase-1: Pathophysiologic implications
	In Vitro study transfecting SARS-CoV-2 viral spike protein in kidney cell lines, showing syncytia formation and upregulation of the cytoprotective gene HO-1, and that quercetin, which induces HO-1, can reduce syncytia formation. Authors c..	
Dec 8 2021	Fazio et al., Medical Science Monitor, doi:10.12659/MSM.935379	Retrospective Study of Outcomes and Hospitalization Rates of Patients in Italy with a Confirmed Diagnosis of Early COVID-19 and Treated at Home Within 3 Days or After 3 Days of Symptom Onset with Prescribed and Non-Prescribed Treatments Between November 2020 and August 2021

	Retrospective 158 COVID-19 patients in Italy treated with hesperidin, quercetin, indomethacin, aspirin, omeprazole, azithromycin, LMWH, and betamethasone (treatment specific for each patient), showing significantly lower hospitalization a..	
Dec 2 2021	Shohan et al., European Journal of Pharmacology, doi:10.1016/j.ejphar.2021.1746158	The therapeutic efficacy of quercetin in combination with antiviral drugs in hospitalized COVID-19 patients: A randomized controlled trial
86% lower mortality (p=0.24) and 32% faster recovery (p=0.04). Small RCT with 60 severe hospitalized patients in Iran, 30 treated with quercetin, showing shorter time until discharge. All patients received remdesivir or favipiravir, and vitamin C, vitamin D, famotidine, zinc, dexamethasone, and magne..		
Nov 14 2021	Bahun et al., Food Chemistry, doi:10.1016/j.foodchem.2021.131594	Inhibition of the SARS-CoV-2 3CLpro main protease by plant polyphenols
In Silico and In Vitro study of plant polyphenols identifying quercetin, curcumin, ellagic acid, epigallocatechin gallate, and resveratrol as SARS-CoV-2 3CLpro inhibitors with IC50 between 11.8µM and 23.4µM. Real-time binding was analyzed..		
Sep 29 2021	Şimşek et al., Journal of Molecular Graphics and Modelling, doi:10.1016/j.jmgm.2021.108038	In silico identification of SARS-CoV-2 cell entry inhibitors from selected natural antivirals
In Silico study identifying quercetin derivatives as SARS-CoV-2 spike protein, ACE2, and neuropilin inhibitors.		
Sep 1 2021	Zupanets et al., Zaporozhye Med. J., doi:10.14739/2310-1210.2021.5.231714	Quercetin effectiveness in patients with COVID-19 associated pneumonia
29% improved recovery (p=0.5). RCT 200 patients in Ukraine, 99 treated with IV quercetin/polyvinylirolidone followed by oral quercetin/pectin, showing improved recovery with treatment.		

Jul 6 2021	Margolin et al., Journal of Evidence-Based Integrative Medicine, doi:10.1177/2515690X211026193	20-Week Study of Clinical Outcomes of Over-the-Counter COVID-19 Prophylaxis and Treatment
	94% fewer cases (p=0.003). Retrospective 113 outpatients, 53 (patient choice) treated with zinc, quercetin, vitamin C/D/E, l-lysine, and quina, showing lower cases with treatment. Results are subject to selection bias and limited information on the groups is provided.	
Jun 15 2021	Kandeil et al., Pathogens, doi:10.3390/pathogens10060758	Bioactive Polyphenolic Compounds Showing Strong Antiviral Activities against Severe Acute Respiratory Syndrome Coronavirus 2
	Vero E6 In Vitro study showing curcumin, hesperidin, and quercetin significantly inhibited SARS-CoV-2 replication, and In Silico analysis with promising Mpro and spike docking results.	
Jun 8 2021	Di Pierro et al., International Journal of General Medicine, doi:10.2147/IJGM.S318720	Possible Therapeutic Effects of Adjuvant Quercetin Supplementation Against Early-Stage COVID-19 Infection: A Prospective, Randomized, Controlled, and Open-Label Study
	86% lower mortality (p=0.25), 94% lower ICU admission (p=0.006), and 68% lower hospitalization (p=0.003). RCT 152 outpatients in Pakistan, 76 treated with quercetin phytosome, showing lower mortality, ICU admission, and hospitalization with treatment.	
Apr 8 2021	Aguilar et al., Journal of Advances in Medical and Pharmaceutical Sciences, doi:10.9734/jamps/2021/v23i330222	Oral Quercetin in Adult Patients as a Potential Nutraceutical against Coronavirus Disease 2019 (COVID-19)
	Prospective study of 52 patients treated with quercetin. There was no control group.	
Jan 19	Onal et al., Turk. J. Biol., 45:518-529 (date from preprint)	Treatment of COVID-19 patients with quercetin: a prospective, single center, randomized, controlled trial

2021	<p>94% lower ICU admission (p=0.39) and 78% higher hospital discharge (p=0.1). RCT 447 moderate-to-severe hospitalized patients in Turkey, 52 treated with quercetin, bromelain, and vitamin C, showing no statistically significant difference in clinical outcomes. NCT04377789.</p>	
Nov 16 2020	<p>Arslan et al., SSRN, doi:10.2139/ ssrn.3682517</p>	<p>Synergistic Effect of Quercetin and Vitamin C Against COVID-19: Is a Possible Guard for Front Liners</p>
<p>92% fewer cases (p=0.03). Small prophylaxis RCT with 113 patients showing fewer cases with quercetin + vitamin C + bromelain prophylaxis. NCT04377789. Note that this paper disappeared from SSRN without explanation.</p>		
Oct 9 2020	<p>Derosa et al., Phytotherapy Research, doi:10.1002/ptr.6887</p>	<p>A role for quercetin in coronavirus disease 2019 (COVID-19)</p>
<p>Review noting that quercetin has a theoretical, but significant, capability to interfere with SARS-CoV-2 replication, with results showing this to be the fifth best compound out of 18 candidates.</p>		
Jun 19 2020	<p>Biancatelli et al., Frontiers in Immunology, doi:10.3389/ fimmu.2020.01451</p>	<p>Quercetin and Vitamin C: An Experimental, Synergistic Therapy for the Prevention and Treatment of SARS-CoV-2 Related Disease (COVID-19)</p>
<p>Review of the evidence for the use of vitamin C and quercetin both for prophylaxis in high-risk populations and for the treatment of COVID-19 patients.</p>		
Apr 24 2020	<p>Sekiou et al., ChemRxiv, doi:10.26434/ chemrxiv.12181404.v1</p>	<p>In-Silico Identification of Potent Inhibitors of COVID-19 Main Protease (Mpro) and Angiotensin Converting Enzyme 2 (ACE2) from Natural Products: Quercetin, Hispidulin, and Cirsimaritin Exhibited Better Potential Inhibition than Hydroxy-Chloroquine Against COVID-19 Main Protease Active Site and ACE2</p>
<p>In Silico study of natural compounds identifying quercetin, curcumin, hispidulin, cirsimaritin, sulfasalazine, and artemisin as potential compounds that inhibit SARS-CoV-2.</p>		

Peer reviewed and other studies on hydroxychloroquine

Chart courtesy c19hcq.org. For more charts, full analysis and more information, visit their website.

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Oct 3	Covid Analysis	HCQ for COVID-19: real-time meta analysis of 411 studies
	Early treatment shows 62% [53-70%] lower risk with pooled effects in 38 studies. Results are similar for higher quality studies and for peer-reviewed studies. The 16 mortality and 16 hospitalization results show 72% [59&..	
Sep 30	Meeus et al., New Microbes and New Infections, doi:10.1016/j.nmni.2023.101172	Efficacy and safety of in-hospital treatment of Covid-19 infection with low-dose hydroxychloroquine and azithromycin in hospitalized patients: A retrospective controlled cohort study
	36% lower mortality (p=0.005). Retrospective 352 hospitalized COVID-19 patients in Belgium and 3,533 control patients from the contemporaneous Belgian Collaborative Group, showing significantly lower mortality with HCQ treatment. The survival benefit was consistent in ..	
Sep 25	Burhan et al., PLOS ONE, doi:10.1371/journal.pone.0290964	Characteristics and outcomes of patients with severe COVID-19 in Indonesia: Lessons from the first wave
	1% higher mortality (p=0.91). Retrospective 559 COVID-19 ICU patients in Indonesia, showing no difference in mortality with HCQ in unadjusted results.	
Aug 28	Zhou et al., BMJ Open Respiratory Research, doi:10.1136/bmjresp-2023-001674	Repurposed drug studies on the primary prevention of SARS-CoV-2 infection during the pandemic: systematic review and meta-analysis
	Meta analysis with many errors/limitations/biases, including many missing studies, use of unadjusted results, use of non-symptomatic results, and use of all-cause instead of COVID-19 hospitalization. For HCQ, there are , including . Note ..	

Aug 15	Shu-Han Lin et al., Journal of Microbiology, Immunology and Infection, doi:10.1016/ j.jmii.2023.08.001	Inhalable Chitosan-Based Hydrogel as a Mucosal Adjuvant for Hydroxychloroquine in the Treatment for SARS-CoV-2 Infection in a Hamster Model
	Hamster study showing intranasal administration of HCQ + chitosan oligosaccharide (COS) resulted in higher HCQ concentrations in the lungs compared to HCQ alone, suggesting COS enhanced lung absorption of HCQ. COS + HCQ led to earlier and..	
Aug 11	Alsmadi et al., AAPS PharmSciTech, doi:10.1208/ s12249-023-02627-3	The In Vitro, In Vivo, and PBPK Evaluation of a Novel Lung-Targeted Cardiac-Safe Hydroxychloroquine Inhalation Aerogel
	Analysis of a novel inhaled formulation of HCQ showing sustained drug release, higher lung bioavailability, longer residence time, faster absorption, and lower cardiac enzyme levels compared to oral HCQ. Inhaled formulations may help prev..	
Aug 5	Chaudhary et al., Scientific Reports, doi:10.1038/ s41598-023-39941-6	Impact of prophylactic hydroxychloroquine on ultrastructural impairment and cellular SARS-CoV-2 infection in different cells of bronchoalveolar lavage fluids of COVID-19 patients
	Ex vivo analysis of HCQ showing preferential protection for early target cell types in the lung, consistent with the increased efficacy seen with early treatment. Authors analyze various cell types in bronchoalveolar lavage fluid from COV..	
Aug 1	Afşin et al., Acta Clinica Croatica, doi:10.20471/ acc.2023.62.01.13	Factors affecting prognosis and mortality in severe COVID-19 pneumonia patients
	17% lower mortality (p=0.5). Retrospective 80 hospitalized severe COVID-19 patients in Turkey, showing no significant difference with HCQ treatment in unadjusted results. All patients received favipiravir.	

Jul 31	Ganesh et al., CMAJ Open, doi:10.9778/ cmajo.20220248	Patient-reported outcomes of neurologic and neuropsychiatric symptoms in mild COVID-19: a prospective cohort study
	37% improvement (p=0.15). Long term neurologic and neuropsychiatric followup for a 7 day delayed treatment RCT showing lower risk of symptoms with treatment, without statistical significance. When a patient reported a symptom, they were asked whether they were sti..	
Jul 25	Wen et al., Journal of Molecular Cell Biology, doi:10.1093/jmcb/ mjad048	Cholinergic $\alpha 7$ nAChR signaling suppresses SARS-CoV-2 infection and inflammation in lung epithelial cells
	In Vitro and mouse study showing that activating $\alpha 7$ nAChR with the agonist GTS-21 reduced oxidative stress and inflammation, and reduced live virus infection in lung epithelial cells. The results provide some mechanistic insight into how ..	
Jul 17	Shamsi et al., Canadian Journal of Infectious Diseases and Medical Microbiology, doi:10.1155/2023/5205 188	Survival and Mortality in Hospitalized Children with COVID-19: A Referral Center Experience in Yazd, Iran
	39% higher mortality (p=0.51). Retrospective 183 hospitalized pediatric COVID-19 patients in Iran, showing no significant difference in mortality with in unadjusted results.	
Jul 12	Kamga Kapchoup et al., Frontiers in Pharmacology, doi:10.3389/ fphar.2023.1128382	In vitro effect of hydroxychloroquine on pluripotent stem cells and their cardiomyocytes derivatives
	In vitro study of HCQ with mouse and human pluripotent stem cells and their cardiomyocyte derivatives. Results suggest HCQ has differential dose-dependent effects in mouse vs. human stem cell-derived cardiomyocytes. At lower concentration..	

Jul 1	Klebanov et al., Journal of Drugs in Dermatology, doi:10.36849/jdd.6593	Antimalarials are not Effective as Pre-Exposure Prophylaxis for COVID-19: A Retrospective Matched Control Study
	31% lower mortality (p=0.8) and 6% more cases (p=0.7). Retrospective 3,074 patients with antimalarial prescriptions and 58,955 matched controls, showing no significant differences with antimalarial prophylaxis for PCR+ cases (99% HCQ). Authors provide only PCR+ and mortality outcomes, and do ..	
Jun 29	Finkelstein et al., Studies in Health Technology and Informatics, doi:10.3233/SHTI230489	The Efficacy of Long-Term Hydroxychloroquine Use in the Prevention of COVID-19: A Retrospective Cohort Study
	21% fewer cases (p=0.0007). PSM retrospective SLE/RA patients in the USA, showing lower COVID-19 cases with HCQ prophylaxis.	
Jun 30	Milan Bonotto et al., Antiviral Research, doi:10.1016/j.antiviral.2023.105655	Cathepsin inhibitors nitroxoline and its derivatives inhibit SARS-CoV-2 infection
	In Vitro study showing that CatB inhibitors including nitroxoline and its derivatives significantly impair SARS-CoV-2 infection. Authors use HCQ as a control. HCQ can indirectly inhibit CatB by elevating the pH of endosomes. Other researc..	
Jun 22	Brouqui et al., New Microbes and New Infections, doi:10.1016/j.nmni.2023.101155	There is no such thing as a Ministry of Truth and why it is important to challenge conventional "wisdom" - A personal view
	Discussion of censorship in scientific journals and the media; fraudulent, false, and misleading information used to justify censorship and the termination of trials; harassment of highly cited and respected researchers reporting life-sav..	

Jun 20	Cárdenas-Jaén et al., Gastroenterología y Hepatología (English Edition), doi:10.1016/ j.gastre.2023.05.002	Gastrointestinal symptoms and complications in patients hospitalized due to COVID-19, an international multicentre prospective cohort study (TIVURON project)
	56% lower severe cases (p=0.13). Retrospective 829 hospitalized COVID-19 patients in Spain focused on gastrointestinal symptoms, showing lower risk of severe COVID-19 with HCQ treatment in bivariate analysis, without statistical significance.	
Jun 17	de Gonzalo-Calvo et al., Respiratory Research, doi:10.1186/ s12931-023-02462-x	A blood microRNA classifier for the prediction of ICU mortality in COVID-19 patients: a multicenter validation study
	38% lower mortality (p=0.23). Retrospective 491 ICU patients in Spain showing lower mortality with HCQ without statistical significance in unadjusted results.	
Jun 16	Hong et al., BMJ Open, doi:10.1136/ bmjopen-2022-065305	Safety and efficacy of hydroxychloroquine as prophylactic against COVID-19 in healthcare workers: a meta-analysis of randomised clinical trials
	Meta analysis of 10 RCTs showing lower COVID-19 cases with HCQ, without statistical significance. This analysis is missing [Nasri, Seet]. Statistically significant efficacy is seen with analysis of all studies, [c19hcq.org]. Authors incl..	
Jun 10	Wade et al., Value in Health, doi:10.1016/ j.jval.2023.03.2056	Variation in Demographic Characteristics, Socioeconomic Status, Clinical Presentation and Selected Treatments in Mortality Among Patients with a Diagnosis of COVID-19 in the United States
	Retrospective analysis of mortality for COVID-19 patients in the USA. Authors do not provide adjusted results, preventing any strong evidence. However it is notable that, despite comparable treatment frequencies, the mortality for patient..	
Jun 1	Alqatari et al., Journal of Medicine and Life, doi:10.25122/ jml-2023-0037	COVID-19 in patients with rheumatological diseases in the Eastern Province of Saudi Arabia

		<p>89% lower ventilation (p=0.13), 64% lower ICU admission (p=0.14), and 64% lower severe cases (p=0.14). Retrospective 34 rheumatological disease patients with COVID-19 in Saudi Arabia, showing lower risk of severe cases with HCQ use in unadjusted results, without statistical significance.</p>
Jun 1	<p>Rathod et al., The Journal of the Association of Physicians of India, doi:10.5005/japi-11001-0263</p>	<p>Risk Factors associated with COVID-19 Patients in India: A Single Center Retrospective Cohort Study</p>
		<p>73% lower mortality (p=0.02). Retrospective 565 COVID-19 patients 5 days from symptom onset in India, showing lower mortality with HCQ+AZ treatment. Most patients (66%) had mild disease at baseline.</p>
Jun 1	<p>Rudraraju et al., Stem Cell Reports, doi:10.1016/j.stemcr.2023.05.007</p>	<p>Parallel use of human stem cell lung and heart models provide insights for SARS-CoV-2 treatment</p>
		<p>In Vitro study showing that SARS-CoV-2 cell entry differs across cell types. ACE2 was required for infection in both lung and cardiac cells, but TMPRSS2 cleavage was required in lung cells, while the endosomal pathway was required in card..</p>
May 31	<p>Dulcey et al., Journal of Clinical Rheumatology, doi:10.1097/RHU.0000000000001986</p>	<p>Long-Term Hydroxychloroquine and Its Association with Covid-19 Infection, a Cohort Study from a South American Hospital</p>
		<p>21% fewer cases (p=0.27). PSM retrospective 322 rheumatological patients on HCQ and 645 matched controls, showing lower risk of COVID-19 with treatment, without statistical significance. Authors mention lower mortality with HCQ but do not provide details. Only an ..</p>
May 30	<p>Gutte et al., Indian Journal of Community Medicine, doi:10.4103/ijcm.ijcm_663_22</p>	<p>QTc Interval of Healthcare Workers from India: Baseline and Effect of Hydroxychloroquine Prophylaxis during the COVID-19 Pandemic</p>

	Prospective study of 250 healthcare workers in India, showing no significant change in QTc interval with HCQ prophylaxis.	
May 22	Souza Neves, F., Infectious Disorders - Drug Targets, doi:10.2174/18715265 23666230522114836	Does Widespread Use of Hydroxychloroquine Reduce the Transmissibility of SARS-CoV-2 / COVID-19? An Ecological Correlational Study
	Analysis of 7 states in Brazil showing that consumption of HCQ was a significant negative predictor of the COVID-19 effective reproduction number (Rt), and that higher HCQ consumption was associated with faster decline of Rt, suggesting a..	
May 11	Yilgwan et al., Nigerian Medical Journal, 64:2	Clinical profile and Predictors of Outcomes of Hospitalized Patients with Laboratory-Confirmed Severe Acute Respiratory Syndrome Coronavirus 2 in Nigeria: A Retrospective Analysis of 13 High Burden States in Nigeria
	93% lower mortality (p<0.0001). Retrospective 3,462 hospitalized COVID-19 patients across 13 states in Nigiera, showing lower mortality with HCQ. Authors note that the improved results compared with many other late stage studies may be related to the dose and experience..	
May 10	AlQadheeb et al., Clinical Infection in Practice, doi:10.1016/ j.clinpr.2023.100229	Impact of common comorbidities on antimicrobial consumption and mortality amongst critically ill COVID-19 patients: A retrospective two center study in Saudi Arabia
	35% lower mortality (p=0.0001). Retrospective 848 ICU patients in Saudi Arabia, showing lower mortality with HCQ in unadjusted results.	
May 1	Galgate et al., Journal of Coastal Life Medicine, 11:2	Formulation and Evaluation of Hydroxychloroquine Sulfate Nasal Spray for SARS Covid 19 Virus
	Formulation and testing of a HCQ nasal spray for improved bioavailability and prolonged release.	

May 1	Said et al., Journal of Multidisciplinary Healthcare, doi:10.2147/JMDH.S403700	Profiles of Independent-Comorbidity Groups in Senior COVID-19 Patients Reveal Low Fatality Associated with Standard Care and Low-Dose Hydroxychloroquine over Antivirals
	78% lower mortality (p<0.0001). Retrospective 750 COVID-19 patients in Saudi Arabia, showing lower mortality with HCQ treatment in unadjusted results. Authors note that the poor results in some other trials may be related to increased dosages and later treatment.	
Apr 25	Loo et al., Pharmaceutical Research, doi:10.1007/s11095-023-03520-1	Recent Advances in Inhaled Nanoformulations of Vaccines and Therapeutics Targeting Respiratory Viral Infections
	Review of nanoformulations for inhaled therapeutics for respiratory viral infections including COVID-19. Inhaled formulations can deliver treatment directly to the respiratory tract, enabling higher concentrations while minimising systemi..	
Apr 24	Sen et al., The Lancet Rheumatology, doi:10.1016/S2665-9913(23)00066-8	Post-COVID-19 condition in patients with autoimmune rheumatic diseases: the COVID-19 Vaccination in Autoimmune Diseases (COVAD) study
	40% lower PASC (p=0.08). Retrospective 755 autoimmune rheumatic disease patients, showing lower risk of PASC (long COVID) with HCQ use, without statistical significance.	
Apr 5	Krishnan et al., The American Journal of Tropical Medicine and Hygiene, doi:10.4269/ajtmh.22-0705	Predictors of Mortality among Patients Hospitalized with COVID-19 during the First Wave in India: A Multisite Case-Control Study
	40% lower mortality (p=0.05). Case control study with 2,431 hospitalized COVID-19 patients in India, showing lower mortality with HCQ treatment, without statistical significance.	

Apr 4	<p>Million et al., medRxiv, doi:10.1101/2023.04.03 .23287649</p>	<p>Early Treatment with Hydroxychloroquine and Azithromycin: A Real-Life Monocentric Retrospective Cohort Study of 30,423 COVID-19 Patients</p>
	<p>59% lower mortality (p=0.008). Retrospective 30,423 patients in France, showing very low mortality overall for outpatients treated with HCQ+AZ and for patients <50, and significantly lower mortality with HCQ and HCQ+AZ versus other treatments. Efficacy was greater for ..</p>	
Mar 31	<p>Ho et al., Malaysian Journal of Medicine and Health Sciences, doi:10.47836/ mjmhs19.2.3</p>	<p>Hydroxychloroquine for COVID-19: A Single Center, Retrospective Cohort Study</p>
	<p>890% higher progression (p=0.03). Retrospective 325 hospitalized COVID-19 patients in Malaysia, showing higher progression with HCQ, however the groups are not comparable. 17 HCQ vs. 3 control patients had severity category ≥3 at baseline (7 vs. 0 for severity ≥4).</p>	
Mar 29	<p>Aweimer et al., Scientific Reports, doi:10.1038/ s41598-023-31944-7</p>	<p>Mortality rates of severe COVID-19-related respiratory failure with and without extracorporeal membrane oxygenation in the Middle Ruhr Region of Germany</p>
	<p>40% lower mortality (p=0.12). Retrospective 149 patients under invasive mechanical ventilation in Germany showing no significant difference in mortality with HCQ in unadjusted results.</p>	
Mar 22	<p>Chevalier et al., Frontiers in Medicine, doi:10.3389/ fmed.2023.1152587</p>	<p>CovAID: Identification of factors associated with severe COVID-19 in patients with inflammatory rheumatism or autoimmune diseases</p>
	<p>35% lower mortality (p=0.19) and 19% lower hospitalization (p=0.36). Retrospective 1,213 rheumatic disease patients in France, showing lower risk of mortality and severe cases with HCQ use in univariate analysis, without statistical significance.</p>	

Mar 22	Brouqui et al., Authorea, Inc., doi:10.22541/ au.167948825.592709 94/v1	Viral clearance in patients with COVID-19: associated factors and the role of antiviral treatment
15% improved viral clearance (p=0.04). Retrospective 1,276 patients in France, showing faster viral clearance with HCQ treatment.		
Mar 17	Million et al., MDPI AG, doi:10.20944/ preprints202303.0325. v1	Cardiovascular Safety of Hydroxychloroquine-Azithromycin in 424 COVID-19 Patients
Retrospective 424 consecutive patients in France showing that HCQ+AZ treatment was safe for early stage COVID-19 treatment with the protocol used, which excluded 11 patients for contraindications. Treatment contraindications were the pres..		
Mar 2	Spivak et al., Microbiology Spectrum, doi:10.1128/ spectrum.04674-22	A Randomized Clinical Trial Testing Hydroxychloroquine for Reduction of SARS-CoV-2 Viral Shedding and Hospitalization in Early Outpatient COVID-19 Infection
73% higher hospitalization (p=0.54), 20% improved recovery (p=0.19), and 17% improved viral clearance (p=0.19). Delayed publication of an early terminated late treatment RCT with low-risk (no mortality) outpatients in the USA, showing no significant differences with HCQ. Authors do not provide symptom onset data, but the subgroup analysis suggests ..		
Feb 28	Mathew et al., Rheumatology Advances in Practice, doi:10.1093/rap/ rkad025	Predictors of COVID-19 severity and outcomes in Indian patients with rheumatic diseases: a prospective cohort study
20% lower mortality (p=0.8), no change in hospitalization (p=0.94), and 40% lower severe cases (p=0.37). Prospective study of 64 rheumatic disease patients with COVID-19, showing no significant difference in outcomes with HCQ use.		

Feb 28	Llanos-Cuentas et al., BMC Research Notes, doi:10.1186/ s13104-023-06281-7	Hydroxychloroquine to prevent SARS-CoV-2 infection among healthcare workers: early termination of a phase 3, randomised, open-label, controlled clinical trial
	69% more cases (p=0.46). Early terminated healthcare worker PrEP RCT with only 68 patients and 8 cases, showing no significant difference with HCQ. No information on symptoms per group, case severity, or the timing of cases is provided.	
Feb 20	Delgado et al., Research Square, doi:10.21203/ rs.3.rs-2596201/v1	Investigational medications in 9,638 hospitalized patients with severe COVID-19: lessons from the “fail-and-learn” strategy during the first two waves of the pandemic in 2020
	26% lower mortality (p=0.002). PSM retrospective 9,638 patients in the USA, showing significantly lower mortality with HCQ in early 2020 (1,157 HCQ patients), and no significant difference in late 2020 (82 HCQ patients). The few patients treated in the later period may..	
Feb 15	Alshamrani et al., Saudi Pharmaceutical Journal, doi:10.1016/ j.jsps.2023.02.004	Comprehensive evaluation of six interventions for hospitalized patients with COVID-19: A propensity score matching study
	50% lower mortality (p=0.18), 37% lower progression (p=0.21), 9% shorter ICU admission (p=0.66), and 3% longer hospitalization (p=0.7). PSM retrospective 29 hospitals in Saudi Arabia, finding lower mortality with HCQ, without reaching statistical significance (described by authors as "no impact").	
Jan 27	Nasri et al., Advanced Biomedical Research, doi:10.4103/ abr.abr_104_21	Efficacy of hydroxychloroquine in pre-exposure severe acute respiratory syndrome coronavirus 2 prophylaxis among high-risk healthcare workers: A multicenter study
	92% fewer symptomatic cases (p=0.03). RCT 143 healthcare workers in Iran, showing lower cases with HCQ prophylaxis, statistically significant only for moderate/severe cases. Baseline details are not provided.	

Jan 19	Alam et al., MDPI AG, doi:10.20944/ preprints202301.0341. v1	Towards Predicting Length of Stay and Identification of Cohort Risk Factors Using Self-Attention Based Transformers and Association Mining: Covid-19 as Phenotype
	Deep learning model for the prediction of hospitalization time for COVID-19 based on 311 patients in Saudi Arabia. Authors report shorter hospitalization time for HCQ and favipiravir, but do not provide details.	
Jan 16	Viglione et al., The Gazette of Medical Sciences, doi:10.46766/ thegms.pubheal.22120 905	Intravenous high dose vitamin C and ozonated saline effective treatment for Covid -19: The Evolution of Local Standard of Care
	Retrospective 479 high risk outpatients in the USA treated with a protocol including intravenous vitamin C, vitamin D, zinc, quercetin, bromelain, lactoferrin, HCQ, ivermectin, ozonated saline, azithromycin, ceftriaxone, methylprednisolon..	
Jan 16	Asadi et al., Journal of Pharmaceutical Policy and Practice, doi:10.1186/ s40545-023-00511-w	Effectiveness of different treatment regimens on patients with COVID-19, hospitalized in Sanandaj hospitals: a retrospective cohort study
	Retrospective 660 hospitalized patients in Iran comparing 6 different drug regimens: 1. HCQ or CQ+AZ, 2. interferons (ReciGen/Ziphron) or interferon + Kaletra (lopinavir/ritonavir), 3. atazanavir, 4. remdesivir, 5. favipiravir, and 6. cor..	
Jan 13	Hawari et al., Journal of Aerosol Medicine and Pulmonary Drug Delivery, doi:10.1089/ jamp.2022.0062	Safety, Tolerability, and Pharmacokinetics of Nebulized Hydroxychloroquine: A Pilot Study in Healthy Volunteers
	Analysis of a nebulized HCQ formulation with 12 healthy patients, showing low systemic concentrations and supporting efficacy, safety, and tolerability.	

Jan 7	Dhibar et al., Scientific Reports, doi:10.1038/s41598-022-26053-w	The 'myth of Hydroxychloroquine (HCQ) as post-exposure prophylaxis (PEP) for the prevention of COVID-19' is far from reality
	27% fewer symptomatic cases (p=0.32) and 21% fewer cases (p=0.21). Low dose low-risk patient HCQ PEP RCT, showing lower symptomatic cases with treatment, without statistical significance. There were no moderate or severe cases. HCQ 800mg on day one followed by 400mg once weekly for 3 weeks.	
Jan 4	Mitjà et al., Clinical and Translational Science, doi:10.1111/cts.13468	Hydroxychloroquine for treatment of non-hospitalized adults with COVID-19: A meta-analysis of individual participant data of randomized trials
	33% improved viral clearance (p=0.02). Extremely high COI (includes authors of trials playing a key role in the suppression of treatment, and funded by the Gates Foundation) IPD meta analysis of 11 HCQ outpatient treatment and prophylaxis trials, showing significantly improved..	
Dec 31 2022	Genton et al., NCT04385264	#StayHome: Early Hydroxychloroquine to Reduce Secondary Hospitalisation and Household Transmission in COVID-19 (#StayHome)
	Estimated 800 patient HCQ early treatment RCT with results not reported over 9 months after estimated completion.	
Dec 16 2022	Higgins et al., JAMA, doi:10.1001/jama.2022.23257	Long-term (180-Day) Outcomes in Critically Ill Patients With COVID-19 in the REMAP-CAP Randomized Clinical Trial
	51% higher mortality (p=0.06). Long-term followup for the REMAP-CAP very late stage ICU trial, showing higher risk with HCQ, not quite reaching statistical significance.	
Dec 13 2022	Shukla et al., The Lancet Regional Health - Southeast Asia, doi:10.1016/j.lansea.2022.100129	An observational multi-centric COVID-19 sequelae study among health care workers
	5% lower PASC (p=0.78). Retrospective 679 healthcare workers post COVID-19 discharge, 76 using HCQ prophylaxis, showing no significant difference in PASC.	

Dec 7 2022	Shahrin et al., Life, doi:10.3390/ life12122047	Hospital-Based Quasi-Experimental Study on Hydroxychloroquine Pre-Exposure Prophylaxis for COVID-19 in Healthcare Providers with Its Potential Side-Effects
	88% more cases (p=0.09). Retrospective 230 low risk healthcare workers taking HCQ prophylaxis, and 106 that declined, showing higher cases without statistical significance. No case severity information is provided. The point estimate favored HCQ when excluding th..	
Nov 24 2022	Alosaimi et al., Pharmaceuticals, doi:10.3390/ ph15121456	Analyzing the Difference in the Length of Stay (LOS) in Moderate to Severe COVID-19 Patients Receiving Hydroxychloroquine or Favipiravir
	400% higher mortality (p=0.49), 43% shorter hospitalization (p=0.63), and 29% higher hospital discharge (p=0.74). Retrospective 200 hospitalized COVID-19 patients in Saudi Arabia, showing no significant difference in outcomes between HCQ and favipiravir.	
Nov 21 2022	Landsteiner de Sampaio Améndola et al., Journal of Clinical Medicine, doi:10.3390/ jcm11226865	COVID-19 Infection in Rheumatic Patients on Chronic Antimalarial Drugs: A Systematic Review and Meta-Analysis
	24% lower mortality (p=0.01) and 20% lower hospitalization (p=0.04). Systematic review and meta analysis of 20 studies on HCQ use in rheumatic disease patients, showing significantly lower mortality and hospitalization with HCQ prophylaxis.	
Nov 17 2022	Bubenek-Turconi et al., European Journal of Anaesthesiology, doi:10.1097/ EJA.000000000000177 6	Clinical characteristics and factors associated with ICU mortality during the first year of the SARS-Cov-2 pandemic in Romania
	22% lower mortality (p=0.01). Prospective study of 9,058 COVID-19 ICU patients in Romania, showing lower mortality with HCQ treatment.	

Nov 14 2022	Sukumar et al., F1000Research, doi:10.12688/ f1000research.109023. 1	The Frontline War: A Case-control study of risk factors for COVID-19 among health care workers
<p>38% fewer cases (p=0.3). Case control study of healthcare workers in India, showing lower risk of cases with HCQ prophylaxis, without statistical significance. While authors comment negatively, as may be required for publication, and this study alone is not stati..</p>		
Oct 26 2022	Patel et al., Seminars in Arthritis and Rheumatism, doi:10.1016/ j.semarthrit.2022.1521 08	Factors Associated with COVID-19 Breakthrough Infection Among Vaccinated Patients with Rheumatic Diseases: A Cohort Study
<p>41% fewer cases (p=0.02). Retrospective 11,468 vaccinated rheumatic disease patients, showing lower risk of COVID-19 cases with HCQ/CQ (antimalarial) treatment compared with all other treatments, statistically significant for 6 treatments.</p>		
Oct 21 2022	Assad, H., Current Issues in Pharmacy and Medical Sciences, doi:10.2478/ cipms-2022-0020	Pharmacotherapy prescribing pattern and outcome for hospitalized patients with severe and critical COVID-19
<p>60% lower mortality (p=0.002). Retrospective 346 hospitalized patients in Iraq, showing lower mortality with HCQ in unadjusted results. HCQ results are only provided within the 93% of patients treated with enoxaparin.</p>		
Oct 18 2022	Cosentino et al., Journal of Clinical Medicine, doi:10.3390/ jcm11206138	Early Outpatient Treatment of COVID-19: A Retrospective Analysis of 392 Cases in Italy

		Retrospective 392 outpatients in Italy showing 0.2% mortality with early treatment, compared with >3% in Italy at the time. Treatment varied for individual patients and included HCQ, vitamin D, vitamin C, vitamin A, zinc, quercetin, bromh..
Oct 13 2022	Gómez et al., Medicina Clínica (English Edition), doi:10.1016/j.medcle.2022.01.020	Mortality risk factors in patients with SARS-CoV-2 infection and atrial fibrillation: Data from the SEMI-COVID-19 registry
		36% lower mortality (p<0.0001) . Retrospective 1,799 hospitalized COVID-19 patients with atrial fibrillation in Spain, showing lower mortality with HCQ treatment in unadjusted results.
Oct 6 2022	Isnardi et al., Clinical Rheumatology, doi:10.1007/s10067-022-06393-8	Sociodemographic and clinical factors associated with poor COVID-19 outcomes in patients with rheumatic diseases: data from the SAR-COVID Registry
		34% lower mortality (p=0.23), 48% lower severe cases (p=0.02), and 17% lower hospitalization (p=0.09) . Retrospective 1,915 rheumatic disease patients with COVID-19 in Argentina, showing lower mortality, severe oxygen requirement, and hospitalization with CQ/HCQ (antimalarial) use in unadjusted results, statistically significant only for se..
Sep 28 2022	Obrîșcă et al., Biomedicines, doi:10.3390/biomedicines10102423	Characteristics of SARS-CoV-2 Infection in an Actively Monitored Cohort of Patients with Lupus Nephritis
		87% fewer cases (p=0.01) . Prospective analysis of 95 Lupus Nephritis patients in Romania, showing lower risk of COVID-19 with HCQ use.
Sep 27 2022	Go et al., Frontiers in Pharmacology, doi:10.3389/fphar.2022.935370	Hydroxychloroquine, azithromycin and methylprednisolone and in hospital survival in severe COVID-19 pneumonia
		55% lower mortality (p=0.03) . Retrospective 759 hospitalized patients in the USA, showing lower mortality with combined HCQ+AZ+methylprednisolone treatment compared to methylprednisolone monotherapy.

<p>Sep 16 2021</p>	<p>Guillaume et al., Rheumatology and Therapy, doi:10.1007/ s40744-021-00373-1</p>	<p>Antirheumatic Drug Intake Influence on Occurrence of COVID-19 Infection in Ambulatory Patients with Immune-Mediated Inflammatory Diseases: A Cohort Study</p>
<p>2% higher hospitalization (p=1) and 3% more cases (p=0.96). Retrospective 459 SLE, RA, SjS, or PsA patients in France, showing no significant difference with HCQ treatment. However, the statistical analysis shows significant mismatches with prior research, which may be due to overfitting with the ..</p>		
<p>Sep 14 2022</p>	<p>Yuan et al., Communications Biology, doi:10.1038/ s42003-022-03841-8</p>	<p>Hydroxychloroquine blocks SARS-CoV-2 entry into the endocytic pathway in mammalian cell culture</p>
<p>In Vitro study showing that HCQ blocks SARS-CoV-2 entry into the endocytic pathway, and that HCQ was more effective with higher cholesterol. Authors also obtained lung samples from adults with chronic obstructive pulmonary disease, findin..</p>		
<p>Sep 11 2022</p>	<p>Gentry et al., The American Journal of the Medical Sciences, doi:10.1016/ j.amjms.2022.08.006</p>	<p>Development of SARS-CoV-2 infection in patients with rheumatic conditions on hydroxychloroquine monotherapy vs. patients without rheumatic conditions: a retrospective, propensity-matched cohort study</p>
<p>12% lower mortality (p=0.99), 12% lower hospitalization (p=0.81), and 14% more cases (p=0.57). Updated version of [Gentry] showing no significant difference in outcomes with HCQ use. The previous version is more informative because authors previously analyzed rheumatic disease patients, while they now compare rheumatic disease pati..</p>		
<p>Sep 9 2022</p>	<p>Núñez-Gil et al., Anti- Infective Agents, doi:10.2174/221135252 0666220514112951</p>	<p>Hydroxychloroquine and Mortality in SARS-Cov-2 Infection; The HOPE- Covid-19 Registry.</p>
<p>53% lower mortality (p<0.0001). PSM retrospective 6,217 hospitalized patients in Spain, showing lower mortality with HCQ. The higher efficacy reported with obesity is consistent with the greater efficacy predicted for higher cholesterol [Yuan].</p>		

Sep 7 2022	Sahebari et al., Reumatologia/ Rheumatology, doi:10.5114/ reum.2022.119039	Influence of biologic and conventional disease-modifying antirheumatic drugs on COVID-19 incidence among rheumatic patients during the first and second wave of the pandemic in Iran
	56% fewer cases (p=0.02). Retrospective 512 rheumatic disease patients in Iran, showing lower risk of COVID-19 with HCQ use.	
Sep 6 2022	Oku et al., Modern Rheumatology, doi:10.1093/mr/ roac104	Risk factors for hospitalization or mortality for COVID-19 in patients with rheumatic diseases: Results of a nation-wide JCR COVID-19 registry in Japan
	92% lower mortality (p=1) and 12% lower hospitalization (p=0.34). Retrospective 220 COVID-19 patients with rheumatic disease in Japan, showing lower mortality and hospitalization with HCQ prophylaxis, without statistical significance.	
Sep 1 2022	Flores-Chavez et al., Clinical and Experimental Rheumatology, doi:10.55563/ clinexprheumatol/ pt3syo	SARS-CoV-2 infection in 898 patients with Sjögren's syndrome: characteristics associated with poor outcomes
	Retrospective 898 patients with Sjögren's disease, showing a lower risk of worse outcomes with HCQ compared to corticosteroids, immunosuppressive agents, and B-cell depleting agents.	
Aug 31 2022	Babayigit et al., Frontiers in Medicine, doi:10.3389/ fmed.2022.894126	The association of antiviral drugs with COVID-19 morbidity: The retrospective analysis of a nationwide COVID-19 cohort
	112% higher ventilation (p=0.21), 53% higher ICU admission (p=0.33), and 17% longer hospitalization (p=0.05). Retrospective 1,472 hospitalized patients in Turkey, showing a higher risk of ICU admission and ventilation with HCQ, without statistical significance.	

<p>Aug 25 2022</p>	<p>Bowen et al., Open Forum Infectious Diseases, doi:10.1093/ofid/ofac436</p>	<p>Reduction in risk of death among patients admitted with COVID-19 between first and second epidemic waves in New York City</p>
<p>20% lower mortality (p=0.007). Retrospective 4,631 hospitalized patients in New York, showing higher mortality with remdesivir, and lower mortality with HCQ. Authors suggest that increased mortality during the first epidemic wave was partly due to strain on hospital re..</p>		
<p>Aug 16 2022</p>	<p>Loucera et al., medRxiv, doi:10.1101/2022.08.14.22278751</p>	<p>Real-world evidence with a retrospective cohort of 15,968 Andalusian COVID-19 hospitalized patients suggests 21 new effective treatments and one drug that increases death risk</p>
<p>69% lower mortality (p=0.0002). Retrospective 15,968 COVID-19 hospitalized patients in Spain, showing lower mortality with existing use of several medications including metformin, HCQ, aspirin, vitamin D, vitamin C, and budesonide.</p>		
<p>Aug 12 2022</p>	<p>Lyashchenko et al., British Journal of Clinical Pharmacology, doi:10.1111/bcp.15489</p>	<p>Systemic Exposure to Hydroxychloroquine and its relationship with outcome in severely ill COVID-19 patients in New York City</p>
<p>48% higher mortality (p<0.0001). Retrospective very late stage hospitalized patients in New York during the first wave, showing no significant relationship between HCQ levels and outcomes. Authors note that the patients with data were the sickest patients.</p>		
<p>Aug 9 2022</p>	<p>García-Albéniz et al., European Journal of Epidemiology, doi:10.1007/s10654-022-00891-4 (date from preprint)</p>	<p>Systematic review and meta-analysis of randomized trials of hydroxychloroquine for the prevention of COVID-19</p>
<p>28% fewer cases (p=0.003). Systematic review and meta-analysis of HCQ prophylaxis RCTs showing a statistically significant reduction in cases for pre-exposure prophylaxis. For PEP trials there were very long treatment delays - in one trial about a third of particip..</p>		

Aug 5 2022	de Reus et al., PLOS ONE, doi:10.1371/journal.pone.0272034	Tolerability and pharmacokinetic evaluation of inhaled dry powder hydroxychloroquine in healthy volunteers
	Tolerability and pharmacokinetic evaluation of an inhaled dry powder formulation of HCQ. Inhaled HCQ was generally well-tolerated, with only minor adverse effects. Pulmonary function tests found no significant drop in FEV1 after inhalatio..	
Aug 5 2022	Becetti et al., Qatar Medical Journal, doi:10.5339/qmj.2022.37	Prevalence of coronavirus disease 2019 in a multiethnic cohort of patients with autoimmune rheumatic diseases in Qatar
	37% fewer cases (p=0.17). Retrospective 700 patients with autoimmune rheumatic disease in Qatar, showing lower risk of COVID-19 with HCQ use, without statistical significance. For patients having close contact with COVID-19 cases, there was a statistically signifi..	
Aug 5 2022	Polo et al., Clinical Microbiology and Infection, doi:10.1016/j.cmi.2022.07.006	Daily tenofovir disoproxil fumarate/emtricitabine and hydroxychloroquine for pre-exposure prophylaxis of COVID-19: a double-blind placebo controlled randomized trial in healthcare workers
	51% fewer symptomatic cases (p=0.79) and 27% fewer cases (p=0.31). Early terminated healthcare worker prophylaxis RCT in Spain, showing lower risk of symptomatic cases with HCQ prophylaxis, without statistical significance due to the small number of events.	
Jul 26 2022	Xu et al., Rapid Communications in Mass Spectrometry, doi:10.1002/rcm.9358	A study of impurities in the repurposed COVID-19 drug hydroxychloroquine sulfate by UHPLC-Q/TOF-MS and LC-SPE-NMR
	Analysis of HCQ from two manufacturers showing 9 different impurities, with significantly different concentrations for each manufacturer.	
Jul 20	Hawari et al., NCT05113810	The Potential Use of Nebulized Hydroxychloroquine for the Treatment of COVID-19

2022	Estimated 110 patient HCQ nebulized late treatment RCT with results not reported over 1 year after estimated completion.	
Jul 15 2022	Patel et al., medRxiv, doi:10.1101/2022.07.13 .22277606	Factors Associated with COVID-19 Breakthrough Infection in the Pre-Omicron Era Among Vaccinated Patients with Rheumatic Diseases: A Cohort Study
	46% fewer cases (p=0.001). Retrospective 11,468 vaccinated rheumatic disease patients in the USA, showing lower risk of COVID-19 with HCQ/CQ use compared with all other treatments. Adjusted results are only provided with respect to specific other treatments.	
Jul 14 2022	Malundo et al., IJID Regions, doi:10.1016/ j.ijregi.2022.07.009	Predictors of Mortality among inpatients with COVID-19 Infection in a Tertiary Referral Center in the Philippines
	24% higher mortality (p=0.32). Retrospective 1,215 hospitalized patients in the Philippines, showing no significant difference in outcomes with remdesivir or HCQ use in unadjusted results subject to confounding by indication.	
Jul 11 2022	Yadav et al., Indian Journal of Community Medicine, doi:10.4103/ ijcm.ijcm_684_21	Hydroxychloroquine/chloroquine prophylaxis among health-care workers: Was it really preventive? – Evidence from a multicentric cross-sectional study
	20% lower seropositivity (p=0.1). Retrospective 2,224 healthcare workers in India, showing lower risk of seropositivity with HCQ prophylaxis, without statistical significance.	
Jul 3 2022	Raabe et al., medRxiv, doi:10.1101/2022.07.01 .22277058	Hydroxychloroquine pre-exposure prophylaxis to prevent SARS-CoV-2 among health care workers at risk for SARS-CoV-2 exposure: A nonrandomized controlled trial
	82% fewer symptomatic cases (p=0.17). Small prophylaxis study with 130 healthcare workers in the USA, showing lower symptomatic cases with HCQ prophylaxis, without statistical significance. HCQ participants were significantly older. The only symptomatic HCQ patient reported h..	

Jul 1 2022	Osawa et al., The Journal of Critical Care Medicine, doi:10.2478/jccm-2022-0015	Characteristics and risk factors for mortality in critically ill patients with COVID-19 receiving invasive mechanical ventilation: the experience of a private network in Sao Paulo, Brazil
	29% lower mortality (p=0.07). Retrospective 215 mechanically ventilated COVID-19 patients in Brazil, 71 treated with HCQ, showing lower mortality with treatment in unadjusted results, without statistical significance. Authors note HCQ was used more toward the start of..	
Jun 30 2022	Ghanem-Zoubi et al., NCT04438837	Hydroxychloroquine Post-Exposure Prophylaxis for Coronavirus Disease (COVID-19) Among Health-Care Workers
	Estimated 582 participant HCQ prophylaxis RCT with results not reported over 1 year after estimated completion.	
Jun 29 2022	Nimitvilai et al., Journal of Global Infectious Diseases, doi:10.4103/jgid.jgid_281_21	A randomized controlled trial of combined ivermectin and zinc sulfate versus combined hydroxychloroquine, darunavir/ritonavir, and zinc sulfate among adult patients with asymptomatic or mild coronavirus-19 infection
	50% worse viral clearance (p=0.12). RCT low-risk patients in Thailand comparing HCQ, darunavir/ritonavir, and zinc, with ivermectin and zinc, showing no significant differences. All patients recovered. 65% of patients were asymptomatic at baseline, 26% were PCR- at baseline..	
Jun 1 2022	Tirupakuzhi Vijayaraghavan et al., BMJ Open, doi:10.1136/bmjopen-2021-059540	Hydroxychloroquine plus personal protective equipment versus personal protective equipment alone for the prevention of laboratory-confirmed COVID-19 infections among healthcare workers: a multicentre, parallel-group randomised controlled trial from India
	196% higher progression (p=1), 52% lower hospitalization (p=0.62), and 14% fewer cases (p=0.73). Low-dose prophylaxis RCT with low-risk healthcare workers in India, showing no significant differences. Symptomatic case results are not provided. Followup was over 6 months, however treatment ended after 3 months. 21% of patients discont..	

May 20 2022	Silva et al., Frontiers in Cellular and Infection Microbiology, doi:10.3389/fcimb.2022.899702	Clinical-Epidemiology Aspect of Inpatients With Moderate or Severe COVID-19 in a Brazilian Macroregion: Disease and Countermeasures
	46% higher mortality (p=0.22). Retrospective 395 hospitalized patients in Brazil, showing higher mortality with HCQ treatment, without statistical significance.	
May 16 2022	Gkioulekas et al., Authorea, Inc., doi:10.22541/au.164745391.17821933/v2	Frequentist and Bayesian analysis methods for case series data and application to early outpatient COVID-19 treatment case series of high risk patients
	Hybrid statistical framework for evaluating treatment protocols. COVID-19 treatment protocols often use risk stratification, multiple treatments, and customization based on the disease stage and the patient. Authors find strong evidence f..	
May 4 2022	Hong et al., PLOS ONE, doi:10.1371/journal.pone.0267645	Use of combined treatment of 3rd-generation cephalosporin, azithromycin and antiviral agents on moderate SARs-CoV-2 patients in South Korea: A retrospective cohort study
	25% faster recovery (p=0.45), 13% longer hospitalization (p=0.75), and no change in viral clearance (p=0.99). Retrospective 25 hospitalized patients treated with cephalosporin, azithromycin, and HCQ, and 217 SOC patients in South Korea, reporting no significant differences. 5 patients receiving lopinavir/ritonavir and HCQ >5 days were excluded fo..	
Apr 30 2022	Bassets-Bosch et al., Anales de Pediatría, doi:10.1016/j.anpedi.2021.01.006	Negativización de PCR a SARS-CoV-2 en muestra respiratoria en pacientes con necesidad de asistencia recurrente
	29% faster viral clearance (p=0.45). Retrospective 15 pediatric patients in Spain, showing faster viral clearance with HCQ+AZ, without statistical significance. Treatment time and details are not provided.	

Apr 22 2022	Satti et al., Cureus, doi:10.7759/ cureus.24382	Characteristics and Obstetric Outcomes in Women With Autoimmune Rheumatic Disease During the COVID-19 Pandemic in Qatar
	61% fewer cases (p=0.04). Retrospective 80 consecutive pregnant patients with autoimmune rheumatic diseases in Qatar, showing lower risk of COVID-19 cases with HCQ prophylaxis.	
Apr 17 2022	Fáisca et al., Pharmaceutics, doi:10.3390/ pharmaceutics1404087 7	Enhanced In Vitro Antiviral Activity of Hydroxychloroquine Ionic Liquids against SARS-CoV-2
	In Vitro study showing improved antiviral activity with ionic formulations of HCQ.	
Apr 16 2022	Roy-García et al., medRxiv, doi:10.1101/2022.04.06 .22273531	Efficacy and Safety of Fixed Combination of Hydroxychloroquine with Azithromycin Versus Hydroxychloroquine and Placebo in Patients with Mild COVID-19: Randomized, double blind, Placebo controlled trial
	Small early terminated RCT in Mexico with 31 HCQ and 31 control patients, showing higher progression with treatment. There were no hospitalizations in the HCQ and control groups. HCQ patients were older, 38 vs. 32. There were no differences.	
Apr 8 2022	Hafez et al., Antibiotics, doi:10.3390/ antibiotics11040498	Antiviral Used among Non-Severe COVID-19 Cases in Relation to Time till Viral Clearance: A Retrospective Cohort Study
	12% faster viral clearance (p=0.59). Retrospective hospitalized patients in the United Arab Emirates, showing no significant difference in viral clearance with different combinations of HCQ, AZ, favipiravir, and lopinavir/ritonavir.	
Apr 6 2022	Walbi et al., Journal of International Medical Research, doi:10.1177/030006052 21090363	Effect of chronic hydroxychloroquine use on COVID-19 risk in patients with rheumatoid arthritis and systemic lupus erythematosus: a multicenter retrospective cohort

	Retrospective RA/SLE patients in Saudi Arabia. Numbers in this paper are contradictory. Figure 1 and the introduction to the results indicate 304 HCQ users, while Table 1 and later in the results shows 207 (arms switched). The subsequent ..	
Apr 2 2022	Delandre et al., Pharmaceuticals, doi:10.3390/ ph15040445	Antiviral Activity of Repurposing Ivermectin against a Panel of 30 Clinical SARS-CoV-2 Strains Belonging to 14 Variants
	In Vitro study with 30 COVID-19 strains from 14 variants, showing stronger efficacy with ivermectin compared to CQ and remdesivir, and relatively homogeneous efficacy with ivermectin regardless of strain/variant, in contrast to results fo..	
Mar 31 2022	Avezum et al., The Lancet Regional Health - Americas, doi:10.1016/ j.lana.2022.100243	Hydroxychloroquine versus placebo in the treatment of non-hospitalised patients with COVID-19 (COPE – Coalition V): A double-blind, multicentre, randomised, controlled trial
	1% lower mortality (p=1), 32% higher ventilation (p=0.79), 16% lower ICU admission (p=0.61), and 23% lower hospitalization (p=0.18). Authors have not responded to a request for the data. Outpatient RCT with 687 HCQ and 682 control patients in Brazil, showing lower hospitalization with treatment, not reaching statistical significance. Higher efficacy was seen with treat..	
Mar 30 2022	Gagneux-Brunon et al., Trials, doi:10.1186/ s13063-021-05329-y	Acceptability of a COVID-19 pre-exposure prophylaxis trial with hydroxychloroquine in French healthcare workers during the first wave of COVID-19 pandemic
	118 participant HCQ prophylaxis RCT with results not reported over 1.5 years after completion.	
Mar 29 2022	MacFadden et al., Open Forum Infectious Diseases, doi:10.1093/ ofid/ofac156	Screening Large Population Health Databases for Potential COVID-19 Therapeutics: A Pharmacopeia-Wide Association Study (PWAS) of Commonly Prescribed Medications
	12% fewer cases (p=0.01). Retrospective 26,121 cases and 2,369,020 controls ≥65yo in Canada, showing lower cases with chronic use of HCQ.	

Mar 23 2022	AlQahtani et al., Scientific Reports, doi:10.1038/ s41598-022-08794-w	Randomized controlled trial of favipiravir, hydroxychloroquine, and standard care in patients with mild/moderate COVID-19 disease
	4% improved recovery (p=0.94) and 47% improved viral clearance (p=0.13). RCT with 54 favipiravir, 51 HCQ, and 52 SOC hospitalized patients in Bahrain, showing no significant differences. Viral clearance improved with both treatments, but did not reach statistical significance with the small sample size.	
Mar 22 2022	White et al., COPCOV, NCT04303507	Chloroquine/ Hydroxychloroquine Prevention of Coronavirus Disease (COVID-19) in the Healthcare Setting (COPCOV)
	4,652 participant HCQ prophylaxis RCT with results not reported over 1.5 years after completion.	
Mar 21 2022	Oztas et al., Journal of Medical Virology, doi:10.1002/jmv.27731	Frequency and Severity of COVID-19 in Patients with Various Rheumatic Diseases Treated Regularly with Colchicine or Hydroxychloroquine
	215% higher hospitalization (p=0.36), 40% more symptomatic cases (p=0.44), and 5% more cases (p=0.88). Retrospective 317 HCQ users and 333 household contacts, showing higher risk with HCQ.	
Mar 19 2022	Ragonnet et al., Future Pharmacology, doi:10.3390/ futurepharmacol20100 07	Drug Repositioning in Intensive Care Patients and Pharmacokinetic Variability: The Illustration of Hydroxychloroquine
	Comparison of two HCQ dosing regimens, showing high inter-individual variability of HCQ concentrations (as in [Ruiz]), and significantly better plasma concentrations for the dosing regimen including a loading dose.	
Mar 18 2022	Ebongue et al., Travel Medicine and Infectious Disease, doi:10.1016/ j.tmaid.2022.102292	Factors predicting in-hospital all-cause mortality in COVID 19 patients at the Laquintinie Hospital Douala, Cameroon
	43% lower mortality (p=0.04). Retrospective 580 hospitalized COVID+ patients in Cameroon, showing lower mortality with HCQ+AZ treatment.	

Mar 17 2022	Uyaroglu et al., Acta Medica, doi:10.32552/2022.ActaMedica.719	Comparison of Favipiravir to Hydroxychloroquine Plus Azithromycin in the Treatment of Patients with Non-critical COVID-19: A Single-center, Retrospective, Propensity Score-matched Study
	200% higher mortality (p=1), 67% lower ICU admission (p=1), and 10% shorter hospitalization (p=0.9). PSM retrospective 260 late stage hospitalized COVID-19 pneumonia patients in Turkey, showing no significant difference between favipiravir and HCQ.	
Mar 11 2022	Salehi et al., Research Square, doi:10.21203/rs.3.rs-1362678/v1	Risk factors of death in mechanically ventilated COVID-19 patients: a retrospective multi-center study
	14% higher mortality (p=0.44). Retrospective 125 mechanically ventilated ICU patients in Iran, showing no significant difference with HCQ treatment in unadjusted results.	
Mar 10 2022	Azaña Gómez et al., Medicina Clínica, doi:10.1016/j.medcli.2022.01.008	Mortality risk factors in patients with SARS-CoV-2 infection and atrial fibrillation: Data from the SEMI-COVID-19 registry
	36% lower mortality (p<0.0001). Retrospective 1,816 COVID-19 patients with atrial fibrillation in Spain, showing lower mortality with HCQ treatment.	
Mar 3 2022	Tsanovska et al., Infectious Disorders - Drug Targets, doi:10.2174/1871526522666220303121209	Hydroxychloroquine (HCQ) treatment for hospitalized patients with COVID-19
	58% lower mortality (p=0.03), 74% lower ventilation (p=0.0007), and 70% lower ICU admission (p=0.0004). PSM prospective study of 260 COVID-19 patients in Bulgaria, showing lower mortality, ventilation, and ICU admission with HCQ treatment.	
Mar 2	Soto et al., PLOS ONE, doi:10.1371/journal.pone.0264789	Mortality and associated risk factors in patients hospitalized due to COVID-19 in a Peruvian reference hospital

2022	<p>6% higher mortality (p=0.46). Retrospective 1,418 very late stage (46% mortality) patients in Peru, showing no significant difference with HCQ. There is strong confounding by indication, for example 48% of patients with baseline SpO2 <70% were treated compared with 22..</p>	
Feb 26 2022	<p>Rouamba et al., International Journal of Infectious Diseases, doi:10.1016/ j.ijid.2022.02.034</p>	<p>Assessment of Recovery Time, Worsening and Death, among COVID-19 inpatients and outpatients, under treatment with Hydroxychloroquine or Chloroquine plus Azithromycin Combination in Burkina Faso</p>
<p>80% lower mortality (p<0.0001), 20% lower progression (p=0.43), and 31% faster viral clearance (p=0.26). Retrospective 863 COVID-19 patients in Burkina Faso, showing lower mortality, lower progression for outpatients, and faster viral clearance with HCQ/CQ treatment. Only the lower mortality was statistically significant. NCT04445441.</p>		
Feb 23 2022	<p>Opdam et al., Clinical Pharmacology & Therapeutics, doi:10.1002/cpt.2551</p>	<p>Identification of Risk Factors for COVID-19 Hospitalization in Patients with Anti-Rheumatic Drugs: Results from a Multicenter Nested Case Control Study</p>
<p>45% lower hospitalization (p=0.18). Retrospective 81 cases and 396 controls among rheumatic disease patients in the Netherlands, showing lower risk of hospitalization with HCQ prophylaxis, without statistical significance.</p>		
Feb 18 2022	<p>Hall et al., The Annals of Thoracic Surgery, doi:10.1016/ j.athoracsur.2022.01.04 3</p>	<p>Multi-institutional Analysis of 505 COVID-19 Patients Supported with ECMO: Predictors of Survival</p>
<p>11% lower mortality (p=0.31). Retrospective 505 ECMO patients showing no significant difference in mortality in unadjusted results.</p>		

Feb 16 2022	Ugarte-Gil et al., Annals of the Rheumatic Diseases, doi:10.1136/ annrheumdis-2021-221 636	Characteristics associated with poor COVID-19 outcomes in individuals with systemic lupus erythematosus: data from the COVID-19 Global Rheumatology Alliance
	44% lower severe cases (p=0.007). Retrospective 1,606 SLE patients showing lower risk of severe COVID-19 outcomes with HCQ/CQ use.	
Feb 13 2022	Beaumont et al., Infectious Diseases Now, doi:10.1016/ j.idnow.2022.02.001	Factors associated with hospital admission and adverse outcome for COVID-19: role of social factors and medical care
	14% lower combined mortality/intubation (p=0.55). Retrospective 296 hospitalized patients in France, showing no significant difference with HCQ treatment.	
Feb 3 2022	Albarghali et al., Journal of Infection and Public Health, doi:10.1016/ j.jiph.2022.02.001	Clinical Characteristics and Treatment Outcomes of Mild to Moderate Covid-19 Patients in Saudi Arabia: A Single Centre Study
	35% higher mortality (p=0.46). Retrospective 811 hospitalized COVID+ patients in Saudi Arabia, showing higher mortality with HCQ treatment in unadjusted results subject to confounding by indication.	
Jan 31 2022	Fernández-Cruz et al., Clinical Infection in Practice, doi:10.1016/ j.clinpr.2022.100137	Higher mortality of hospitalized haematologic patients with COVID-19 compared to non-haematologic is driven by thrombotic complications and development of ARDS: An age-matched cohorts study
	27% lower mortality (p=0.47). Retrospective 71 hospitalized haematologic patients in Spain, showing lower mortality with HCQ treatment in unadjusted results and without statistical significance.	

Jan 31 2022	Omama et al., The Journal of Infection in Developing Countries, doi:10.3855/jidc.14933	Hydroxychloroquine shortened hospital stay and reduced intensive care unit admissions in hospitalized COVID-19 patients
	<p>28% lower mortality (p=0.3), 50% lower ICU admission (p=0.004), and 17% shorter hospitalization (p=0.007). Retrospective 393 hospitalized COVID-19 patients in Turkey, showing lower ICU admission and shorter hospitalization time with HCQ. There was no significant difference for mortality. Severity was higher in the HCQ group with greater baseli..</p>	
Jan 23 2022	Erden et al., Bratislava Medical Journal, doi:10.4149/ BLL_2022_018	COVID-19 outcomes in patients with antiphospholipid syndrome: a retrospective cohort study
	<p>75% lower hospitalization (p=0.23). Retrospective 9 COVID-19 patients with antiphospholipid syndrome in Turkey, showing no significant differences based on existing HCQ treatment.</p>	
Jan 21 2022	Lavilla Olleros et al., PLOS ONE, doi:10.1371/ journal.pone.0261711	Use of glucocorticoids megadoses in SARS-CoV-2 infection in a spanish registry: SEMI-COVID-19
	<p>36% lower mortality (p<0.0001). Retrospective 14,921 hospitalized patients in Spain, showing lower mortality with HCQ treatment.</p>	
Jan 20 2022	Alwafi et al., Cureus, doi:10.7759/ cureus.21442	Negative Nasopharyngeal SARS-CoV-2 PCR Conversion in Response to Different Therapeutic Interventions
	<p>15% improved viral clearance (p=0.65). Retrospective 93 hospitalized patients in Saudi Arabia, 45 treated with CQ/HCQ, showing no significant difference in viral clearance. More patients treated with CQ/HCQ had severe cases at baseline (20% vs. 2%).</p>	

<p>Jan 13 2022</p>	<p>Tu et al., Infectious Diseases & Immunity, doi:10.1097/ID9.0000000000000037</p>	<p>Risk Factors for Severity and Mortality in Adult Patients Confirmed with COVID-19 in Sierra Leone: A Retrospective Study</p>
<p>17% lower mortality (p=0.81). Retrospective 180 hospitalized COVID-19 patients in Sierra Leone, showing no significant difference with HCQ treatment in unadjusted results, however HCQ was significantly more likely to be used for severe patients (33% vs. 12%).</p>		
<p>Jan 13 2022</p>	<p>Tyson et al., Preprint</p>	<p>Low Rates of Hospitalization and Death in 4,376 COVID-19 Patients Given Early Ambulatory Medical and Supportive Care. A Case Series and Observational Study.</p>
<p>100% lower mortality (p<0.0001) and 100% lower hospitalization (p<0.0001). Retrospective 4,376 patients with mild/moderate COVID-19 in the USA treated with multiple medications including HCQ/ivermectin, favipiravir, vitamin C, D, quercetin, zinc, mAbs, budesonide, dexamethasone, prednisone, and colchicine (exact..</p>		
<p>Jan 11 2022</p>	<p>AbdelGhaffar et al., PLOS ONE, doi:10.1371/journal.pone.0262348</p>	<p>Prediction of mortality in hospitalized Egyptian patients with Coronavirus disease-2019: A multicenter retrospective study</p>
<p>100% lower mortality (p<0.0001). Retrospective 3,712 hospitalized patients in Egypt, showing lower mortality with HCQ treatment in unadjusted results. According to the official treatment protocol, HCQ was recommended with higher risk and/or more serious cases.</p>		
<p>Jan 7 2022</p>	<p>Juneja et al., Journal of Basic and Clinical Physiology and Pharmacology, doi:10.1515/jbcpp-2021-0221</p>	<p>Hydroxychloroquine pre-exposure prophylaxis provides no protection against COVID-19 among health care workers: a cross-sectional study in a tertiary care hospital in North India</p>
<p>142% higher severe cases (p=0.59) and 6% more cases (p=0.67). Retrospective 2,200 healthcare workers in India, 996 taking HCQ prophylaxis, showing no significant differences. There were large differences in the occupation of participants and therefore exposure, and the authors make no adjustments.</p>		

Dec 31 2021	Pineda et al., NCT04954040	Prevention and Treatment With Hydroxychloroquine + Azithromycin of Acute Respiratory Syndrome Induced by COVID-19 (AMBUCOV)
	Estimated 132 patient HCQ early treatment RCT with results not reported over 1.5 years after estimated completion.	
Dec 31 2021	Aston et al., NCT04334382	Hydroxychloroquine vs. Azithromycin for Outpatients in Utah With COVID-19 (HyAzOUT)
	Estimated 1,550 patient HCQ early treatment RCT with results not reported over 1.5 years after estimated completion.	
Dec 31 2021	Al Ansari et al., NCT04437693	Post Exposure Prophylaxis in Healthcare Workers Exposed to COVID-19 Patients (HCQ-COVID19)
	Estimated 500 participant HCQ prophylaxis RCT with results not reported over 1.5 years after estimated completion.	
Dec 23 2021	McKinnon et al., International Journal of Infectious Diseases, doi:10.1016/j.ijid.2021.12.343	Safety and Tolerability of Hydroxychloroquine in healthcare workers and first responders for the prevention of COVID-19: WHIP COVID-19 Study
	2% fewer symptomatic cases (p=1) and 51% fewer cases (p=0.6). HCQ prophylaxis RCT with 201 weekly HCQ patients, 197 daily HCQ patients, and 200 control patients, concluding the prophylaxis is safe. There were no grade 3 or 4 AEs, SAEs, ER visits, or hospitalizations. There was only 4 confirmed cases..	
Dec 4 2021	Rao et al., Expert Review of Anti-infective Therapy, doi:10.1080/14787210.2022.2015326	Hydroxychloroquine as pre-exposure prophylaxis against COVID-19 infection among healthcare workers: a prospective cohort study
	11% fewer cases (p=0.68). Prospective PrEP study with low risk healthcare workers in India showing RR=0.89 [0.53-1.52]. There were no significant adverse effects. Only mean age and gender distribution are provided for baseline characteristics, no severity informat..	

Nov 26 2021	Ferreira et al., Revista da Associação Médica Brasileira, doi:10.1590/1806-9282.20210661	Outcomes associated with Hydroxychloroquine and Ivermectin in hospitalized patients with COVID-19: a single-center experience
	151% higher mortality (p=0.03) and 46% higher combined mortality/intubation (p=0.23). Retrospective 230 hospitalized patients in Brazil showing higher mortality with HCQ treatment. Authors note that the treatments were more likely to be offered to sicker patients. Authors note that they do not know if treatment was started..	
Nov 23 2021	Calderón et al., PAMJ - Clinical Medicine, doi:10.11604/pamj-cm.2021.7.15.30981	Treatment with hydroxychloroquine vs nitazoxanide in patients with COVID-19: brief report
	215% higher mortality (p=0.38), 652% higher ventilation (p=0.15), 145% higher ICU admission (p<0.0001), and 107% longer hospitalization (p=0.007). Planned RCT of HCQ vs. HCQ+nitazoxanide which was aborted due to the retracted Surgisphere paper. Authors retrospectively analyze a small set of HCQ vs. nitazoxanide patients (which were protocol deviations in the planned RCT), showing re..	
Nov 23 2021	Ahmed et al., BioMed Research International, doi:10.1155/2021/1676914	Factors Affecting the Incidence, Progression, and Severity of COVID-19 in Type 1 Diabetes Mellitus
	99% fewer cases (p=0.08). Retrospective type 1 diabetes patients in Saudi Arabia showing reduced risk of cases with HCQ prophylaxis.	
Nov 17 2021	Samajdar et al., Journal of the Association of Physicians India, 69:11	Ivermectin and Hydroxychloroquine for Chemo-Prophylaxis of COVID-19: A Questionnaire Survey of Perception and Prescribing Practice of Physicians vis-a-vis Outcomes
	75% fewer cases (p<0.0001). Physician survey in India with 164 ivermectin prophylaxis, 129 HCQ prophylaxis, and 81 control patients, showing significantly lower COVID-19 cases with treatment. Details of the treatment and control groups and the definition of cases ar..	

Nov 12 2021	Schmidt et al., JAMA Network Open, doi:10.1001/ jamanetworkopen.2021 .34330	Association Between Androgen Deprivation Therapy and Mortality Among Patients With Prostate Cancer and COVID-19	333% higher mortality (p=0.0001) and 613% higher severe cases (p<0.0001). Retrospective 1,106 prostate cancer patients, showing higher mortality with HCQ treatment.
Nov 11 2021	Cortez et al., Western Pacific Surveillance and Response Journal, doi:10.5365/ wpsar.2021.12.4.852	Clinical characteristics and outcomes of COVID-19 patients in a tertiary hospital in Baguio City, Philippines	15% lower mortality (p=1). Retrospective 280 hospitalized patients in the Philippines, 25 treated with HCQ, not showing any significant differences in unadjusted results.
Nov 5 2021	Chechter et al., Heliyon, doi:10.1016/ j.heliyon.2023.e15337 (date from preprint)	Evaluation of patients treated by telemedicine in the beginning of the COVID-19 pandemic in São Paulo, Brazil: A non-randomized clinical trial preliminary study	95% lower hospitalization (p=0.004). Prospective study of 187 telemedicine patients in Brazil. 74 presenting with moderate symptoms were offered treatment with HCQ+AZ, 12 did not accept HCQ (taking AZ only), forming a control group. There was lower hospitalization and improv..
Nov 2 2021	Sarhan et al., Journal of Infection and Public Health, doi:10.1016/ j.jiph.2021.10.024	Efficacy of the early treatment with tocilizumab-hydroxychloroquine and tocilizumab-remdesivir in severe COVID-19 Patients	26% lower mortality (p=0.39), 26% higher hospital discharge (p=0.39), and 25% longer hospitalization (p=0.06). Small 108 patient RCT comparing HCQ vs. remdesivir in very late stage treatment. All patients received tocilizumab. There were significant unadjusted baseline differences in ventilation and ICU admission. NCT04779047. REC-H-PhBSU-21011.

Oct 13 2021	Perrella et al., Viruses, doi:10.3390/v13102052	Pre-Exposure Prophylaxis with Hydroxychloroquine Does Not Prevent COVID-19 nor Virus Related Venous Thromboembolism
	71% higher ventilation (p=0.28), 33% higher ARDS (p=0.7), and 476% more cases (p<0.0001). Retrospective 8,811 HCQ users and 17,514 control patients, showing higher risk of COVID-19 for HCQ users. There were 12 cases for the 8,811 HCQ patients. There is no count for the control group that produces the reported unadjusted OR 4.9..	
Oct 31 2021	González et al., Trials, doi:10.1186/s13063-020-04557-y	Hydroxychloroquine efficacy and safety in preventing SARS-CoV-2 infection and COVID-19 disease severity during pregnancy (COVID-Preg): a structured summary of a study protocol for a randomised placebo controlled trial
	129 participant HCQ early treatment and prophylaxis RCT with results not reported over 1.5 years after completion.	
Oct 28 2021	Shousha et al., World Journal of Gastroenterology, doi:10.3748/wjg.v27.i40.6951	Hepatic and gastrointestinal disturbances in Egyptian patients infected with coronavirus disease 2019: A multicentre cohort study
	12% lower mortality (p=0.87). Retrospective 547 hospitalized COVID+ patients in Egypt, showing no significant differences with CQ/HCQ treatment in unadjusted analysis. Treatments were applied according to patient conditions, demographics, and comorbidities as per the ..	
Oct 25 2021	Guglielmetti et al., Scientific Reports, doi:10.1038/s41598-021-00243-4	Treatment for COVID-19—a cohort study from Northern Italy
	28% lower mortality (p=0.1). Retrospective 600 hospitalized patients in Italy, showing lower mortality with HCQ treatment, without reaching statistical significance (p = 0.1).	
Oct 6 2021	Belmont et al., ClinicalTrials.gov, NCT04354870	COVID-19 PrEP HCW HCQ Study

		<p>79% fewer symptomatic cases (p=0.21). Prospective study of HCQ prophylaxis in the USA, with 56 HCQ patients and 24 control patients, showing no significant differences. NCT04354870</p>
Oct 5 2021	<p>Atipornwanich et al., SSRN Electronic Journal, doi:10.2139/ ssrn.3936499</p>	<p>Various Combinations of Favipiravir, Lopinavir-Ritonavir, Darunavir-Ritonavir, High-Dose Oseltamivir, and Hydroxychloroquine for the Treatment of COVID-19: A Randomized Controlled Trial (FIGHT-COVID-19 Study)</p>
		<p>56% lower mortality (p=0.07), 54% lower progression (p=0.02), and 7% faster viral clearance (p=0.51). RCT 320 patients in Thailand, showing significantly lower progression with HCQ for moderate/severe patients, and faster viral clearance with mild patients (statistically significant for 800mg). There are two sets of results - for moderate..</p>
Oct 1 2021	<p>Fung et al., PLoS ONE, doi:10.1371/ journal.pone.0266922 (date from preprint)</p>	<p>Effect of common maintenance drugs on the risk and severity of COVID-19 in elderly patients</p>
		<p>13% lower mortality (p=0.15), 3% lower hospitalization (p=0.63), and 9% fewer cases (p=0.02). Retrospective database analysis of 374,229 patients in the USA, showing no significant difference with HCQ use, however authors do not adjust for the very different baseline risk for systemic autoimmune disease patients. Other research sh..</p>
Oct 1 2021	<p>Babalola et al., Journal of Infectious Diseases and Epidemiology, doi:10.23937/2474-365 8/1510233 (date from preprint)</p>	<p>A Randomized Controlled Trial of Ivermectin Monotherapy Versus Hydroxychloroquine, Ivermectin, and Azithromycin Combination Therapy in Covid-19 Patients in Nigeria</p>
		<p>55% lower hospital discharge (p=0.2) and 10% improved viral clearance (p=0.78). Small RCT with 61 patients in Nigeria, all patients treated with ivermectin, zinc, and vitamin C, showing no significant improvements in recovery with the addition of HCQ+AZ.</p>

Sep 30 2021	Nanni et al., Trials, doi:10.1186/ s13063-020-04527-4	PROTECT Trial: A cluster-randomized study with hydroxychloroquine versus observational support for prevention or early-phase treatment of Coronavirus disease (COVID-19): A structured summary of a study protocol for a randomized controlled trial
	Estimated 2,300 participant HCQ early treatment and prophylaxis RCT with results not reported over 2 years after estimated completion.	
Sep 30 2021	Panda et al., Clinical Pharmacology: Advances and Applications, doi:10.2147/ CPAA.S325083	Antiviral Combination Clinically Better Than Standard Therapy in Severe but Not in Non-Severe COVID-19
	48% lower mortality (p=0.45). RCT 111 patients in India in 5 groups: severe patients: A) standard treatment, B) hydroxychloroquine+ribavirin+standard treatment, or C) lopinavir+ritonavir+ribavirin+standard treatment, and non-severe: A) standard treatment or B)..	
Sep 30 2021	Menardi et al., PharmAdvances, doi:10.36118/ pharmadvances.2021.1 5	A retrospective analysis on pharmacological approaches to COVID-19 patients in an Italian hub hospital during the early phase of the pandemic
	35% lower mortality (p=0.12). Retrospective 277 hospitalized patients in Italy, showing lower mortality with HCQ treatment, not reaching statistical significance, and subject to confounding by indication.	
Sep 15 2021	Uygen et al., Northern Clinics of Istanbul, doi:10.14744/ nci.2021.65471	Effect of Hydroxychloroquine Use on the Length Of Hospital Stay in Children Diagnosed With Covid 19
	12% faster viral clearance (p=0.05). Retrospective 40 pediatric hospitalized patients, 15 treated with HCQ, showing 7.2 vs. 8.2 days until PCR-, not quite reaching statistical significance.	

Sep 15 2021	Çivriz Bozdağ et al., Türk. J. Haematol., doi:10.4274/ tjh.galenos.2021.2021. 0287	Clinical Characteristics and Outcome of COVID-19 in Turkish Hematological Malignancy Patients
	399% higher mortality (p=0.003). Retrospective 340 patients with hematological malignancy in Turkey, showing higher mortality with HCQ treatment. Confounding by time is likely because more HCQ patients were earlier in time when overall treatment protocols were significant..	
Sep 14 2021	Alotaibi et al., International Journal of General Medicine, 2021:14	Effectiveness and Safety of Favipiravir Compared to Hydroxychloroquine for Management of Covid-19: A Retrospective Study
	134% higher mortality (p=0.05). Retrospective hospitalized patients in Saudi Arabia, showing lower mortality with favipiravir compared to HCQ, not quite reaching statistical significance. Authors do not indicate the factors behind which therapy was chosen. May be subject..	
Sep 14 2021	Agarwal et al., medRxiv, doi:10.1101/2021.09.13 .21262971	Low dose hydroxychloroquine prophylaxis for COVID-19 - a prospective study
	27% lower progression (p=0.21) and 5% more cases (p=0.81). Small prophylaxis trial with 29 low dose HCQ and 455 control healthcare workers in India, showing no statistically significant differences.	
Sep 14 2021	Accinelli et al., Travel Medicine and Infectious Disease, doi:10.1016/ j.tmaid.2021.102163	Hydroxychloroquine / azithromycin in COVID-19: The association between time to treatment and case fatality rate
	Retrospective 1,265 outpatients in Peru treated with HCQ+AZ showing mortality associated with treatment delay. Mortality was six times lower than the national average.	

Sep 9 2021	Sawanpanyalert et al., Southeast Asian Journal of Tropical Medicine and Public Health, 52:4	Assessment of outcomes following implementation of antiviral treatment guidelines for COVID-19 during the first wave in Thailand
	42% lower progression (p=0.37). Retrospective 744 hospitalized patients in Thailand, showing lower risk of a poor outcome for favipiravir treatment within 4 days of symptom onset. Early treatment with CQ/HCQ and lopinavir/ritonavir or darunavir/ritonavir also showed low..	
Sep 1 2021	Karruli et al., Microbial Drug Resistance, doi:10.1089/ mdr.2020.0489	Multidrug-Resistant Infections and Outcome of Critically Ill Patients with Coronavirus Disease 2019: A Single Center Experience
	5% lower mortality (p=1). Retrospective 32 ICU patients, showing no significant difference with HCQ treatment in unadjusted results.	
Aug 27 2021	Cordtz et al., Journal of Clinical Medicine, doi:10.3390/ jcm10173842	Incidence of COVID-19 Hospitalisation in Patients with Systemic Lupus Erythematosus: A Nationwide Cohort Study from Denmark
	40% lower hospitalization (p=0.39). Retrospective 2,533 SLE patients in Denmark showing no significant difference in hospitalization risk for COVID-19 cases with HCQ treatment.	
Aug 25 2021	Rodrigues et al., International Journal of Antimicrobial Agents, doi:10.1016/ j.ijantimicag.2021.1064 28	Hydroxychloroquine plus azithromycin early treatment of mild COVID-19 in outpatient setting: a randomized, double-blinded, placebo-controlled clinical trial evaluating viral clearance
	14% improved viral clearance (p=0.15). RCT 84 low risk patients, 42 treated with HCQ/AZ, showing no significant differences. There was only one hospitalization which was in the treatment arm.	

Aug 25 2021	Naggie et al., International Journal of Infectious Diseases, doi:10.1016/ j.ijid.2023.01.019 (date from preprint)	Hydroxychloroquine for pre-exposure prophylaxis of COVID-19 in health care workers: A randomized, multicenter, placebo-controlled trial (HERO-HCQ)
	24% fewer symptomatic cases (p=0.18). HCQ prophylaxis RCT reporting statistically significant lower cases when pooling results with the COVID PREP RCT, OR 0.74 [0.55-1.0] p = 0.046. There were no significant safety issues. The trials were both terminated early resulting in a ..	
Aug 24 2021	Patil et al., Research Square, doi:10.21203/ rs.3.rs-805748/v1	A Prospective Longitudinal Study Evaluating The Influence of Immunosuppressives and Other Factors On COVID-19 in Autoimmune Rheumatic Diseases
	66% lower mortality (p=0.1) and 9% fewer cases (p=0.43). Prospective study of 9,212 autoimmune rheumatic disease patients showing lower mortality with HCQ, without reaching statistical significance. Authors incorrectly state "HCQ use did not influence occurrence of COVID-19 (RR = 0.909, CI..	
Aug 23 2021	Navya et al., Informatics in Medicine Unlocked, doi:10.1016/ j.imu.2021.100714	A computational study on hydroxychloroquine binding to target proteins related to SARS-COV-2 infection
	In Silico analysis showing that HCQ binds to multiple targets related to SARS-CoV-2 infection, including the ACE2 receptor, $\alpha 7$ nicotinic acetylcholine receptor, $\alpha 1D$ -adrenergic receptor, and topoisomerase III β , suggesting that HCQ may int..	
Aug 20 2021	McCullough et al., NCT04333225	Hydroxychloroquine in the Prevention of COVID-19 Infection in Healthcare Workers
	52% fewer cases (p=0.01). Prospective study with 221 healthcare workers, showing lower risk of COVID-19 with HCQ prophylaxis.	

Aug 16 2021	Eldeen et al., Microbes and Infectious Diseases, doi:10.21608/ mid.2021.85877.1177	Comparative study between the therapeutic effect of remdesivir versus hydroxychloroquine in COVID-19 hospitalized patients
	Small study comparing 25 HCQ and 25 remdesivir hospitalized patients, reporting faster viral clearance with remdesivir. The article proof is missing the results for the HCQ group. Confounding by time is likely - remdesivir patients were a..	
Aug 14 2021	Tai et al., Pharmaceutics, doi:10.3390/ pharmaceutics1308126 0	Nebulised Isotonic Hydroxychloroquine Aerosols for Potential Treatment of COVID-19
	Analysis of HCQ solutions suitable for nebulization for COVID-19.	
Aug 10 2021	Shabani et al., Pulmonary Pharmacology & Therapeutics, doi:10.1016/ j.pupt.2021.102069	Evaluation of the Prophylactic Effect of Hydroxychloroquine on People in Close-Contact with Patients with Covid-19
	19% fewer symptomatic cases (p=1) and 6% more cases (p=1). Small PEP trial with 51 HCQ patients, not showing a significant difference in cases. IRCT20130917014693N10.	
Aug 5 2021	Stricker et al., Journal of Infection and Public Health, doi:10.1016/ j.jiph.2021.08.001	Hydroxychloroquine Pre-Exposure Prophylaxis for COVID-19 in Healthcare Workers from India: A Meta-Analysis
	75% lower mortality (p<0.0001). Meta analysis of 11 HCQ PrEP studies in India covering 7,616 healthcare workers, showing significantly lower cases with treatment.	

Aug 4 2021	Özuygur Ermiş et al., Turkish Journal of Medical Sciences, doi:10.3906/ sag-2009-64	The Efficacy of Hydroxychloroquine and Azithromycin Combination Therapy on Hospital Mortality in COVID 19 Pneumonia Patients
	Retrospective 370 hospitalized patients, 222 receiving HCQ+AZ and 148 receiving HCQ, showing mortality OR 0.61 [0.23-1.59], p = 0.31 for the addition of AZ.	
Aug 4 2021	Bhatt et al., medRxiv, doi:10.1101/2021.08.02 .21260750	Hydroxychloroquine Prophylaxis against Coronavirus Disease-19: Practice Outcomes among Health-Care Workers
	49% more cases (p=0.02). Observational study of 927 low-risk healthcare workers in India, 731 volunteering for weekly HCQ prophylaxis, showing higher cases with treatment in unadjusted results. Clinical outcome was in the protocol, however no information on which..	
Aug 4 2021	Alghamdi et al., Saudi Pharmaceutical Journal, doi:10.1016/ j.jsps.2021.08.008	Clinical characteristics and treatment outcomes of severe (ICU) COVID-19 patients in Saudi Arabia: A single centre study
	39% higher mortality (p=0.52). Retrospective 171 ICU patients in Saudi Arabia showing no significant difference for HCQ treatment in unadjusted results.	
Jul 31 2021	Barra et al., medRxiv, doi:10.1101/2021.07.30 .21261220	COVID-19 in hospitalized patients in 4 hospitals in San Isidro, Buenos Aires, Argentina
	11% lower mortality (p=1). Retrospective 668 hospitalized patients in Argentina, 18 treated with HCQ, not showing a significant difference in unadjusted results.	
Jul 29	Sobngwi et al., Cureus, doi:10.7759/ cureus.45619 (date from preprint)	Doxycycline vs Hydroxychloroquine + Azithromycin in the Management of COVID-19 Patients: An Open-Label Randomized Clinical Trial in Sub-Saharan Africa (DOXYCOV)

2021		<p>52% improved recovery ($p=0.44$) and 3% improved viral clearance ($p=0.88$). RCT 194 mild/asymptomatic low-risk patients in Cameroon, 97 treated with HCQ+AZ and 97 treated with doxycycline, showing 2.1% symptomatic patients at day 10 with HCQ+AZ, versus 4.3% with doxycycline, without statistical significance. Ther..</p>
Jul 20 2021	<p>Küçükakkaş et al., Research Square, doi:10.21203/ rs.3.rs-43812/v1</p>	<p>The effect of hydroxychloroquine against SARS-CoV-2 infection in rheumatoid arthritis patients</p>
		<p>43% higher ICU admission ($p=1$). Retrospective 17 rheumatoid arthritis COVID-19+ patients, 7 on HCQ treatment, showing no significant differences. They study reports only including hospitalized patients, but the results include non-hospitalized patients. Results do not r..</p>
Jul 16 2021	<p>Alhamlan et al., medRxiv, doi:10.1101/2021.07.13 .21260428</p>	<p>Epidemiology and Clinical Characteristics in Individuals with Confirmed SARS-CoV-2 Infection During the Early COVID-19 Pandemic in Saudi Arabia</p>
		<p>52% higher mortality ($p=0.58$). Retrospective hospitalized patients in Saudi Arabia showing higher mortality with most treatments although not reaching statistical significance. Confounding by indication, time, or other factors is likely (a 19x higher risk with lopinavi..</p>
Jul 13 2021	<p>Barrat-Due et al., Annals of Internal Medicine, doi:10.7326/ M21-0653</p>	<p>Evaluation of the Effects of Remdesivir and Hydroxychloroquine on Viral Clearance in COVID-19</p>
		<p>120% higher mortality ($p=0.35$). Small RCT in Norway with 52 HCQ and 42 remdesivir patients, showing no significant differences with treatment. Add-on trial to WHO Solidarity. NCT04321616.</p>
Jul 13 2021	<p>Tamura et al., Diabetology & Metabolic Syndrome, doi:10.1186/ s13098-021-00695-8</p>	<p>Outcome and death risk of diabetes patients with Covid-19 receiving pre-hospital and in-hospital metformin therapies</p>

		<p>299% higher mortality (p=0.04). Retrospective 188 hospitalized patients in Brazil, showing higher risk of mortality with HCQ. Relatively few patients received HCQ. The results are likely subject to confounding by indication with treatment more likely for severe cases, a..</p>
Jul 12 2021	Arabi et al., Intensive Care Medicine	Lopinavir-ritonavir and hydroxychloroquine for critically ill patients with COVID-19: REMAP-CAP randomized controlled trial
		<p>44% higher mortality (p=0.01). Very late stage RCT with 50 ICU patients treated with HCQ, 255 lopinavir-ritonavir patients, and 27 combined therapy patients, showing higher mortality with all treatments.</p>
Jul 10 2021	Roger et al., Anaesthesia Critical Care & Pain Medicine, doi:10.1016/j.accpm.2021.100931	French Multicentre Observational Study on SARS-CoV-2 infections Intensive care initial management: the FRENCH CORONA Study
		<p>no change in mortality (p=0.94). Prospective study of 966 ICU patients in France, 289 treated with HCQ, showing no significant difference with treatment. Time based confounding is likely because HCQ became increasingly controversial and less used over the time covered, w..</p>
Jul 6 2021	Jacobs et al., The Annals of Thoracic Surgery, doi:10.1016/j.athoracsur.2021.06.026	Multi-institutional Analysis of 200 COVID-19 Patients treated with ECMO:Outcomes and Trends
		<p>7% lower mortality (p=0.74). Prospective study of 200 ECMO patients showing no significant difference in unadjusted results for HCQ treatment. Time based confounding is likely because HCQ became increasingly controversial and less used over the time covered (as shown..</p>
Jul 1 2021	Shaw et al., Journal of Drugs in Dermatology, doi:10.36849/JDD.5843	COVID-19 in Individuals Treated With Long-Term Hydroxychloroquine: A Propensity Score-Matched Analysis of Cicatricial Alopecia Patients
		<p>13% fewer cases (p=0.006). PSM retrospective 144 alopecia patients in the USA, showing lower risk of COVID-19 with HCQ prophylaxis. The supplemental appendix is not available.</p>

Jun 30 2021	Granados-Montiel et al., BMJ Open, doi:10.1136/bmjopen-2020-045190	New prophylaxis regimen for SARS-CoV-2 infection in health professionals with low doses of hydroxychloroquine and bromhexine: a randomised, double-blind placebo clinical trial (ELEVATE Trial)
	Estimated 214 participant HCQ + bromhexine prophylaxis RCT with results not reported over 2 years after estimated completion.	
Jun 30 2021	Taieb et al., J. Clin. Med. 2021, doi:10.3390/jcm10132954	Hydroxychloroquine and Azithromycin Treatment of Hospitalized Patients Infected with SARS-CoV-2 in Senegal from March to October 2020
	39% higher hospital discharge (p=0.02). Retrospective 926 patients in Senegal, 674 treated with HCQ+AZ, showing significantly higher hospital discharge at day 15 with treatment.	
Jun 24 2021	Gerlovin et al., American Journal of Epidemiology, doi:10.1093/aje/kwab183	Pharmacoepidemiology, Machine Learning and COVID-19: An intent-to-treat analysis of hydroxychloroquine, with or without azithromycin, and COVID-19 outcomes amongst hospitalized US Veterans
	22% higher mortality (p=0.18) and 55% higher ventilation (p=0.02). Retrospective 1,769 hospitalized patients in the USA showing no significant differences for HCQ, and higher intubation for HCQ+AZ.	
Jun 21 2021	Yadav et al., Research Square, doi:10.21203/rs.3.rs-628277/v1	Repurposing the Combination Drug of Favipiravir, Hydroxychloroquine and Oseltamivir as a Potential Inhibitor Against SARS-CoV-2: A Computational Study
	In Silico study showing stronger inhibition of SAR-CoV-2 for HCQ+favipiravir+oseltamivir compared to any of these alone or combinations of two of these drugs.	
Jun 18	Schwartz et al., CMAJ Open, doi:10.9778/cmajo.20210069	Assessing the efficacy and safety of hydroxychloroquine as outpatient treatment of COVID-19: a randomized controlled trial

2021		<p>37% improved recovery (p=0.15). Small early terminated late treatment RCT showing no significant differences. The HCQ group was a median of 7 days from symptom onset at baseline, which may not include the delay delivering the medication. From the 4 HCQ hospitalizations,...</p>
Jun 18 2021	<p>Purwati et al., PLOS One, doi:10.1371/journal.pone.0252302</p>	<p>An in vitro study of dual drug combinations of anti-viral agents, antibiotics, and/or hydroxychloroquine against the SARS-CoV-2 virus isolated from hospitalized patients in Surabaya, Indonesia</p>
		<p>In Vitro study of combinations of drugs showing antiviral efficacy of HCQ alone and in combination with AZ, favipiravir, and doxycycline. No high levels of cytotoxicity were observed, and authors conclude that using a combination of drugs..</p>
Jun 11 2021	<p>Turrini et al., Vaccines, 10.3390/vaccines9060640</p>	<p>Clinical Course and Risk Factors for In-Hospital Mortality of 205 Patients with SARS-CoV-2 Pneumonia in Como, Lombardy Region, Italy</p>
		<p>10% lower mortality (p=0.15). Retrospective 205 patients in Italy, 160 treated with HCQ, showing lower mortality with treatment in multivariate analysis, but not reaching statistical significance.</p>
Jun 9 2021	<p>Saib et al., PLOS ONE, doi:10.1371/journal.pone.0252388</p>	<p>Lack of efficacy of hydroxychloroquine and azithromycin in patients hospitalized for COVID-19 pneumonia: A retrospective study</p>
		<p>125% higher combined mortality/intubation (p=0.23). 203 hospitalized patients in France, not showing significant differences with treatment. Confounding by indication is likely. Authors do not discuss confounding.</p>
Jun 8 2021	<p>Singh et al., medRxiv, doi:0.1101/2021.06.06.21258091</p>	<p>Safety and efficacy of antiviral therapy alone or in combination in COVID-19 - a randomized controlled trial (SEV COVID Trial)</p>
		<p>48% lower mortality (p=0.45) and 14% improved recovery (p=0.76). Very small early terminated RCT in India, showing lower mortality but without statistical significance with the very small sample size. Time since symptom onset is not provided. The recovery percentage for non-severe group B (86.7%) does ..</p>
Jun 7 2021	<p>Badyal et al., Journal of the Association of Physicians of India, 69:6, June 2021</p>	<p>Hydroxychloroquine for SARS CoV2 Prophylaxis in Healthcare Workers – A Multicentric Cohort Study Assessing Effectiveness and Safety</p>

		<p>60% fewer cases (p<0.0001). Prophylaxis study with 12,089 Indian healthcare workers, showing lower risk of COVID-19 cases with treatment, and increasingly lower risk for longer durations of HCQ prophylaxis. The appendices are not currently available.</p>
Jun 4 2021	<p>Lagier et al., Therapeutics and Clinical Risk Management, doi:10.2147/ TCRM.S364022</p>	<p>Outcomes of 2,111 COVID-19 hospitalised patients treated with 2 hydroxychloroquine/azithromycin and other regimens in Marseille, France: a 3 monocentric retrospective analysis</p>
		<p>32% lower mortality (p=0.004). Retrospective 2,011 hospitalized patients in France, median age 67, showing lower mortality with HCQ+AZ, and further benefit with the addition of zinc.</p>
Jun 4 2021	<p>Byakika-Kibwika et al., Research Square, doi:10.21203/ rs.3.rs-506195/v1</p>	<p>Safety and Efficacy of Hydroxychloroquine for Treatment of Non-Severe COVID-19 in Adults in Uganda: A Randomized Open Label Phase II Clinical Trial</p>
		<p>no change in recovery (p=0.91) and 29% improved viral clearance (p=0.47). Small 105 patient RCT in Uganda showing no significant differences. No mortality was reported. The patients were very young (median age 32), recovering in a median time of 3 days with standard of care, so there is little room for a treatm..</p>
Jun 3 2021	<p>Sivapalan et al., European Respiratory Journal, doi:10.1183/13993003. 00752-2021</p>	<p>Azithromycin and hydroxychloroquine in hospitalised patients with confirmed COVID-19—a randomised double-blinded placebo-controlled trial</p>
		<p>92% lower mortality (p=0.32), 22% higher ICU admission (p=1), and 8% lower hospital discharge (p=0.36). Early terminated late stage (8 days from onset, 59% on oxygen) RCT not showing statistically significant differences. NCT04322396 ProPAC-COVID. NNF20SA0062834.</p>
Jun 1 2021	<p>Kara et al., NCT04411433</p>	<p>Efficacy and Safety of Hydroxychloroquine and Favipiravir in the Treatment of Mild to Moderate COVID-19</p>
		<p>1,008 patient HCQ early treatment RCT with results not reported over 2 years after completion.</p>

Jun 1 2021	Chauffe et al., NCT04363450	Hydroxychloroquine as Prophylaxis for COVID-19 in Healthcare Workers (HCQPreP)
	Estimated 1,700 participant HCQ prophylaxis RCT with results not reported over 2 years after estimated completion.	
Jun 1 2021	Korkmaz et al., Authorea, doi:10.22541/ au.162257516.686654 04/v1	The effect of Hydroxychloroquine use due to rheumatic disease on the risk of Covid-19 infection and its course
	82% lower mortality (p=0.19) and 94% fewer cases (p<0.0001). Retrospective 683 patients in a rheumatology department, 384 chronic HCQ users and 299 control patients, showing no mortality for HCQ users vs. 2 deaths in the control group, and significantly fewer cases for HCQ users.	
Jun 1 2021	Kamstrup et al., International Journal of Infectious Diseases, doi:10.1016/ j.ijid.2021.05.076	Hydroxychloroquine as a primary prophylactic agent against sars-cov-2 infection: a cohort study
	44% higher hospitalization (p=0.25) and 10% fewer cases (p=0.23). Retrospective HCQ users in Denmark, not showing a significant difference, however authors do not adjust for the very different baseline risk for systemic autoimmune disease patients. Authors appear unaware of research in the area, for exa..	
May 31 2021	Ramírez-García et al., Archivos de Medicina Universitaria	Hydroxychloroquine and Tocilizumab in the Treatment of COVID-19: A Longitudinal Observational Study
	67% lower mortality (p<0.0001) and 6% higher ICU admission (p=1). Retrospective 403 hospitalized patients in Spain, showing lower mortality with treatment, however authors do not adjust for the differences between the groups. Confounding by indication is likely.	
May 31	Smith et al., medRxiv, doi:10.1101/2021.05.28 .21258012	Observational Study on 255 Mechanically Ventilated Covid Patients at the Beginning of the USA Pandemic

2021	<p>27% lower mortality (p=0.002). Retrospective 255 mechanical ventilation patients in USA, showing that weight-adjusted HCQ+AZ improved survival by over 100%. QTc prolongation did not correlate with cumulative HCQ dose or HCQ serum level. Although authors mention immorta..</p>	
May 29 2021	<p>Ali et al., Journal of Pharmaceutical Research International, doi:10.9734/jpri/2020/v32i830468</p>	<p>Optimizing the Use of Hydroxychloroquine in the Management of COVID-19 Given Its Pharmacological Profile</p> <p>Review of the mechanisms of action, pharmacokinetics and toxicity of HCQ, recommending use as early as possible with a loading dose in 3-4 divided doses to minimize toxicity, and daily maintenance divided into two doses, continued until r..</p>
May 27 2021	<p>Million et al., Reviews in Cardiovascular Medicine, doi:10.31083/j.rcm2203116 (date from preprint)</p>	<p>Early Treatment with Hydroxychloroquine and Azithromycin in 10,429 COVID-19 Outpatients: A Monocentric Retrospective Cohort Study</p> <p>83% lower mortality (p=0.0007), 44% lower ICU admission (p=0.18), and 4% lower hospitalization (p=0.77). Retrospective 10,429 outpatients in France, 8,315 treated with HCQ+AZ a median of 4 days from symptom onset, showing significantly lower mortality with treatment.</p>
May 17 2021	<p>Syed et al., Cureus, doi:10.7759/cureus.20572 (date from preprint)</p>	<p>Pre-exposure Prophylaxis With Various Doses of Hydroxychloroquine Among Healthcare Personnel With High-Risk Exposure to COVID-19: A Randomized Controlled Trial</p> <p>60% more symptomatic cases (p=0.41) and 92% more cases (p=0.12). Small PrEP RCT of low risk healthcare workers, showing no significant differences. Authors report that there was no hospitalization, ICU care, or death from COVID-19, however table 3 of the preprint shows severe events labeled as "re..</p>

May 16 2021	Rojas-Serrano et al., PLOS ONE, doi:10.1371/ journal.pone.0261980 (date from preprint)	Hydroxychloroquine for prophylaxis of COVID-19 in health workers: A randomized clinical trial
	82% fewer symptomatic cases (p=0.12). Early terminated HCQ PrEP RCT with 62 HCQ and 65 placebo patients, showing 82% lower cases with treatment, p = 0.12. If the trial is continued and the same event rate is observed, statistical significance will be reached after adding about..	
May 12 2021	Drancourt et al., Viruses, doi:10.3390/ v13050890	SARS-CoV-2 Persistent Viral Shedding in the Context of Hydroxychloroquine-Azithromycin Treatment
	Retrospective 3,737 patients in France, showing lower risk of persistent viral shedding with HCQ+AZ treatment.	
May 10 2021	Sammartino et al., PLOS One, doi:10.1371/ journal.pone.0251262	Predictors for inpatient mortality during the first wave of the SARS-CoV-2 pandemic: A retrospective analysis
	240% higher mortality (p=0.002). Retrospective 1,108 hospitalized patients in New York showing significantly higher mortality with HCQ treatment. Time based confounding is very likely because HCQ became increasingly controversial and less used over the time covered (Mar ..	
May 8 2021	Vigbedor et al., Journal of Applied Pharmaceutical Science, doi:10.7324/ JAPS.2021.110825	Review of four major biomolecular target sites for COVID-19 and possible inhibitors as treatment interventions
	Review of major target sites in SARS-CoV-2 and the host organism along with potential inhibitors.	
May 1	De Rosa et al., J. Clin. Med., doi:10.3390/ jcm10091951	Risk Factors for Mortality in COVID-19 Hospitalized Patients in Piedmont, Italy: Results from the Multicenter, Regional, CORACLE Registry

2021	<p>35% lower mortality (p=0.02). Retrospective 1,538 hospitalized patients in Italy, showing only HCQ associated with reduced mortality. Authors analyze mortality amongst those that were alive at day 7 to avoid survival time bias due to drug recording requiring a minimum..</p>	
Apr 30 2021	<p>Moraes et al., NCT04384458</p>	<p>Comparative Study of Hydroxychloroquine and Ivermectin in COVID-19 Prophylaxis</p>
	<p>Estimated 400 participant HCQ vs. ivermectin prophylaxis RCT with results not reported over 2.5 years after estimated completion.</p>	
Apr 30 2021	<p>Borrie et al., NCT04397328</p>	<p>COVID-19 PEP- High-risk Individuals in Long-term and Specialized Care - Canada</p>
	<p>Estimated 336 participant HCQ prophylaxis RCT with results not reported over 2 years after estimated completion.</p>	
Apr 30 2021	<p>James et al., NCT04352933</p>	<p>PROLIFIC Chemoprophylaxis Trial (COVID-19)</p>
	<p>Estimated 500 participant HCQ prophylaxis RCT with results not reported over 2.5 years after estimated completion. The number of patients enrolled is unknown - enrollment started May 11 and the trial was suspended based on an MHRA decisio..</p>	
Apr 30 2021	<p>Çiyiltepe et al., South. Clin. Ist. Euras., doi:10.14744/ scie.2021.89847</p>	<p>The Effect of Pre-admission Hydroxychloroquine Treatment on COVID-19-Related Intensive Care Follow-up in Geriatric Patients</p>
	<p>3% lower mortality (p=0.85). Retrospective 147 ICU patients in Turkey, showing no significant difference in outcomes based on HCQ treatment before ICU admission. This is not very informative, for example we do not know if HCQ treated patients were much less likely to..</p>	
	<p>Bosaeed et al., Infect. Dis. Ther., doi:10.1007/ s40121-021-00496-6</p>	<p>Favipiravir and Hydroxychloroquine Combination Therapy in Patients with Moderate to Severe COVID19 (FACCT Trial): An Open-Label, Multicenter, Randomized, Controlled Trial</p>

<p>Apr 30 2021</p>	<p>4% lower mortality (p=0.91), 8% higher ventilation (p=0.78), 31% higher ICU admission (p=0.24), and 29% slower recovery (p=0.29). RCT 254 very late stage (93% on oxygen, 17% in ICU at baseline) hospitalized patients in Saudi Arabia not showing significant differences with HCQ+favipiravir treatment. Only SaO2 < 94% patients were eligible, however the actual SaO2 of e..</p>	
<p>Apr 29 2021</p>	<p>Haji Aghajani et al., Journal of Medical Virology, doi:10.1002/ jmv.27053</p>	<p>Decreased in-hospital mortality associated with aspirin administration in hospitalized patients due to severe COVID-19</p> <p>19% lower mortality (p=0.09). Retrospective 991 hospitalized patients in Iran, showing lower mortality with HCQ, not reaching statistical significance.</p>
<p>Apr 29 2021</p>	<p>Aghajani et al., Journal of Medical Virology, doi:10.1002/jmv.27053</p>	<p>Decreased In-Hospital Mortality Associated with Aspirin Administration in Hospitalized Patients Due to Severe COVID-19</p> <p>19% lower mortality (p=0.09). Retrospective 991 hospitalized patients in Iran focusing on aspirin use but also showing results for HCQ, remdesivir, and favipiravir.</p>
<p>Apr 28 2021</p>	<p>Kokturk et al., Respiratory Medicine, doi:10.1016/ j.rmed.2021.106433</p>	<p>The predictors of COVID-19 mortality in a nationwide cohort of Turkish patients</p> <p>4% higher mortality (p=0.97). Retrospective 1,500 hospitalized late stage (median SaO2 87.7) patients in Turkey, showing no significant difference with HCQ treatment.</p>
<p>Apr 27 2021</p>	<p>Réa-Neto et al., Scientific Reports, doi:10.1038/ s41598-021-88509-9</p>	<p>An open-label randomized controlled trial evaluating the efficacy of chloroquine/hydroxychloroquine in severe COVID-19 patients</p> <p>57% higher mortality (p=0.2), 115% higher ventilation (p=0.03), and 147% worse recovery (p=0.02). Early terminated very late stage (99% on oxygen, 81% in ICU, 18% on mechanical ventilation at baseline) RCT with 24 CQ patients, 29 HCQ, and 52 control patients, showing worse clinical outcomes with treatment. NCT04420247.</p>

Apr 26 2021	Mohandas et al.,	Clinical review of COVID-19 patients presenting to a quaternary care private hospital in South India: A retrospective study
	81% higher mortality (p=0.007). Retrospective 3,345 hospitalized patients in India, 11.5% treated with HCQ, showing unadjusted higher mortality with treatment. Confounding by indication and time based confounding (due to declining use over the period when overall treatm..	
Apr 24 2021	Corradini et al., Internal and Emergency Medicine, doi:10.1007/s11739-021-02742-8	Clinical factors associated with death in 3044 COVID-19 patients managed in internal medicine wards in Italy: results from the SIMI-COVID-19 study of the Italian Society of Internal Medicine (SIMI)
	70% lower mortality (p<0.0001). Retrospective 3,044 hospitalized COVID-19 patients in Italy, showing HCQ significantly associated with survival in light, mild, and moderate cases in multivariable analysis, but not in severe cases.	
Apr 23 2021	Toya et al., SSRN	A Cross-Country Analysis of the Determinants of COVID-19 Fatalities
	Country based analysis finding lower mortality with the use of HCQ.	
Apr 22 2021	Reis et al., JAMA Network Open, doi:10.1001/jamanetworkopen.2021.6468	Effect of Early Treatment With Hydroxychloroquine or Lopinavir and Ritonavir on Risk of Hospitalization Among Patients With COVID-19 The TOGETHER Randomized Clinical Trial
	24% lower hospitalization (p=0.57) and 4% improved viral clearance (p=0.1). Early terminated RCT in Brazil showing lower mortality and hospitalization with HCQ, but not reaching statistical significance. Although the title includes "early treatment", treatment was relatively late, with most patients bei..	
Apr 15 2021	Alzahrani et al., Rheumatology International, doi:10.1007/s00296-021-04857-9	Clinical characteristics and outcome of COVID-19 in patients with rheumatic diseases
	59% lower mortality (p=1), 81% lower ventilation (p=0.54), and 33% lower severe cases (p=0.7). Retrospective 47 rheumatic disease patients not finding significant differences with HCQ.	

<p>Apr 15 2021</p>	<p>Alegiani et al., Rheumatology, doi:10.1093/ rheumatology/keab348</p>	<p>Risk of COVID-19 hospitalization and mortality in rheumatic patients treated with hydroxychloroquine or other conventional DMARDs in Italy</p>
<p>8% higher mortality (p=0.64) and 18% lower hospitalization (p=0.03). Retrospective database analysis case control study of rheumatic patients. When compared with other cDMARDs, HCQ users had significantly lower hospitalization, however there was no significant difference in mortality. Results differ signif..</p>		
<p>Apr 14 2021</p>	<p>Seet et al., International Journal of Infectious Diseases, doi:10.1016/ j.ijid.2021.04.035</p>	<p>Positive impact of oral hydroxychloroquine and povidone-iodine throat spray for COVID-19 prophylaxis: an open-label randomized trial</p>
<p>35% fewer symptomatic cases (p=0.05) and 32% fewer cases (p=0.009). Prophylaxis RCT in Singapore with 3,037 low risk patients, showing lower serious cases, lower symptomatic cases, and lower confirmed cases of COVID-19 with all treatments (ivermectin, HCQ, PVP-I, and Zinc + vitamin C) compared to vitamin ..</p>		
<p>Apr 8 2021</p>	<p>Gadhiya et al., BMJ Open, doi:10.1136/ bmjopen-2020-042549</p>	<p>Clinical characteristics of hospitalised patients with COVID-19 and the impact on mortality: a single-network, retrospective cohort study from Pennsylvania state</p>
<p>5% higher mortality (p=0.89). Retrospective 283 patients in the USA showing higher mortality with all treatments (not statistically significant). Confounding by indication is likely. In the supplementary appendix, authors note that the treatments were usually given fo..</p>		
<p>Apr 7 2021</p>	<p>Mulhem et al., BMJ Open, doi:10.1136/ bmjopen-2020-042042</p>	<p>3219 hospitalised patients with COVID-19 in Southeast Michigan: a retrospective case cohort study</p>
<p>28% higher mortality (p=0.1). Retrospective database analysis of 3,219 hospitalized patients in the USA. Very different results in the time period analysis (Table S2), and results significantly different to other studies for the same medications (e.g., heparin OR 3.06..</p>		

Apr 6 2021	Mokhtari et al., International Immunopharmacology, doi:10.1016/ j.intimp.2021.107636	Clinical outcomes of patients with mild COVID-19 following treatment with hydroxychloroquine in an outpatient setting
	70% lower mortality (p<0.0001) and 35% lower hospitalization (p<0.0001). Retrospective 28,759 adult outpatients with mild COVID-19 in Iran, 7,295 treated with HCQ, showing significantly lower hospitalization and mortality with treatment.	
Apr 5 2021	Edington et al., European Journal of Internal Medicine, doi:10.1016/ j.ejim.2021.03.028	Safety of treatment with chloroquine and hydroxychloroquine: A ten-year systematic review and meta-analysis
	Safety analysis of CQ and HCQ covering 46 RCTs with 23,132 patients, showing no mortality attributed to CQ/ HCQ. Authors conclude that the data reinforces that CQ and HCQ have a good safety profile though caution is advised when using high..	
Apr 1 2021	Morales-Asencio et al., NCT04400019	Prevention of COVID19 Infection in Nursing Homes by Chemoprophylaxis With Hydroxychloroquine
	Estimated 1,930 participant HCQ prophylaxis nursing home RCT with results not reported over 2.5 years after estimated completion.	
Mar 31 2021	Alghamdi et al., Antibiotics, doi:10.3390/ antibiotics10040365	Clinical Efficacy of Hydroxychloroquine in Patients with COVID-19: Findings from an Observational Comparative Study in Saudi Arabia
	7% higher mortality (p=0.88). Retrospective 775 hospitalized patients in Saudi Arabia showing no significant difference. There was no adjustment for severity or comorbidities. Confounding by indication is likely.	
Mar 26 2021	Faruqui et al., Indian J. Med. Res., doi:10.4103/ ijmr.IJMR_2294_20	Safety of hydroxychloroquine in healthcare workers for COVID-19 prophylaxis

		Retrospective 1303 health care workers finding that HCQ prophylaxis was well tolerated. 20% reported an adverse event, mostly gastrointestinal. 1.5% received treatment for adverse effects, with none requiring hospitalization.
Mar 24 2021	Dev et al., Transactions of The Royal Society of Tropical Medicine and Hygiene, doi:10.1093/trstmh/tra047	Risk factors and frequency of COVID-19 among healthcare workers at a tertiary care centre in India: a case-control study
		26% fewer cases (p=0.003). Retrospective case control study of 3,100 healthcare workers in India showing lower cases with HCQ prophylaxis, and an inverse association between the number of HCQ doses taken and the risk of COVID-19 cases. Low risk population with no m..
Mar 23 2021	Barry et al., International Journal of Infectious Diseases, doi:10.1016/j.ijid.2021.03.058	Clinical Characteristics and Outcomes of Hospitalized COVID-19 Patients in a MERS-CoV Referral Hospital during the Peak of the Pandemic
		99% lower mortality (p=0.6). 605 hospitalized patients in Saudi Arabia showing no mortality with HCQ (only 6 patients received HCQ).
Mar 17 2021	Stewart et al., PLoS ONE, doi:10.1371/journal.pone.0248128	COVID-19 Evidence Accelerator: A parallel analysis to describe the use of Hydroxychloroquine with or without Azithromycin among hospitalized COVID-19 patients
		18% higher mortality (p=0.27) and 29% higher ventilation (p=0.09). Collection of seven retrospective database analyses in the USA, showing higher mortality with treatment (not statistically significant). Results contradict strong evidence from the RECOVERY/SOLIDARITY trials, suggesting substantial confou..
Mar 17 2021	Dang et al., bioRxiv, doi:10.1101/2021.03.16.435741	Structural basis of anti-SARS-CoV-2 activity of hydroxychloroquine: specific binding to NTD/CTD and disruption of LLPS of N protein
		Microscopy/spectroscopy study showing that HCQ binds to both N-terminal domain and C-terminal domain of SARS-CoV-2 nucleocapsid protein to inhibit their interactions with nucleic acids and disrupt NA-induced liquid-liquid phase separation..

Mar 12 2021	Roy et al., medRxiv, doi:10.1101/2021.03.08 .21252883	Outcome of Different Therapeutic Interventions in Mild COVID-19 Patients in a Single OPD Clinic of West Bengal: A Retrospective study
	2% faster recovery (p=0.96). Retrospective database analysis of 56 mild COVID-19 patients, all treated with vitamin C, vitamin D, and zinc, comparing ivermectin + doxycycline (n=14), AZ (n=13), HCQ (n=14), and SOC (n=15), finding that all groups recover quickly, and ..	
Mar 9 2021	Vivanco-Hidalgo et al., Eurosurveillance, doi:/ 10.2807/1560-7917.ES .2021.26.9.2001202	Incidence of COVID-19 in patients exposed to chloroquine and hydroxychloroquine: results from a population-based prospective cohort in Catalonia, Spain, 2020
	46% higher hospitalization (p=0.1) and 8% more cases (p=0.5). Retrospective database analysis of chronic HCQ users and matched control patients, failing to match or adjust for the very different baseline risk for systemic autoimmune disease patients. Other research shows that the risk of COVID-19 fo..	
Mar 8 2021	Martin-Vicente et al., medRxiv, doi:10.1101/2021.03.08 .21253121	Absent or insufficient anti-SARS-CoV-2 S antibodies at ICU admission are associated to higher viral loads in plasma, antigenemia and mortality in COVID-19 patients
	59% lower mortality (p=0.41). Retrospective 92 ICU patients with almost all treated with HCQ and only one non-HCQ treated patient that died, showing unadjusted non-statistically significant lower mortality with treatment.	
Mar 4 2021	Salvador et al., Cureus, doi:10.7759/ cureus.13687	Clinical Features and Prognostic Factors of 245 Portuguese Patients Hospitalized With COVID-19
	33% lower mortality (p=0.1), 448% higher ventilation (p=0.003), and 17% lower combined mortality/intubation (p=0.21). Prospective study of 245 hospitalized patients, 121 treated with HCQ, showing lower (non-statistically significant) mortality and higher ventilation at 30 days. Confounding by indication is likely.	

Mar 3 2021	Rubio-Sánchez et al., Advances in Laboratory Medicine / Avances en Medicina de Laboratorio, doi:10.1515/ almed-2021-0017	Prognostic factors for the severity of SARS-CoV-2 infection
	40% lower severe cases (p=0.02). Retrospective 197 hospitalized COVID-19 patients in Spain, showing lower progression to pneumonia with HCQ in unadjusted results.	
Mar 2 2021	Pham et al., Rheumatology Advances in Practice, 10.1093/rap/rkab014	Failure of chronic hydroxychloroquine in preventing severe complications of COVID-19 in patients with rheumatic diseases
	20% lower mortality (p=0.77) and 35% higher ICU admission (p=0.61). Tiny retrospective database analysis of hospitalized COVID-19 patients with rheumatologic disease containing 14 chronic HCQ and 28 control patients. Patients are very poorly matched. Bias against HCQ is clear in the abstract which mention..	
Feb 28 2021	Thakar et al., Indian J. Med. Res., doi:10.4103/ ijmr.IJMR_3665_20	Chloroquine nasal drops in asymptomatic & mild COVID-19: An exploratory randomized clinical trial
	Small RCT for CQ nasal drops suggesting efficacy in preventing infection, while no significant difference was seen for patients that already had mild COVID-19.	
Feb 28 2021	Bhandari et al., International Journal of Medicine and Public Health, doi:10.5530/ ijmedph.2021.1.4	A Preventive Study on Hydroxychloroquine Prophylaxis against COVID-19 in Health Care Workers at a Tertiary Care Center in North India
	Retrospective 4,239 healthcare workers using HCQ prophylaxis showing no mortality, 8 mild symptomatic cases, and 85 asymptomatic cases, with the cases occurring mostly in the first week.	

Feb 27 2021	Shang et al., <i>Virology Journal</i> , doi:10.1186/s12985-021-01515-1	Inhibitors of endosomal acidification suppress SARS-CoV-2 replication and relieve viral pneumonia in hACE2 transgenic mice
	In Vitro study showing that endosomal acidification inhibitors including chloroquine reduce SARS-CoV-2 replication in Vero E6, Huh-7, and 293T-ACE2 cells.	
Feb 26 2021	Mordmüller et al., NCT04342221	Hydroxychloroquine for COVID-19 (COV-HCQ)
	30 patient HCQ late treatment RCT with results not reported over 2.5 years after completion.	
Feb 26 2021	Amaravadi et al., medRxiv, doi:10.1101/2021.02.22.21252228	Hydroxychloroquine for SARS-CoV-2 positive patients quarantined at home: The first interim analysis of a remotely conducted randomized clinical trial
	60% improved recovery (p=0.13). Tiny early-terminated 34 patient RCT for outpatient treatment showing faster recovery with treatment (not statistically significant). All patients recovered (3 control patients recovered after crossover to the treatment arm) - as per prot..	
Feb 26 2021	Tanriverdi et al., Turkish Journal of Medical Sciences, doi:doi:10.3906/sag-2005-82	Hydroxychloroquine plus azithromycin and early hospital admission are beneficial in COVID-19 patients: Turkish experience with real-life data
	Retrospective 83 hospitalized patients in Turkey confirming that earlier treatment is better, and showing that the addition of AZ to HCQ reduced hospitalization time.	
Feb 26 2021	Giraud-Gatineau et al., Research Square, doi:rs.3.rs-251817/v1	The Need for Early Management in Patients With COVID-19
	Review of early treatment of COVID-19 at IHU Méditerranée Infection in France, including HCQ+AZ treatment, comparing outcomes to those for all of France. Age-standardized mortality was lower with early treatment for all periods of the epi..	

Feb 23 2021	Beltran Gonzalez et al., Infectious Disease Reports, doi:10.3390/ idr14020020 (date from preprint)	Efficacy and Safety of Ivermectin and Hydroxychloroquine in Patients with Severe COVID-19: A Randomized Controlled Trial
63% lower mortality (p=0.27) and 25% lower progression (p=0.57). RCT late stage severe condition (93% SOFA ≥ 2, 96% APACHE ≥ 8) high comorbidity hospitalized patients in Mexico with 33 HCQ and 37 control patients not finding significant differences. NCT04391127.		
Feb 20 2021	Bae et al., Viruses 2021, doi:10.3390/ v13020329	Recent Hydroxychloroquine Use Is Not Significantly Associated with Positive PCR Results for SARS-CoV-2: A Nationwide Observational Study in South Korea
30% fewer cases (p=0.18). Retrospective database analysis of prior HCQ usage in South Korea, showing non-statistically significantly lower mortality and cases with treatment.		
Feb 19 2021	Lamback et al., The Brazilian Journal of Infectious Diseases, doi:10.1016/ j.bjid.2021.101549	Hydroxychloroquine with azithromycin in patients hospitalized for mild and moderate COVID-19
9% lower mortality (p=0.83), 20% higher ICU admission (p=0.61), and 12% shorter hospitalization. Retrospective 193 hospitalized patients in Brazil not finding a significant difference with HCQ. The control group was composed of patients refusing HCQ or with contraindications. Time based confounding is very likely because HCQ became m..		
Feb 18 2021	Awad et al., American Journal of Health- System Pharmacy, doi:10.1093/ajhp/ zxab056	Impact of hydroxychloroquine on disease progression and ICU admissions in patients with SARS-CoV-2 infection

			<p>19% higher mortality (p=0.6), 461% higher ventilation (p<0.0001), and 463% higher ICU admission (p<0.0001).</p> <p>This paper has inconsistent values - the number of treatment and control patients differs in the text and Table 1, we have used treatment 188 and control 148. Retrospective 336 hospitalized patients in the USA showing higher mortality, IC..</p>
Feb 16 2021	Gül et al., NCT04981379	Clinical Trial For Early SARS-CoV-2 (COVID-19) Treatment	1,120 patient HCQ early treatment RCT with results not reported over 2.5 years after completion.
Feb 15 2021	Mahto et al., American Journal of Blood Research, 11:1	Seroprevalence of IgG against SARS-CoV-2 and its determinants among healthcare workers of a COVID-19 dedicated hospital of India	27% lower IgG positivity (p=0.38). Retrospective 689 healthcare workers in India, showing no significant difference in IgG positivity with HCQ prophylaxis in unadjusted results.
Feb 11 2021	Lora-Tamayo et al., J. Infection, doi:10.1016/ j.jinf.2021.02.011	Early Lopinavir/ritonavir does not reduce mortality in COVID-19 patients: results of a large multicenter study	50% lower mortality (p<0.0001). Lopinavir/ritonavir retrospective study also showing univariate results for HCQ, with significantly lower mortality.
Feb 10 2021	Desai et al., J. Clinical Medicine, doi:10.3390/ jcm10040686	The Use of Antiviral Agents against SARS-CoV-2: Ineffective or Time and Age Dependent Result? A Retrospective, Observational Study among COVID-19 Older Adults	Retrospective 143 COVID-19 hospitalized patients >65yo, showing adjusted OR for antiviral treatment starting within 6 days of 0.44 [0.2-0.9], p = 0.02, compared to treatment started later.
Feb 9 2021	Lounnas e al., Archives of Microbiology & Immunology, doi:	Revisiting a Meta-analysis Shows that Hydroxychloroquine with Azithromycin may be Efficient in Covid-19 patients	Analysis of the Fiolet meta analysis and correction of bias evaluation, showing HCQ RR 0.45 [0.31-0.59], and HCQ+AZ RR 0.34 [0.06-0.61].

<p>Feb 9 2021</p>	<p>Purwati et al., Biochemistry Research International, doi:10.1155/2021/6685 921</p>	<p>A Randomized, Double-Blind, Multicenter Clinical Study Comparing the Efficacy and Safety of a Drug Combination of Lopinavir/Ritonavir-Azithromycin, Lopinavir/Ritonavir-Doxycycline, and Azithromycin-Hydroxychloroquine for Patients Diagnosed with Mild to Moderate COVID-19 Infections</p>
<p>66% improved viral clearance (p<0.0001). RCT 754 patients comparing HCQ+AZ along with other treatment groups using lopinavir/ritonavir and doxycycline to a control group taking AZ, finding significantly faster viral clearance with all treatment groups. (The labels in Figure 2 ap..</p>		
<p>Feb 5 2021</p>	<p>Fitzgerald et al., medRxiv, doi:10.1101/2021.02.03 .21251069</p>	<p>Risk Factors for Infection and Health Impacts of the COVID-19 Pandemic in People with Autoimmune Diseases</p>
<p>9% fewer cases (p=0.54). Retrospective 4666 people with autoimmune or inflammatory conditions, showing HCQ adjusted risk of COVID-19 OR 0.91 [0.68-1.23]. Results are not adjusted for the significantly different risk of COVID-19 depending on the type and severity ..</p>		
<p>Feb 5 2021</p>	<p>Hernandez-Cardenas et al., medRxiv, doi:10.1101/2021.02.01 .21250371</p>	<p>Hydroxychloroquine for the treatment of severe respiratory infection by COVID-19: a randomized controlled trial</p>
<p>12% lower mortality (p=0.66). Very late stage RCT with 214 patients, mean SpO2 65%, 162 on mechanical ventilation, showing no significant difference in mortality. Patients not intubated at baseline show greater improvement, HR 0.43 [0.09-2.03]. Table 4 shows different..</p>		
<p>Feb 5 2021</p>	<p>Ouedraogo et al., Revue des Maladies Respiratoires, doi:10.1016/ j.rmr.2021.02.001</p>	<p>Factors associated with the occurrence of acute respiratory distress and death in patients with COVID-19 in Burkina Faso</p>
<p>33% lower mortality (p=0.38) and 68% lower severe cases (p=0.001). Retrospective 456 patients in Burkina Faso showing lower risk of ARDS (p=0.001) and mortality (p=0.38) with HCQ.</p>		

Feb 1 2021	Alexander et al., medRxiv, doi:10.1101/2021.01.28 .21250706	Early Multidrug Outpatient Treatment of SARS-CoV-2 Infection (COVID-19) and Reduced Mortality Among Nursing Home Residents
	Review of studies on treatment of COVID-19 for nursing home residents, concluding that there is a large >60% mortality risk reduction associated with multidrug treatment using two or more intracellular anti-infectives (HCQ and either AZM ..	
Feb 1 2021	Ubaldo et al., Critical Care Research and Practice, 10.1155/2021/7510306	COVID-19: A Single-Center ICU Experience of the First Wave in the Philippines
	18% lower mortality (p=0.64). Retrospective ICU patients in the Philippines showing unadjusted HCQ RR 0.82, p = 0.64.	
Jan 31 2021	Abu-Helalah et al., NCT04597775	Chemoprevention Clinical Trial of COVID-19: Hydroxychloroquine Post Exposure Prophylaxis (APCC-19)
	Estimated 93 participant HCQ prophylaxis RCT with results not reported over 2.5 years after estimated completion.	
Jan 31 2021	Naderi et al., Immunopathologia Persa, doi:10.34172/ ipp.2021.29	Prophylactic effects of hydroxychloroquine on the incidence of COVID-19 in patients with rheumatic arthritis: an observational cohort study
	Prospective observational study of 215 RA patients treated with HCQ showing 9 cases, 1 hospitalization (without ICU/intubation), and no mortality.	
Jan 31 2021	Roig et al., Revista Espanola de Quimioterapia, doi:10.37201/req/ 130.2020	Clinical and pharmacological data in COVID-19 hospitalized nonagenarian patients

		<p>16% lower mortality (p=0.76). Retrospective 79 hospitalized nonagenarian patients showing unadjusted HCQ mortality RR 0.84, p = 0.76.</p>
Jan 29 2021	<p>Di Castelnuovo et al., Journal of Healthcare Engineering, doi:10.1155/2021/5556 207 (date from preprint)</p>	<p>Disentangling the Association of Hydroxychloroquine Treatment with Mortality in Covid-19 Hospitalized Patients through Hierarchical Clustering</p>
		<p>40% lower mortality (p<0.0001). Retrospective 4,396 hospitalized patients in Italy showing significantly lower mortality with HCQ treatment, and identifying greater efficacy for a subgroup of patients in clustering analysis.</p>
Jan 27 2021	<p>Strangfeld et al., Annals of the Rheumatic Diseases, doi:10.1136/ annrheumdis-2020-219 498</p>	<p>Factors associated with COVID-19-related death in people with rheumatic diseases: results from the COVID-19 Global Rheumatology Alliance physician-reported registry</p>
		<p>48% lower mortality (p<0.0001). Retrospective 3,729 rheumatic disease patients showing lower risk of mortality with HCQ/CQ use (HCQ/CQ vs. no DMARD therapy).</p>
Jan 27 2021	<p>Trefond et al., Revue du Rhumatisme, doi:10.1016/ j.rhum.2021.09.004 (date from preprint)</p>	<p>Effet d'un traitement par hydroxychloroquine prescrit comme traitement de fond de rhumatismes inflammatoires chroniques ou maladies auto-immunes systémiques sur les tests diagnostiques et l'évolution de l'infection à SARS CoV-2: étude de 871 patients</p>
		<p>17% higher mortality (p=0.8), 78% higher combined mortality/ICU admission (p=0.21), and 45% higher hospitalization (p=0.12). Retrospective 71 chronic HCQ patients compared with 191 matched controls, analyzing only those with a highly suspected or confirmed diagnosis of COVID-19. No significant difference was found in outcomes, however matching failed with extre..</p>

Jan 26 2021	Eftekhari et al., medRxiv, doi:10.1101/2021.01.16 .21249941	Hydroxychloroquine and azithromycin: As a double edge sword for COVID-19?
	Retrospective 172 hospitalized patients, 83% treated and HCQ+AZ and 17% with HCQ, not finding a significant difference in QTc prolongation, but recommending careful monitoring for the use of HCQ+AZ; especially in males, patients with high..	
Jan 25 2021	Dabbous et al., Archives of Virology, doi:10.1007/ s00705-021-04956-9	Efficacy of favipiravir in COVID-19 treatment: a multi-center randomized study
	This study was retracted.	
Jan 25 2021	Hussein et al., Journal of Molecular Structure, doi:10.1016/ j.molstruc.2021.129979	Molecular Docking Identification for the efficacy of Some Zinc Complexes with Chloroquine and Hydroxychloroquine against Main Protease of COVID-19
	Molecular dynamics analysis recommending Zn (CQ) Cl ₂ (H ₂ O) and Zn (HCQ) Cl ₂ (H ₂ O) as potential inhibitors for COVID-19 Mpro. Zn (HCQ) Cl ₂ (H ₂ O) exhibited a strong binding to the main protease receptor, forming eight hydrogen bonds.	
Jan 24 2021	Zelenko, Z., Preprint	Nebulized Hydroxychloroquine for COVID-19 Treatment: 80x Improvement in Breathing
	Report on the use of nebulized HCQ showing much more rapid improvement compared to tablets, with 95% of patients experiencing improved breathing within 1 hour. Author notes that the effectiveness of HCQ is time and dose dependent, with a ..	
Jan 23 2021	Cifuentes et al., Medicina Clínica (English Edition), doi:10.1016/ j.medcle.2020.10.012	Incidence of COVID-19 in patients under chronic treatment with hydroxychloroquine

	Retrospective 3,817 chronic HCQ patients showing 4.4% COVID-19 positive rate, 1.3% severe. There is no comparison with a control group. Authors note that there was a 3.6% incidence among 2,032,863 patients in one of the regions (Castilla ..	
Jan 18 2021	Li et al., Science China Life Sciences, doi:10.1007/s11427-020-1871-4	Evaluation of the efficacy and safety of hydroxychloroquine in comparison with chloroquine in moderate and severe patients with COVID-19
	50% higher hospital discharge (p=0.09). Small RCT comparing HCQ and CQ in China with 88 very late stage (17.6 days from onset to hospitalization and ~10 days to randomization) patients. The primary clinical outcomes (TTCR and TTCl) were not significantly different. Authors note..	
Jan 13 2021	Khoubnasabjafari et al., Postgraduate Medical Journal, doi:10.1136/postgradmedj-2020-139561	Prevalence of COVID-19 in patients with rheumatoid arthritis (RA) already treated with hydroxychloroquine (HCQ) compared with HCQ-naive patients with RA: a multicentre cross-sectional study
	17% fewer cases (p=0.59). Survey analysis of 1,858 RA patients in Iran, showing no significant difference in cases with HCQ prophylaxis.	
Jan 12 2021	Li et al., Research Square, doi:10.21203/rs.3.rs-119202/v1	Treatment of COVID-19 patients with hydroxychloroquine or chloroquine: A retrospective analysis
	40% slower viral clearance (p=0.06). Small retrospective database analysis of 37 late stage patients hospitalized in an intensive care center in China, not finding a significant difference in viral shedding. Patients were all in serious condition. There was only one death ho..	
Jan 10 2021	Rangel et al., Journal of the American Academy of Dermatology, doi:10.1016/j.jaad.2020.10.098	Chronic Hydroxychloroquine Therapy and COVID-19 Outcomes: A Retrospective Case-Control Analysis

		<p>25% lower mortality (p=0.77) and 22% lower hospitalization (p=0.29). Retrospective 50 COVID-19 patients that take chronic HCQ, compared to a matched sample of patients not taking chronic HCQ, showing lower mortality and ICU admission, and shorter hospitalization for HCQ patients, but not statistically sign..</p>
Jan 8 2021	<p>Yegerov et al., medRxiv, doi:10.1101/2021.01.06 .20249091</p>	<p>Epidemiological and Clinical Characteristics, and Virologic Features of COVID-19 Patients in Kazakhstan: a Nation-Wide, Retrospective, Cohort Study</p>
		<p>95% lower mortality (p=1). Retrospective 1,072 hospitalized patients in Kazakhstan showing no mortality for HCQ treated patients, however only 23 patients received treatment - this result is not statistically significant.</p>
Jan 7 2021	<p>Bailyda et al., Journal of Molecular Structure, doi:10.1016/ j.molstruc.2021.129891</p>	<p>Inhibitory capacity of Chloroquine against SARS-COV-2 by effective binding with Angiotensin converting enzyme-2 receptor: An insight from molecular docking and MD-simulation studies</p>
		<p>Molecular docking study of 16 drugs showing CQ had the highest binding affinity with ACE2, and molecular dynamics study of the docked CQ-ACE2 structure. Authors conclude that CQ binds reasonably strongly with ACE2 and the stable ACE2-CQ m..</p>
Jan 6 2021	<p>Noureddine et al., Journal of King Saud University - Science, doi:10.1016/ j.jksus.2020.101334</p>	<p>Quantum chemical studies on molecular structure, AIM, ELF, RDG and antiviral activities of hybrid hydroxychloroquine in the treatment of COVID-19: molecular docking and DFT calculations</p>
		<p>In silico analysis of hydroxychloroquine and hydroxychloroquine sulfate predicting that hydroxychloroquine sulfate is more stable and effective for COVID-19.</p>
Jan 4 2021	<p>Gautret et al., International Journal of Antimicrobial Agents, doi:10.1016/ j.ijantimicag.2020.1062 36</p>	<p>Safety profile of hydroxychloroquine and azithromycin combined treatment in COVID-19 patients</p>

	Report on the safety of HCQ+AZ with 3,737 COVID-19 patients. 138 had contraindications and treatment was discontinued in 12 cases due to QTc prolongation. There were no cases of torsade de pointe or sudden death.	
Jan 2 2021	Sarfaraz et al., medRxiv, doi:10.1101/2020.12.28 .20248920	Determinants of in-hospital mortality in COVID-19; a prospective cohort study from Pakistan
	45% higher mortality (p=0.07). Retrospective 186 hospitalized patients in Pakistan showing unadjusted HCQ mortality RR 1.45, p = 0.07. Confounding by indication is likely.	
Jan 1 2021	Lotfy et al., Turk. Thorac. J., doi:10.5152/ TurkThoracJ.2021.201 80	Use of Hydroxychloroquine in Patients with COVID-19: A Retrospective Observational Study
	25% higher mortality (p=0.76), 41% higher ventilation (p=0.34), and 17% higher ICU admission (p=0.53). Retrospective 202 patients in Saudi Arabia not showing significant differences with treatment. No information is provided on how patients were selected for treatment, there may be significant confounding by indication. Time varying confou..	
Jan 1 2021	Sands et al., International Journal of Infectious Diseases, doi:/10.1016/ j.ijid.2020.12.060	No clinical benefit in mortality associated with hydroxychloroquine treatment in patients with COVID-19
	70% higher mortality (p=0.01). Retrospective database analysis of 1,669 patients in the US showing OR 1.81, p = 0.01. Confounding by indication is likely. COVID-19 was determined via PCR+ results, therefore authors include patients asymptomatic for COVID-19, but in th..	
Dec 31 2020	Okasha et al., NCT04361318	Hydroxychloroquine and Nitazoxanide Combination Therapy for COVID-19
	Estimated 100 patient HCQ early treatment RCT with results not reported over 2.5 years after estimated completion.	

Dec 31 2020	Mahale et al., Indian Journal of Critical Care Medicine, doi:10.5005/ jp- journals-10071-23599	A Retrospective Observational Study of Hypoxic COVID-19 Patients Treated with Immunomodulatory Drugs in a Tertiary Care Hospital
	29% lower mortality (p=0.36). Retrospective 134 hospitalized COVID-19 patients in India, showing no significant difference with HCQ treatment in unadjusted results.	
Dec 31 2020	Matada et al., Bioorganic & Medicinal Chemistry, doi:10.1016/ j.bmc.2020.115973	A comprehensive review on the biological interest of quinoline and its derivatives
	Review of quinolone and derivatives, natural and drug sources, and biological activity.	
Dec 31 2020	Pseudos et al., Open Forum Infectious Diseases, doi:10.1093/ ofid/ofaa439.721	Corona Virus Disease-19 (COVID-19) in a Veterans Affairs Hospital at Suffolk County, Long Island, New York
	63% higher mortality (p=0.52). Retrospective 67 hospitalized patients in the USA showing non-statistically significant unadjusted increased mortality with HCQ. Confounding by indication is likely. Time varying confounding is likely. HCQ became controversial and was sus..	
Dec 31 2020	Texeira et al., Open Forum Infectious Diseases, doi:10.1093/ ofid/ofaa439.560	Characteristics and outcomes of COVID-19 patients admitted to a regional health system in the southeast
	79% higher mortality (p=0.1). Retrospective 161 hospitalized patients in the USA showing non-statistically significant unadjusted increased mortality with HCQ. Confounding by indication is likely. Time varying confounding is likely. HCQ became controversial and was su..	

Dec 31 2020	Vernaz et al., Swiss Medical Weekly, doi:10.4414/ smw.2020.20446	Early experimental COVID-19 therapies: associations with length of hospital stay, mortality and related costs
	15% lower mortality (p=0.71) and 49% longer hospitalization (p=0.002). Retrospective 840 hospitalized patients in Switzerland showing non-statistically significant lower mortality with HCQ but significantly longer hospitalization times. Confounding by indication is likely. PSM fails to adjust for severity wi..	
Dec 30 2020	McCullough et al., Reviews in Cardiovascular Medicine, doi:10.31083/ j.rcm.2020.04.264	Multifaceted highly targeted sequential multidrug treatment of early ambulatory high-risk SARS-CoV-2 infection (COVID-19)
	Review urging early treatment of COVID-19 with sequential multidrug treatment that has been shown to be safe and effective. Proposed treatment includes zinc, vitamin D & C, quercetin, and depending on age, comorbidities, and symptoms may ..	
Dec 30 2020	Procter et al., Reviews in Cardiovascular Medicine, doi:10.31083/ j.rcm.2020.04.260	Clinical outcomes after early ambulatory multidrug therapy for high-risk SARS-CoV-2 (COVID-19) infection
	Retrospective 922 outpatients, with 320 treated early due to age>50 or comorbidities, showing 2.2% hospitalization and 0.3% death, which authors note is considerably lower than reported in other studies in their region. At least two of zi..	
Dec 29 2020	Güner et al., Journal of Infection and Public Health, doi:10.1016/ j.jiph.2020.12.017	Comparing ICU Admission Rates of Mild/Moderate COVID-19 Patients Treated with Hydroxychloroquine, Favipiravir, and Hydroxychloroquine plus Favipiravir
	77% lower ICU admission (p=0.16). Retrospective 824 hospitalized patients in Turkey showing lower ICU admission for HCQ vs. favipiravir.	

Dec 28 2020	Cordtz et al., Rheumatology, doi:10.1093/ rheumatology/keaa897	Incidence and severeness of COVID-19 hospitalisation in patients with inflammatory rheumatic disease: a nationwide cohort study from Denmark
	Retrospective 58,052 rheumatic disease patients in Denmark showing that RA patients have a higher risk of COVID-19 hospitalization in general. HCQ treated patients show lower risk, although this is not statistically significant with only ..	
Dec 24 2020	Chari et al., Blood, doi:10.1182/ blood.2020008150	Clinical features associated with COVID-19 outcome in multiple myeloma: first results from the International Myeloma Society data set
	33% lower mortality (p=0.17). Retrospective multiple myeloma patients showing lower mortality with HCQ treatment, unadjusted RR 0.67, p = 0.17 (data is in the supplementary material).	
Dec 23 2020	Su et al., BioScience Trends, doi:10.5582/ bst.2020.03340	Efficacy of early hydroxychloroquine treatment in preventing COVID-19 pneumonia aggravation, the experience from Shanghai, China
	85% lower progression (p=0.006), 24% faster improvement (p=0.02), and 36% improved viral clearance (p=0.001). 85% lower disease progression with early use of HCQ. Retrospective 616 patients in China showing adjusted progression HR 0.15, p = 0.006.	
Dec 23 2020	Taccone et al., The Lancet Regional Health - Europe, doi:10.1016/ j.lanep.2020.100019	The role of organizational characteristics on the outcome of COVID-19 patients admitted to the ICU in Belgium
	25% lower mortality (p=0.02). Retrospective 1,747 ICU patients in Belgium showing lower mortality with HCQ, multivariate mixed effects analysis HCQ aOR 0.64 [0.45-0.92].	
Dec 22	Cangiano et al., Aging, doi:10.18632/ aging.202307	Mortality in an Italian nursing home during COVID-19 pandemic: correlation with gender, age, ADL, vitamin D supplementation, and limitations of the diagnostic tests

2020	<p>73% lower mortality (p=0.03). 73% lower mortality with HCQ. Analysis of 98 PCR+ nursing home residents in Italy, mean age 90, showing HCQ mortality RR 0.27, p = 0.03. Subject to confounding by contraindication. The paper provides the p value for regression but not the..</p>	
Dec 19 2020	<p>Huh et al., International Journal of Infectious Diseases, doi:10.1016/j.ijid.2020.12.041</p>	<p>Association of prescribed medications with the risk of COVID-19 infection and severity among adults in South Korea</p>
	<p>251% higher progression (p=0.11) and 6% fewer cases (p=0.82). Retrospective database analysis with 17 cases for existing HCQ users and 5 severe cases, showing no significant difference for cases and higher risk for severe cases. However, HCQ users are likely systemic autoimmune disease patients and ..</p>	
Dec 18 2020	<p>Matangila et al., PLoS ONE, doi:10.1371/journal.pone.0244272</p>	<p>Clinical characteristics of COVID-19 patients hospitalized at Clinique Ngaliema, a public hospital in Kinshasa, in the Democratic Republic of Congo: A retrospective cohort study</p>
	<p>55% lower mortality (p=0.21). 55% lower death with HCQ+AZ. Retrospective 160 hospitalized patients in the Democratic Republic of Congo, 92% receiving HCQ+AZ, showing adjusted OR 0.24 [0.03-2.2].</p>	
Dec 16 2020	<p>Signes-Costa et al., Archivos de Bronconeumología, doi:10.1016/j.arbres.2020.11.012</p>	<p>Prevalence and 30-day mortality in hospitalized patients with COVID-19 and prior lung diseases</p>
	<p>47% lower mortality (p=0.0005). 47% lower mortality with HCQ/CQ. Retrospective 1,271 patients with lung disease in Canada, China, Cuba, Ecuador, Germany, Italy and Spain, 83% treated with HCQ/CQ. Multivariable Cox regression HCQ/CQ mortality hazard ratio HR 0.53, p < 0...</p>	
Dec 16 2020	<p>Gönenli et al., Infectious Diseases and Clinical Microbiology, doi:10.36519/idcm.2022.111 (date from preprint)</p>	<p>Analysis of the Prophylactic use of Hydroxychloroquine at the Beginning of the COVID-19 Pandemic Among Physicians</p>

			<p>30% lower progression ($p=0.77$) and 19% more cases ($p=0.58$). Small prophylaxis survey showing lower, but not statistically significant, progression to pneumonia (3 of 148 HCQ, 12 of 416 control), RR 0.70, $p = 0.77$.</p> <p>There was a higher incidence of cases with HCQ, OR 1.19, $p = 0.58$, which may be due ..</p>
Dec 14 2020	De Luna et al., medRxiv, doi:10.1101/2020.12.11 .20247437	Clinical and Demographic Characteristics of COVID-19 Patients Admitted in a Tertiary Care Hospital in the Dominican Republic	<p>105% higher mortality ($p=0.69$). Retrospective 150 patients in the Dominican Republic, 132 treated with HCQ, showing higher mortality with treatment in unadjusted results. Confounding by indication is likely.</p>
	Sofian et al., Wiener Medizinische Wochenschrift, doi:10.1007/ s10354-020-00793-8	SARS-CoV-2, a virus with many faces: a series of cases with prolonged persistence of COVID-19 symptoms	<p>Report on a series of 10 patients experiencing prolonged COVID-19 symptoms that were given HCQ 250mg bid for 5 days, with resolution of symptoms in all cases, and patients reporting they felt much better 2 days after treatment initiation.</p>
Dec 14 2020	Orioli et al., Diabetes & Metabolic Syndrome: Clinical Research & Reviews, doi:10.1016/ j.dsx.2020.12.020	Clinical characteristics and short-term prognosis of in-patients with diabetes and COVID-19: A retrospective study from an academic center in Belgium	<p>13% lower mortality ($p=1$). Small retrospective study of 73 diabetic patients in Belgium, 55 HCQ patients, showing HCQ RR 0.87, $p = 1.0$.</p>
	Naseem et al., medRxiv, doi:10.1101/2020.12.13 .20247254	Predicting mortality in SARS-COV-2 (COVID-19) positive patients in the inpatient setting using a Novel Deep Neural Network	<p>33% lower mortality ($p=0.34$). Retrospective 1,214 hospitalized patients in Pakistan, 77 HCQ patients, showing 33% lower mortality with HCQ, multivariate Cox HR 0.67, $p = 0.34$.</p>

Dec 14 2020	Tan et al., Virus Research, doi:10.1016/ j.virusres.2020.198262	A retrospective comparison of drugs against COVID-19
	35% shorter hospitalization (p=0.04). Retrospective 333 patients in China, with only 8 HCQ patients, showing shorter duration of hospitalization with HCQ.	
Dec 11 2020	Levi et al., NCT04355052	Open Label Study to Compare Efficacy, Safety and Tolerability of Hydroxychloroquine Combined With Azithromycin Compared to Hydroxychloroquine Combined With Camostat Mesylate and to "no Treatment" in SARS CoV 2 Virus (COSTA)
	Estimated 250 patient HCQ late treatment RCT with results not reported over 2.5 years after estimated completion.	
Dec 11 2020	Bielza et al., Journal of the American Medical Directors Association, doi:10.1016/ j.jamda.2020.12.003	Clinical characteristics, frailty and mortality of residents with COVID-19 in nursing homes of a region of Madrid
	22% lower mortality (p=0.09). Retrospective 630 elderly patients in Spain showing lower mortality with HCQ treatment, unadjusted relative risk RR 0.78, p = 0.09. HCQ was used more often with patients that were hospitalized (24% versus 3% use in the nursing homes). Med..	
Dec 11 2020	Sogut et al., The American Journal of Emergency Medicine, doi:10.1016/ j.ajem.2020.12.014	Safety and efficacy of hydroxychloroquine in 152 outpatients with confirmed COVID-19: A pilot observational study
	Safety study of 152 outpatients concluding that HCQ is safe for COVID-19, was well tolerated, and was not associated with a risk of ventricular arrhythmia due to drug-induced QTc interval prolongation.	
Dec 11 2020	Jung et al., Clinical Microbiology and Infection, doi:10.1016/ j.cmi.2020.12.003	Effect of hydroxychloroquine pre-exposure on infection with SARS-CoV-2 in rheumatic disease patients: A population-based cohort study

	<p>59% lower mortality (p=1) and 13% more cases (p=0.86). Retrospective cohort study of RA and SLE patients not showing a significant difference in PCR+ cases. PCR+ does not distinguish asymptomatic cases or severity. There was only one death which was in the control group. No other information ..</p>	
<p>Dec 10 2020</p>	<p>Rosenthal et al., JAMA Network Open, doi:10.1001/ jamanetworkopen.2020 .29058</p>	<p>Risk Factors Associated With In-Hospital Mortality in a US National Sample of Patients With COVID-19</p> <p>8% higher mortality (p=0.13). Retrospective database analysis of 64,781 hospitalized patients in the USA, showing lower mortality with vitamin C or vitamin D (authors do not distinguish between the two), and higher mortality with zinc and HCQ, statistically significant..</p>
<p>Dec 10 2020</p>	<p>Alqassieh et al., F1000Research, Preprint</p>	<p>Clinical characteristics and predictors of the duration of hospital stay in COVID-19 patients in Jordan</p> <p>18% shorter hospitalization (p=0.11). Prospective observational study of 131 COVID-19 patients in Jordan, showing 18% shorter hospital stay with HCQ, p = 0.11.</p>
<p>Dec 10 2020</p>	<p>Italian Council of State</p>	<p>Consiglio di Stato, sì all'uso dell'idrossiclorachina per la cura del Covid</p> <p>Consiglio di Stato ruling in Italy re-establishes the right of Italian MDs to prescribe HCQ, which was suspended after the retracted Lancet study.</p>
<p>Dec 9 2020</p>	<p>Johnston et al., EClinicalMedicine, doi:10.1016/ j.eclinm.2021.100773 (date from preprint)</p>	<p>Hydroxychloroquine with or Without Azithromycin for Treatment of Early SARS-CoV-2 Infection Among High-Risk Outpatient Adults: A Randomized Clinical Trial</p> <p>30% lower hospitalization (p=0.73), 2% improved recovery (p=0.95), and 29% faster viral clearance. Small early terminated late treatment RCT comparing vitamin C + folic acid, HCQ + folic acid, and HCQ+AZ, showing non-statistically significantly lower hospitalization with HCQ/HCQ+AZ, and faster viral clearance with HCQ. Enrollment was a..</p>

Dec 9 2020	Agusti et al., Enfermedades Infecciosas y Microbiología Clínica, doi:10.1016/ j.eimc.2020.10.023	Efficacy and safety of hydroxychloroquine in healthcare professionals with mild SARS-CoV-2 infection: prospective, non-randomized trial
	68% lower progression (p=0.21) and 32% faster viral clearance. Small trial of low dose HCQ for healthcare workers with mild SARS-CoV-2 showing 68% lower progression to pneumonia, p = 0.21, and faster, but not statistically significant viral clearance. There were no ICU admissions or deaths. Prospecti..	
Dec 9 2020	Guglielmetti et al., Journal of Infection and Public Health, doi:10.1016/ j.jiph.2020.11.012	Severe COVID-19 pneumonia in Piacenza, Italy – a cohort study of the first pandemic wave
	35% lower mortality (p=0.22). Retrospective 218 hospitalized patients in Italy showing non-statistically significant 35% lower mortality with HCQ, hazard ratio aHR 0.65 [0.33–1.30].	
Dec 7 2020	WellStar, NCT04429867	Hydroxychloroquine Use in Hospitalized Patients With COVID-19: Impact on Progression to Severe or Critical Disease
	Estimated 700 patient HCQ late treatment RCT with results not reported over 2.5 years after estimated completion.	
Dec 7 2020	Barnabas et al., Annals of Internal Medicine, doi:10.7326/M20-6519	Hydroxychloroquine for Post-exposure Prophylaxis to Prevent Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) Infection: A Randomized Trial
	27% more cases (p=0.33). Early terminated PEP RCT comparing HCQ and vitamin C with 781 low-risk patients (83% household contacts), reporting no significant differences. Different results were reported at IDWeek from the AIM results. The study enrolled people with..	

Dec 4 2020	Ozturk et al., Nephrology Dialysis Transplantation, doi:10.1093/ndt/ gfaa271	Mortality analysis of COVID-19 infection in chronic kidney disease, haemodialysis and renal transplant patients compared with patients without kidney disease: a nationwide analysis from Turkey
	44% lower mortality (p=0.14). Retrospective 1210 hospitalized patients in Turkey focused on chronic kidney disease, haemodialysis and renal transplant patients, but also showing lower mortality with HCQ. Subject to confounding by indication.	
Dec 4 2020	Modrák et al., medRxiv, doi:10.1101/2020.12.03 .20239863	Detailed disease progression of 213 patients hospitalized with Covid-19 in the Czech Republic: An exploratory analysis
	59% lower mortality (p=0.04). Retrospective 213 hospitalized patients in Czech Republic showing lower mortality with HCQ. Subject to confounding by indication.	
Dec 4 2020	Peng et al., Nephrology Dialysis Transplantation, doi:10.1093/ndt/ gfaa288	Early versus late acute kidney injury among patients with COVID-19—a multicenter study from Wuhan, China
	11% lower progression (p=0.63). Retrospective 4020 hospitalized patients in China showing non-statistically significant lower risk of acute kidney injury with HCQ.	
Dec 2 2020	Wiseman et al., medRxiv, doi:10.1101/2020.11.29 .20235218	Effective post-exposure prophylaxis of Covid-19 is associated with use of hydroxychloroquine: Prospective re-analysis of a public dataset incorporating novel data
	42% fewer cases (p=0.04). 6th independent analysis showing efficacy from the Boulware PEP trial. This prospective analysis corrects an error in the NEJM paper where shipping delays are omitted (still not corrected). 42% reduction in COVID-19 (9.6% vs. 16.5%), RR 0..	

<p>Dec 1 2020</p>	<p>Capsoni et al., Research Square, doi:10.21203/ rs.3.rs-113418/v1</p>	<p>CPAP Treatment In COVID-19 Patients: A Retrospective Observational Study In The Emergency Department</p>
<p>40% lower ventilation (p=0.3). Small 52 patient retrospective study of patients with acute respiratory failure showing lower rates of intubation with HCQ.</p>		
<p>Nov 30 2020</p>	<p>Aboulenain et al., HCA Healthcare Journal of Medicine, doi:10.36518/2689-021 6.1169</p>	<p>The Effect of Hydroxychloroquine on In-Hospital Mortality in COVID-19</p>
<p>15% higher mortality (p=0.72). Retrospective 175 hospitalized COVID-19 patients in the USA, showing no significant difference in mortality with HCQ. Authors note that "patients treated with HCQ in our cohort were more likely to be sicker at baseline".</p>		
<p>Nov 30 2020</p>	<p>Abdulrahman et al., medRxiv, doi:10.1101/2020.11.25 .20234914</p>	<p>The efficacy and safety of hydroxychloroquine in COVID19 patients : a multicenter national retrospective cohort</p>
<p>17% lower mortality (p=1) and 75% higher combined mortality/intubation (p=0.24). Retrospective analysis of acute care patients in Bahrain not showing a significant effect of HCQ. Confounding by indication is likely. Matching appears not to have matched for baseline severity. 17.5% of HCQ patients required oxygen while..</p>		
<p>Nov 29 2020</p>	<p>Abd-Elsalam et al., Biological Trace Element Research, doi:10.1007/ s12011-020-02512-1</p>	<p>Do Zinc Supplements Enhance the Clinical Efficacy of Hydroxychloroquine?: a Randomized, Multicenter Trial</p>
<p>191 patient RCT in Egypt comparing the addition of zinc to HCQ, not showing a significant difference. No information on baseline zinc values was recorded. Egypt has a low rate of zinc deficiency so supplementation may be less likely to be..</p>		

<p>Nov 28 2020</p>	<p>Lambermont et al., Critical Care Explorations, doi:10.1097/ CCE.00000000000003 05</p>	<p>Predictors of Mortality and Effect of Drug Therapies in Mechanically Ventilated Patients With Coronavirus Disease 2019: A Multicenter Cohort Study</p> <p>32% lower mortality (p=0.46). Retrospective 247 mechanically ventilated patients showing lower mortality with HCQ, but not statistically significant on multiple Cox regression. The paper gives the p value for multiple Cox (0.46) and simple Cox (0.02), but does not spe..</p>
<p>Nov 28 2020</p>	<p>Ruiz et al., International Journal of Antimicrobial Agents, doi:10.1016/ j.ijantimicag.2020.1062 47</p>	<p>Hydroxychloroquine lung pharmacokinetics in critically ill patients infected with COVID-19</p> <p>HCQ lung pharmacokinetic study confirming that lung concentrations can be much higher than plasma and exceed predicted EC50 values. The median lung epithelial lining fluid concentration was 38 times higher than plasma concentrations. 22 C..</p>
<p>Nov 28 2020</p>	<p>Rodriguez-Gonzalez et al., International Journal of Antimicrobial Agents, doi:10.1016/ j.ijantimicag.2020.1062 49</p>	<p>COVID-19 in hospitalized patients in Spain: a cohort study in Madrid</p> <p>23% lower mortality (p=0.26). Retrospective 1255 patients in Spain showing lower mortality with HCQ. Subject to confounding by indication.</p>
<p>Nov 27 2020</p>	<p>van Halem et al., BMC Infect Dis., doi:10.1186/ s12879-020-05605-3</p>	<p>Risk factors for mortality in hospitalized patients with COVID-19 at the start of the pandemic in Belgium: a retrospective cohort study</p>

	<p>32% lower mortality (p=0.05). Retrospective 319 hospitalized patients in Belgium showing lower mortality with HCQ, although not reported to be statistically significant.</p>	
<p>Nov 26 2020</p>	<p>Burdick et al., Journal of Clinical Medicine, doi:10.3390/jcm9123834</p>	<p>Is Machine Learning a Better Way to Identify COVID-19 Patients Who Might Benefit from Hydroxychloroquine Treatment?—The IDENTIFY Trial</p>
	<p>59% higher mortality (p=0.12). 290 patient observational trial in the USA, not showing a significant difference with HCQ treatment overall, but showing significantly lower mortality in a subgroup of patients where HCQ is expected to be beneficial based on a machine lea..</p>	
<p>Nov 24 2020</p>	<p>Abbas et al., Int. J. Clin. Pract., doi:10.1111/ijcp.13856</p>	<p>Assessment of COVID-19 Treatment containing both Hydroxychloroquine and Azithromycin: A Natural Clinical Trial</p>
	<p>Prospective study of 161 hospitalized patients in Iraq showing HCQ+AZ appears to help recovery. Most mortality was in patients that were already in critical condition on admission and died before treatment could be effective.</p>	
<p>Nov 23 2020</p>	<p>Qin et al., Thrombosis Research, doi:10.1016/j.thromres.2020.11.020</p>	<p>Low molecular weight heparin and 28-day mortality among patients with coronavirus disease 2019: A cohort study in the early epidemic era</p>
	<p>34% lower mortality (p=0.61). Low molecular weight heparin study also showing results for HCQ treatment, unadjusted HCQ mortality relative risk RR 0.66, p = 0.61.</p>	
<p>Nov 22 2020</p>	<p>Akram et al., Trials, doi:10.1186/s13063-020-04616-4</p>	<p>Pakistan Randomized and Observational Trial to Evaluate Coronavirus Treatment (PROTECT) of Hydroxychloroquine, Oseltamivir and Azithromycin to treat newly diagnosed patients with COVID-19 infection who have no comorbidities like diabetes mellitus: A structured summary of a study protocol for a randomized controlled trial</p>
	<p>550 patient HCQ early treatment RCT with results not reported over 2.5 years after completion.</p>	

Nov 21 2020	Revollo et al., Journal of Antimicrobial Chemotherapy, doi:10.1093/jac/dkaa477	Hydroxychloroquine pre-exposure prophylaxis for COVID-19 in healthcare workers
<p>23% fewer cases (p=0.52). Retrospective PrEP analysis with 69 healthcare workers on PrEP HCQ, and 418 control. Authors report PCR and IgG results, with no baseline results for either. Authors note they "identified 69 HCWs receiving HCQ" while providing n..</p>		
Nov 20 2020	Omrani et al., EClinicalMedicine, doi:10.1016/j.eclinm.2020.100645	Randomized double-blinded placebo-controlled trial of hydroxychloroquine with or without azithromycin for virologic cure of non-severe Covid-19
<p>12% lower hospitalization (p=1), 26% improved recovery (p=0.58), and 10% worse viral clearance (p=0.13). Low risk patient RCT for HCQ+AZ and HCQ vs. control, not showing any significant differences. Authors note that the results are not applicable to higher risk patients, that positive PCR may simply reflect detection of inactive (non-infect..</p>		
Nov 19 2020	Falcone et al., Open Forum Infectious Diseases, doi:10.1093/ofid/ofaa563	Role of low-molecular weight heparin in hospitalized patients with SARS-CoV-2 pneumonia: a prospective observational study
<p>65% lower mortality (p=0.2). Prospective observational study of 315 hospitalized patients in Italy showing 65% lower mortality with HCQ. The median treatment delay was 6 days for survivors and 6.5 days for non-survivors. Mortality relative risk: RR 0.35, p = 0.2, pro..</p>		
Nov 18 2020	Budhiraja et al., medRxiv, doi:10.1101/2020.11.16.20232223	Clinical Profile of First 1000 COVID-19 Cases Admitted at Tertiary Care Hospitals and the Correlates of their Mortality: An Indian Experience
<p>65% lower mortality (p<0.0001). Retrospective 976 hospitalized patients with 834 treated with HCQ+AZ showing HCQ mortality relative risk RR 0.35, p < 0.0001. Note that in this case HCQ was recommended for mild/moderate cases, so more severe cases may not have received H..</p>		

Nov 17 2020	Boari et al., Biosci. Rep., doi:10.1042/ BSR20203455	Prognostic factors and predictors of outcome in patients with COVID-19 and related pneumonia: a retrospective cohort study
	55% lower mortality (p=0.001). Retrospective 258 hospitalized patients in Italy showing lower mortality with HCQ treatment, unadjusted relative risk RR 0.455, p<0.001. Data is in the supplementary appendix.	
Nov 13 2020	Sheshah et al., Diabetes Research and Clinical Practice, doi:10.1016/ j.diabres.2020.108538	Prevalence of Diabetes, Management and Outcomes among Covid-19 Adult Patients Admitted in a Specialized Tertiary Hospital in Riyadh, Saudi Arabia
	80% lower mortality (p=0.001). Retrospective 300 hospitalized patients in Saudi Arabia showing HCQ adjusted odds ratio aOR 0.12, p < 0.001.	
Nov 12 2020	Simova et al., New Microbes and New Infections, doi:10.1016/ j.nmni.2020.100813	Hydroxychloroquine for prophylaxis and treatment of COVID-19 in health care workers
	94% lower hospitalization (p=0.01) and 96% improved viral clearance (p=0.001). 100% reduction in hospitalization and cases with early treatment using HCQ+AZ+zinc. Brief report on healthcare workers in Bulgaria. 0 hospitalizations with treatment vs. 2 for control 0 PCR+ at day 14 with treatment vs. 3 for control 33 t..	
Nov 12 2020	Simova et al., New Microbes and New Infections, doi:10.1016/ j.nmni.2020.100813	Hydroxychloroquine for prophylaxis and treatment of COVID-19 in health care workers
	93% fewer cases (p=0.01). 100% reduction in cases with HCQ+zinc post-exposure prophylaxis. Brief report for healthcare workers in Bulgaria. 0 cases with treatment vs. 3 for control. 156 treatment patients and 48 control patients. No serious adverse events. This pa..	

Nov 12 2020	Tchounga et al., Journal of Pharmaceutical and Biomedical Analysis, doi:10.1016/ j.jpba.2020.113761	Composition analysis of falsified chloroquine phosphate samples seized during the COVID-19 pandemic
	Analysis of fake CQ tablets finding: - no CQ in six samples, substituted with metronidazole (at sub-therapeutic levels) or paracetamol. - trace levels of paracetamol and chloramphenicol in four and two samples respectively. - CQ levels to..	
Nov 11 2020	Águila-Gordo et al., Revista Española de Geriatría y Gerontología, doi:10.1016/ j.regg.2020.09.006	Mortality and associated prognostic factors in elderly and very elderly hospitalized patients with respiratory disease COVID-19
	67% lower mortality (p=0.1). 67% lower mortality with HCQ. Retrospective 416 elderly patients in Spain showing adjusted HCQ mortality hazard ratio HR 0.33, p = 0.1.	
Nov 9 2020	Khamis et al., International Journal of Infectious Diseases, doi:10.1016/ j.ijid.2020.11.008	Randomized Controlled Open Label Trial on the Use of Favipiravir Combined with Inhaled Interferon beta-1b in Hospitalized Patients with Moderate to Severe COVID-19 Pneumonia
	Small 89 patient RCT comparing favipiravir and inhaled interferon with HCQ for moderate to severe COVID-19 pneumonia, not finding significant differences.	
Nov 9 2020	Rodriguez et al., Medicina Intensiva, doi:10.1016/ j.medine.2020.05.005	Severe infection due to the SARS-CoV-2 coronavirus: Experience of a tertiary hospital with COVID-19 patients during the 2020 pandemic
	59% lower mortality (p=0.23). Small prospective study of 43 hospitalized patients with 39 taking HCQ, showing unadjusted mortality relative risk RR 0.41, p=0.23.	

Nov 9 2020	Self et al., JAMA, doi:10.1001/ jama.2020.22240	Effect of Hydroxychloroquine on Clinical Status at 14 Days in Hospitalized Patients With COVID-19: A Randomized Clinical Trial
6% higher mortality (p=0.85) and 3% worse 7-point scale results (p=0.87). Early terminated very late stage (65% on supplemental oxygen) RCT with 242 HCQ and 237 control patients showing no significant difference in outcomes. For the subgroup not on supplemental oxygen at baseline (relatively early treatment), t..		
Nov 9 2020	Brown et al., Annals of the American Thoracic Society, doi:10.1513/ AnnalsATS.202008-94 00C	Hydroxychloroquine vs. Azithromycin for Hospitalized Patients with COVID-19 (HAHPS): Results of a Randomized, Active Comparator Trial
Small early terminated very late stage (86% on oxygen, 44% enrolled in the ICU) RCT comparing HCQ vs. AZ, not finding a significant difference between the two treatments. There is no comparison with a control group. HCQ patients not in th..		
Nov 9 2020	Núñez-Gil et al., Intern. Emerg. Med., doi:10.1007/ s11739-020-02543-5	Mortality risk assessment in Spain and Italy, insights of the HOPE COVID-19 registry
8% lower mortality (p=0.005). Retrospective database study of 1,021 patients in Ecuador, Germany, Italy, and Spain, showing HCQ propensity score adjusted mortality odds ratio aOR 0.88, p=0.005.		
Nov 6 2020	Mathai et al., J. Marine Medical Society, doi:10.4103/ jmms.jmms_115_20	Hydroxychloroquine as pre-exposure prophylaxis against COVID-19 in health-care workers: A single-center experience
90% fewer cases (p<0.0001). 90% reduction in cases with HCQ pre-exposure prophylaxis. Retrospective 604 healthcare workers.		
Nov 6 2020	Datta et al., Journal of Vaccines & Vaccination, S6:1000002	No Role of HCQ in COVID-19 Prophylaxis: A Survey amongst Indian Doctors

		22% fewer cases (p=0.47). Survey of Indian doctors not finding a significant effect of HCQ prophylaxis.
Nov 6 2020	Dhibar et al., International Journal of Antimicrobial Agents, doi:10.1016/ j.ijantimicag.2020.1062 24	Post Exposure Prophylaxis with Hydroxychloroquine (HCQ) for the Prevention of COVID-19, a Myth or a Reality? The PEP-CQ Study
		44% fewer symptomatic cases (p=0.21) and 50% fewer cases (p=0.04). Low dose prospective PEP study with 132 HCQ patients and 185 control patients, showing significantly lower COVID-19 cases with treatment. There were no serious adverse events. HCQ 800mg on day one followed by 400mg once weekly for 3 weeks.
Nov 5 2020	Maldonado et al., Nefrología, doi:10.1016/ j.nefro.2020.09.002	COVID-19 incidence and outcomes in a home dialysis unit in Madrid (Spain) at the height of the pandemic
		91% lower mortality (p=0.17). Very small retrospective of 12 dialysis patients showing 1/11 deaths with HCQ and 1/1 without HCQ.
Nov 5 2020	Rodriguez-Nava et al., Mayo Clinic Proceedings: Innovations, Quality & Outcomes	Clinical characteristics and risk factors for mortality of hospitalized patients with COVID-19 in a community hospital: A retrospective cohort study
		6% higher mortality (p=0.77). Retrospective 313 patients, mostly critical stage and mostly requiring respiratory support, showing unadjusted RR 1.06, p = 0.77. Confounding by indication likely.
Nov 4 2020	Salazar et al., The American Journal of Pathology, doi:10.1016/ j.ajpath.2020.10.008	Significantly Decreased Mortality in a Large Cohort of Coronavirus Disease 2019 (COVID-19) Patients Transfused Early with Convalescent Plasma Containing High-Titer Anti-Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) Spike Protein IgG
		37% higher mortality (p=0.28). Convalescent plasma study also showing mortality based on HCQ treatment, unadjusted hazard ratio uHR 1.37, p = 0.28. Confounding by indication is likely.

<p>Nov 4 2020</p>	<p>Cadegiani et al., New Microbes and New Infections, doi:10.1016/ j.nmni.2021.100915 (date from preprint)</p>	<p>Early COVID-19 Therapy with azithromycin plus nitazoxanide, ivermectin or hydroxychloroquine in Outpatient Settings Significantly Improved COVID-19 outcomes compared to Known outcomes in untreated patients</p> <p>81% lower mortality (p=0.21), 95% lower ventilation (p=0.0008), and 98% lower hospitalization (p<0.0001). Comparison of HCQ, nitazoxanide, and ivermectin showing similar effectiveness for overall clinical outcomes in COVID-19 when used before seven days of symptoms, and overwhelmingly superior compared to the untreated COVID-19 population, ev..</p>
<p>Nov 3 2020</p>	<p>Behera et al., PLoS ONE, doi:10.1371/ journal.pone.0247163 (date from preprint)</p>	<p>Role of ivermectin in the prevention of SARS-CoV-2 infection among healthcare workers in India: A matched case-control study</p> <p>28% fewer cases (p=0.29). Retrospective matched case-control prophylaxis study for HCQ, ivermectin, and vitamin C with 372 healthcare workers, showing lower COVID-19 incidence for all treatments, with statistical significance reached for ivermectin. HCQ OR 0.56, p..</p>
<p>Nov 2 2020</p>	<p>López et al., Annals of Pediatrics, doi:10.1016/ j.anpedi.2020.10.017</p>	<p>Telemedicine follow-ups for COVID-19: experience in a tertiary hospital</p> <p>64% lower progression (p=0.02). Retrospective 72 pediatric patients showing HCQ associated with a shorter duration of fever (p=0.023), less progression (p=0.016), and fewer return visits to the ER (p=0.017).</p>
<p>Nov 1 2020</p>	<p>Niwas et al., Advances in Respiratory Medicine, doi:10.5603/ ARM.a2020.0139</p>	<p>Clinical outcome, viral response and safety profile of chloroquine in COVID-19 patients — initial experience</p> <p>29% faster recovery (p=0.008). Retrospective 12 hospitalized patients in India treated with CQ and 17 controls, showing faster recovery with treatment. There was no significant difference in viral clearance. The CQ group mean age was 41.3 vs. 47.6 for controls.</p>

<p>Oct 31 2020</p>	<p>Szente Fonseca et al., Travel Medicine and Infectious Disease, doi:10.1016/ j.tmaid.2020.101906</p>	<p>Risk of Hospitalization for Covid-19 Outpatients Treated with Various Drug Regimens in Brazil: Comparative Analysis</p>
<p>64% lower hospitalization (p=0.0008). 64% lower hospitalization with HCQ. Retrospective 717 patients in Brazil with early treatment, adjusted OR 0.32, p=0.00081, for HCQ versus no medication, and OR 0.45, p=0.0065, for HCQ vs. anything else.</p>		
<p>Oct 30 2020</p>	<p>Tehrani et al., International Journal of Infectious Diseases, doi:10.1016/ j.ijid.2020.10.071</p>	<p>Risk factors for mortality in adult COVID-19 patients: frailty predicts fatal outcome in older patients</p>
<p>13% lower mortality (p=0.63). Retrospective 255 hospitalized patients, 65 treated with HCQ, showing unadjusted RR 0.87, p=0.63. Confounding by indication is likely.</p>		
<p>Oct 27 2020</p>	<p>Arleo et al., medRxiv, doi:10.1101/2020.10.26 .20219154</p>	<p>Clinical Course and Outcomes of coronavirus disease 2019 (COVID-19) in Rheumatic Disease Patients on Immunosuppression: A case Cohort Study at a Single Center with a Significantly Diverse Population</p>
<p>50% lower mortality (p=0.67). Retrospective hospitalized rheumatic disease patients showing 50% lower mortality for patients on HCQ.</p>		
<p>Oct 27 2020</p>	<p>Choi et al., International Journal of Infectious Diseases, doi:10.1016/ j.ijid.2020.10.062</p>	<p>Comparison of antiviral effect for mild-to-moderate COVID-19 cases between lopinavir/ritonavir versus hydroxychloroquine: A nationwide propensity score-matched cohort study</p>
<p>22% slower viral clearance (p=0.0001). Health insurance database analysis failing to adjust for disease severity and not finding a significant difference in time to PCR- for LPV/r and HCQ. There are large differences in severity across groups. Authors did PSM but chose not to ..</p>		

<p>Oct 26 2020</p>	<p>Frontera et al., Research Square, doi:10.21203/ rs.3.rs-94509/v1</p>	<p>Treatment with Zinc is Associated with Reduced In-Hospital Mortality Among COVID-19 Patients: A Multi-Center Cohort Study</p> <p>37% lower mortality (p=0.02). Retrospective 3,473 hospitalized patients showing lower mortality with HCQ+zinc.</p>
<p>Oct 24 2020</p>	<p>Goenka et al., SSRN, doi:10.2139/ ssrn.3689618</p>	<p>Seroprevalence of COVID-19 Amongst Health Care Workers in a Tertiary Care Hospital of a Metropolitan City from India</p> <p>87% lower IgG positivity (p=0.03). Study of SARS-CoV-2-IgG antibodies in 1122 health care workers in India finding 87% lower positives for adequate HCQ prophylaxis, 1.3% HCQ versus 12.3% for no HCQ prophylaxis. Adequate prophylaxis is defined as 400mg 1/wk for >6 weeks.</p>
<p>Oct 23 2020</p>	<p>Coll et al., American Journal of Transplantation, doi:10.1111/ajt.16369</p>	<p>Covid-19 in transplant recipients: the spanish experience</p> <p>46% lower mortality (p<0.0001). Retrospective 652 transplant recipient patients in Spain showing 46% lower mortality for patients treated with HCQ, unadjusted relative risk RR 0.54, p<0.0001.</p>
<p>Oct 21 2020</p>	<p>Lano et al., Clinical Kidney Journal, 13:5, October 2020, 878– 888, doi:10.1093/ckj/ sfaa199</p>	<p>Risk factors for severity of COVID-19 in chronic dialysis patients from a multicentre French cohort</p> <p>33% lower mortality (p=0.28) and 39% lower combined mortality/ICU admission (p=0.23). 33% lower mortality with HCQ+AZ, p=0.28. Retrospective 122 French dialysis patients. 69% lower combined mortality/ICU, p=0.11, for the subgroup not requiring O2 on diagnosis (slightly earlier treatment).</p>

<p>Oct 21 2020</p>	<p>Dubee et al., Clinical Microbiology and Infection, doi:10.1016/j.cmi.2021.03.005 (date from preprint)</p>	<p>Hydroxychloroquine in mild-to-moderate COVID-19: a placebo-controlled double blind trial</p> <p>46% lower mortality (p=0.21) and 26% lower combined mortality/intubation (p=0.48). Small early terminated late stage (60% on oxygen) RCT in France showing 46% lower mortality. mortality at 28 days relative risk RR 0.54 [0.21-1.42] combined mortality/intubation at 28 days relative risk RR 0.74 [0.33-1.70] If not stopped ..</p>
<p>Oct 21 2020</p>	<p>Ñamendys-Silva et al., Heart & Lung, doi:10.1016/j.hrtlng.2020.10.013</p>	<p>Outcomes of patients with COVID-19 in the Intensive Care Unit in Mexico: A multicenter observational study</p> <p>32% lower mortality (p=0.19). Retrospective 164 ICU patients in Mexico showing 32% lower mortality with HCQ+AZ and 37% lower with CQ. HCQ+AZ vs. neither HCQ or CQ relative risk RR 0.68, p = 0.03 CQ vs. neither HCQ or CQ relative risk RR 0.63, p = 0.02 HCQ+AZ or CQ vs...</p>
<p>Oct 20 2020</p>	<p>IHU Marseille</p>	<p>Meta-analysis on chloroquine derivatives and COVID-19 mortality</p> <p>Updated meta analysis of 41 studies showing CQ/HCQ OR 0.57, p<0.0001 from clinical studies. For big data studies authors find inconsistent results and OR 0.83, p=0.0014, and for all studies combined OR 0.72, p<0.0001.</p>
<p>Oct 20 2020</p>	<p>Solh et al., medRxiv, doi:10.1101/2020.10.16.20214130</p>	<p>Clinical course and outcome of COVID-19 acute respiratory distress syndrome: data from a national repository</p> <p>18% higher mortality (p=0.17). Retrospective database analysis of 7,816 Veterans Affairs hospitalized patients analyzing progression to ARDS and 30-day mortality from ARDS. Confounding by indication is likely. Chronological bias is likely, with HCQ more likely to be us..</p>

Oct 17 2020	Mohana et al., International Journal of Infectious Diseases, doi:10.1016/ j.ijid.2020.10.031 (date from preprint)	Hydroxychloroquine Safety Outcome within Approved Therapeutic Protocol for COVID-19 Outpatients in Saudi Arabia
	Safety study of 2,733 patients in Saudi Arabia showing HCQ in mild to moderate cases in an outpatient setting, within the protocol recommendation and inclusion/exclusion criteria, is safe, highly tolerable, and has minimal side effects. N..	
Oct 15 2020	Burney et al., NCT04370015	Hydroxychloroquine Chemoprophylaxis for COVID-19 Infection in High-risk Healthcare Workers
	Estimated 374 participant HCQ prophylaxis RCT with results not reported over 2.5 years after estimated completion.	
Oct 15 2020	Guisado-Vasco	Clinical characteristics and outcomes among hospitalized adults with severe COVID-19 admitted to a tertiary medical center and receiving antiviral, antimalarials, glucocorticoids, or immunomodulation with tocilizumab or cyclosporine: A retrospective observational study (COQUIMA cohort)
	20% lower mortality (p=0.36). Retrospective 607 patients reporting results for early outpatient HCQ use with mortality odds ratio OR 0.092 [0.022-0.381], p = 0.001 (65 patients), and for hospital use, mortality odds ratio OR 0.737 [0.38-1.41], p = 0.36 (558 patients)...	
Oct 15 2020	SOLIDARITY Trial Consortium, NEJM, doi:10.1056/ NEJMoa2023184 (date from preprint)	Repurposed antiviral drugs for COVID-19; interim WHO SOLIDARITY trial results
	19% higher mortality (p=0.23). WHO SOLIDARITY open-label trial with 954 very late stage (64% on oxygen/ventilation) HCQ patients, mortality relative risk RR 1.19 [0.89-1.59], p=0.23. HCQ dosage very high as in RECOVERY, 1.6g in the first 24 hours, 9.6g total over 10 da..	

Oct 12 2020	Annie et al., Pharmacotherapy, doi:10.1002/phar.2467	Hydroxychloroquine in hospitalized COVID-19 patients: Real world experience assessing mortality
	4% lower mortality (p=0.83). Retrospective database analysis with PSM not including COVID-19 severity, finding mortality OR 0.95 [0.62-1.46] for HCQ, and 1.24 [0.70-2.22] for HCQ+AZ. Confounding by indication likely.	
Oct 11 2020	Sili et al., medRxiv, doi:10.1101/2020.10.09 .20209775	Factors associated with progression to critical illness in 28 days among COVID-19 patients: results from a tertiary care hospital in Istanbul, Turkey
	Analysis of hospitalized patients in Turkey showing HCQ was given to 99.2% of patients and the incidence of critical illness was lower than most studies. Authors note "whether HCQ administration lowered the rates of critical illness ..	
Oct 8 2020	Aparisi et al., medRxiv, doi:10.1101/2020.10.06 .20207092	Low-density lipoprotein cholesterol levels are associated with poor clinical outcomes in COVID-19
	63% lower mortality (p=0.008). Retrospective 654 hospitalized patients focused on low-density lipoprotein cholesterol levels, also showing results for HCQ with 605 HCQ patients, unadjusted 30 day mortality relative risk RR 0.37, p = 0.008.	
Oct 8 2020	Soto-Becerra et al., medRxiv, doi:10.1101/2020.10.06 .20208066	Real-World Effectiveness of hydroxychloroquine, azithromycin, and ivermectin among hospitalized COVID-19 patients: Results of a target trial emulation using observational data from a nationwide Healthcare System in Peru
	18% lower mortality (p<0.0001). Retrospective database study of 5683 patients, 692 received HCQ/CQ+AZ, 200 received HCQ/CQ, 203 received ivermectin, 1600 received AZ, 358 received ivermectin+AZ, and 2630 received standard of care. This study includes anyone with ICD-10 ..	
Oct 6	Ader et al., medRxiv, doi:10.1101/2022.02.16 .22271064	An open-label randomized, controlled trial of the effect of lopinavir/ritonavir, lopinavir/ritonavir plus IFN-beta-1a and hydroxychloroquine in hospitalized patients with COVID-19 - Final results from the DisCoVeRy trial

2020		<p>15% higher mortality (p=0.7) and 24% improved viral clearance (p=0.68). Early terminated very late stage (95% on oxygen at baseline) DISCOVERY trial. 4% more patients were on ventilation at baseline in the HCQ group. This preprint presents more recent results than the earlier journal article.</p>
Oct 5 2020	<p>Mori et al., Journal of Microbiology, Immunology and Infection, doi:10.1016/j.jmii.2020.09.003</p>	<p>Triple therapy with hydroxychloroquine, azithromycin, and ciclesonide for COVID-19 pneumonia</p>
		<p>Small case study of 5 patients in Japan showing improvement with HCQ+AZ+ciclesonide.</p>
Oct 5 2020	<p>Prodromos et al., New Microbes and New Infections, doi:10.1016/j.nmni.2020.100776</p>	<p>Hydroxychloroquine is effective, and consistently so used early, for Covid-19: A systematic review</p>
		<p>Meta analysis of 43 studies reporting: "HCQ was found consistently effective against COVID-19 when used early, in the outpatient setting. It was found overall effective also including inpatient studies. No unbiased study found worse ..</p>
Oct 2 2020	<p>Nachegea et al., The American Journal of Tropical Medicine and Hygiene, doi:10.4269/ajtmh.20-1240</p>	<p>Clinical Characteristics and Outcomes of Patients Hospitalized for COVID-19 in Africa: Early Insights from the Democratic Republic of the Congo</p>
		<p>28% lower mortality (p=0.17) and 26% greater improvement (p=0.13). Retrospective 766 hospitalized patients in DRC showing mortality reduced from 29% to 11%, and improvement at 30 days increased from 65% to 84%. Mortality cox regression adjusted hazard ratio aHR 0.26, p < 0.001 Risk of no improvement adju..</p>
Oct 1 2020	<p>Almazrou et al., Saudi Pharmaceutical Journal, doi:10.1016/j.jsps.2020.09.019</p>	<p>Comparing the impact of Hydroxychloroquine based regimens and standard treatment on COVID-19 patient outcomes: A retrospective cohort study</p>

	<p>65% lower ventilation (p=0.16) and 21% lower ICU admission (p=0.78). Retrospective 161 hospitalized patients in Saudi Arabia showing lower ventilation and ICU admission with HCQ, but not statistically significant with the small sample sizes.</p>	
<p>Sep 30 2020</p>	<p>Sow et al., NCT04501965</p>	<p>Phytomedicines Versus Hydroxychloroquine as an Add on Therapy to Azythromycin in Asymptomatic Covid-19 Patients (PHYTCOVID-19)</p>
<p>231 patient HCQ vs. phytomedicines early treatment RCT with results not reported over 3 years after completion.</p>		
<p>Sep 30 2020</p>	<p>Yadav et al., ResearchGate, doi:10.13140/ RG.2.2.34411.77603</p>	<p>Sero-survey for health-care workers provides corroborative evidence for the effectiveness of Hydroxychloroquine prophylaxis against COVID-19 infection</p>
<p>82% lower hospitalization (p=0.01) and 42% fewer cases (p=0.05). ICMR seroprevalence survey of 500 healthcare workers in India, 279 taking HCQ prophylaxis, showing a significantly lower risk with treatment, and lower severity.</p>		
<p>Sep 30 2020</p>	<p>Polat et al., Medical Journal of Bakirkoy, 16:3, 280-6, doi:10.5222/ BMJ.2020.50469</p>	<p>Hydroxychloroquine Use on Healthcare Workers Exposed to COVID-19 - A Pandemic Hospital Experience</p>
<p>57% fewer cases (p=0.03). Small prophylaxis study of 208 healthcare workers in Turkey, 138 with high risk exposure received HCQ, while 70 with low and medium risk exposure did not. COVID-19 cases were lower in the treatment group, relative risk RR 0.43, p = 0.026...</p>		
<p>Sep 30 2020</p>	<p>Ayerbe et al., Internal and Emergency Medicine, doi:0.1007/ s11739-020-02505-x</p>	<p>The association of treatment with hydroxychloroquine and hospital mortality in COVID-19 patients</p>
<p>52% lower mortality (p=0.001). 2075 hospital patients in Spain showing HCQ reduces mortality 52%, odds ratio OR 0.39, p<0.001, after adjustment for age, gender, temperature >37 °C, and saturation of oxygen <90% treatment with azithromycin, steroids, heparin, tocilizu..</p>		

Sep 30 2020	Ladapo et al., medRxiv, doi:10.1101/2020.09.30 .20204693	Randomized Controlled Trials of Early Ambulatory Hydroxychloroquine in the Prevention of COVID-19 Infection, Hospitalization, and Death: Meta-Analysis
	24% lower combined death/hospitalization/cases (p=0.03). Meta analysis of prophylactic and early treatment RCTs, 24% reduction in cases, hospitalization or death with HCQ, RR 0.76, p=0.025. No serious adverse cardiac events were reported. 5,577 patients. The Boulware study provides a breakdown ..	
Sep 30 2020	Abella et al., JAMA Internal Medicine, doi:doi:10.1001/ jamainternmed.2020.6 319	Efficacy and Safety of Hydroxychloroquine vs Placebo for Pre-exposure SARS-CoV-2 Prophylaxis Among Health Care Workers
	5% fewer cases (p=1). Very small early-terminated underpowered PrEP RCT with 64/61 HCQ/control patients and only 8 infections, HCQ infection rate 6.3% versus control 6.6%, RR 0.95 [0.25 - 3.64]. There was no hospitalization or death, no significant difference ..	
Sep 29 2020	Lammers et al., Int. J. Infectious Diseases, doi:10.1016/ j.ijid.2020.09.1460	Early hydroxychloroquine but not chloroquine use reduces ICU admission in COVID-19 patients
	32% lower combined mortality/ICU admission (p=0.02). Observational study 1,064 hospitalized patients in the Netherlands, 53% reduced risk of transfer to the ICU for mechanical ventilation with HCQ treatment starting on the first day of admission. Weighted propensity score adjusted hazard ra..	
Sep 29 2020	Dabbous et al., Scientific Reports, doi:10.1038/ s41598-021-85227-0 (date from preprint)	Safety and efficacy of favipiravir versus hydroxychloroquine in management of COVID-19: A randomised controlled trial
	This paper has been retracted [nature.com].	
Sep 28 2020	Luco, J., Trends Med, doi:10.15761/ TiM.1000268	Hydroxychloroquine as post-exposure prophylaxis for Covid-19: Why simple data analysis can lead to the wrong conclusions from well-designed studies

	Reanalysis of Boulware et al. PEP trial data showing statistically significant improvements with HCQ.	
Sep 24 2020	Gasperetti et al., EP Europace, doi:10.1093/ europace/euaa216	Arrhythmic safety of hydroxychloroquine in COVID-19 patients from different clinical settings
	Safety study of 649 patients finding that HCQ administration is safe for short-term treatment for patients with COVID-19 infection regardless of the clinical setting of delivery, causing only modest QTc prolongation and no directly attrib..	
Sep 24 2020	Shoaibi et al., medRxiv, doi:10.1101/2020.09.23 .20199463	Comparative Effectiveness of Famotidine in Hospitalized COVID-19 Patients
	15% lower mortality (p=0.001). Retrospective database analysis focused on Famotidine but also showing results for HCQ users, with unadjusted mortality RR 0.85, p<0.001 (13.6% vs. 16.1%).	
Sep 23 2020	Ulrich et al., Open Forum Infectious Diseases, doi:10.1093/ ofid/ofaa446	Treating Covid-19 With Hydroxychloroquine (TEACH): A Multicenter, Double-Blind, Randomized Controlled Trial in Hospitalized Patients
	6% higher mortality (p=1) and 173% higher ICU admission (p=0.13). Small RCT on very late stage use of HCQ, with 48% on oxygen at baseline. 67 HCQ patients, 61 control. Baseline states were not comparable - 82% more HCQ patients had the highest severity at baseline, there was 32% more male HCQ patients, ..	
Sep 22 2020	Serrano et al., Ann. Oncol., 2020, Sep, 31, S1026, doi:10.1016/ j.annonc.2020.08.1830	COVID-19 and lung cancer: What do we know?
	43% lower mortality (p=0.15). Small retrospective study of 22 lung cancer patients, 14 treated with HCQ+AZ, showing HCQ+AZ mortality relative risk RR 0.57, p = 0.145.	

Sep 21 2020	Gentry et al., Lancet Rheumatology, doi:10.1016/S2665-9913(20)30305-2	Long-term hydroxychloroquine use in patients with rheumatic conditions and development of SARS-CoV-2 infection: a retrospective cohort study
	91% lower mortality (p=0.1) and 21% fewer cases (p=0.27). Retrospective patients with rheumatologic conditions showing zero of 10,703 COVID-19 deaths for HCQ patients versus 7 of 21,406 propensity matched control patients (not statistically significant). The average age of HCQ patients is slight..	
Sep 21 2020	Rajasingham et al., medRxiv, doi:10.1101/2020.09.18.20197327	Hydroxychloroquine as pre-exposure prophylaxis for COVID-19 in healthcare workers: a randomized trial
	27% fewer cases (p=0.12). PrEP RCT showing HR 0.73, p = 0.12. Trial halted after 47% enrollment, p < 0.05 will be reached at ~75% enrollment if similar results continue. HR 0.66/0.68 for full medication adherence, 0.72/0.74, p = 0.18/0.22 overall (1x/2x dosing). E..	
Sep 21 2020	Grau-Pujol et al., Trials, doi:10.1186/s13063-021-05758-9	Pre-exposure prophylaxis with hydroxychloroquine for COVID-19: a double-blind, placebo-controlled randomized clinical trial
	11% fewer cases (p=1). Small PrEP RCT showing that PrEP with HCQ is safe at the dosage used. There were no deaths, hospitalizations, or serious adverse events. The paper states: "Among all trial participants at the end of the first month (n=253), only one ..	
Sep 21 2020	Lofgren et al., Open Forum Infectious Diseases, doi:10.1093/ofid/ofaa500 (date from preprint)	Safety of Hydroxychloroquine among Outpatient Clinical Trial Participants for COVID-19
	Analysis of 2,795 outpatients not showing significant safety concerns with HCQ. No deaths were related to HCQ. There was one serious event requiring hospitalization, identical to the frequency with placebo.	

Sep 18 2020	Axfors et al., Nature, doi:10.1038/ s41467-021-22446-z	Mortality outcomes with hydroxychloroquine and chloroquine in COVID-19 from an international collaborative meta-analysis of randomized trials
	Meta analysis assigning 89% weight to the RECOVERY and SOLIDARITY trials, producing the same result. These trials used excessively high non-patient-customized dosage in very sick late stage patients, results are not generalizable to typic..	
Sep 16 2020	Karatza et al., Xenobiotica	Optimization of hydroxychloroquine dosing scheme based on COVID-19 patients' characteristics: a review of the literature and simulations
	Analysis of HCQ dosing, suggesting that high initial doses followed by low and sparse doses may offer significant benefits to patients by decreasing the viral load without reaching levels considered to produce adverse effects. For instanc..	
Sep 15 2020	Ashinyo et al., Pan African Medical Journal, 37:1, doi:10.11604/ pamj.supp.2020.37.1.2 5718	Clinical characteristics, treatment regimen and duration of hospitalization among COVID-19 patients in Ghana: a retrospective cohort study
	33% shorter hospitalization (p=0.03) . Retrospective 307 hospital patients in Ghana showing 33% reduction in hospitalization time with HCQ, 29% reduction with HCQ+AZ, and 37% reduction with CQ+AZ.	
Sep 14 2020	Lauriola et al., Clinical and Translational Science, doi:10.1111/ cts.12860	Effect of combination therapy of hydroxychloroquine and azithromycin on mortality in COVID-19 patients
	74% lower mortality (p=0.001) . Retrospective 377 patients, 73% reduction in mortality with HCQ+AZ, adjusted hazard ratio HR 0.27 [0.17-0.41]. Mean age 71.8. No serious adverse events. Subject to incomplete adjustment for confounders.	
Sep 13 2020	Sulaiman et al., medRxiv, doi:10.1101/2020.09.09 .20184143	The Effect of Early Hydroxychloroquine-based Therapy in COVID-19 Patients in Ambulatory Care Settings: A Nationwide Prospective Cohort Study

	<p>64% lower mortality (p=0.01) and 39% lower hospitalization (p=0.001). Observational prospective 5,541 patients, adjusted HCQ mortality odds ratio OR 0.36, p = 0.012. Adjusted hospitalization OR 0.57, p < 0.001. Zinc supplementation was used in all cases. Early treatment in ambulatory fever clinics in Saudi ..</p>	
<p>Sep 12 2020</p>	<p>Pellegrini et al., COVID-SHIELD, ACTRN126200005019 43</p>	<p>Effectiveness of Prophylactic Hydroxychloroquine on incidence of COVID-19 infection in Front-line Health and Allied Health Care Workers: The COVID-SHIELD Trial</p>
<p>Estimated 2,250 participant HCQ prophylaxis RCT with results not reported over 3 years after estimated completion. The lead investigators are Prof. Marc Pellegrini and Prof. Ian Wicks [centenary.org.au, findanexpert.unimelb.edu.au, viin.o..</p>		
<p>Sep 12 2020</p>	<p>Heberto et al., IJC Heart & Vasculature, doi:10.1016/ j.ijcha.2020.100638</p>	<p>Implications of myocardial injury in Mexican hospitalized patients with coronavirus disease 2019 (COVID-19)</p>
<p>54% lower mortality (p=0.04) and 65% lower ventilation (p=0.008). Observational prospective 254 hospitalized patients, HCQ+AZ mortality odds ratio OR 0.36, p = 0.04. Ventilation OR 0.20, p = 0.008.</p>		
<p>Sep 9 2020</p>	<p>Alamdari et al., Tohoku J. Exp. Med., 2020, 252, 73-84, doi:10.1620/ tjem.252.73</p>	<p>Mortality Risk Factors among Hospitalized COVID-19 Patients in a Major Referral Center in Iran</p>
<p>55% lower mortality (p=0.03). Retrospective 459 patients in Iran with 93% treated with HCQ, showing HCQ mortality RR 0.45, p = 0.028. HCQ was the only antiviral that showed a significant difference. There was relatively few control patients and the result is subject t..</p>		
<p>Sep 9 2020</p>	<p>Kirenga et al., BMJ Open Respiratory Research, doi:10.1136/ bmjresp-2020-000646</p>	<p>Characteristics and outcomes of admitted patients infected with SARS-CoV-2 in Uganda</p>

	<p>26% faster recovery (p=0.2). Prospective 56 patients in Uganda, 29 HCQ and 27 control, showing 25.6% faster recovery with HCQ, 6.4 vs. 8.6 days (p = 0.20). There was no ICU admission, mechanical ventilation, or death. Treatment delay is not specified but at least a p..</p>	
<p>Sep 9 2020</p>	<p>Rentsch et al., The Lancet Rheumatology, doi:10.1016/S2665-9913(20)30378-7 (date from preprint)</p>	<p>Effect of pre-exposure use of hydroxychloroquine on COVID-19 mortality: a population-based cohort study in patients with rheumatoid arthritis or systemic lupus erythematosus using the OpenSAFELY platform</p>
	<p>3% higher mortality (p=0.83). Observational database study of RA/SLE patients in the UK, 194,637 RA/SLE patients with 30,569 having >= 2 HCQ prescriptions in the prior 6 months, HCQ HR 1.03 [0.80-1.33] (HR 0.78 before adjustments). 70 patients with HCQ prescriptions d..</p>	
<p>Sep 9 2020</p>	<p>Laplana et al., PLOS ONE, doi:10.1371/journal.pone.0243598</p>	<p>Lack of protective effect of chloroquine derivatives on COVID-19 disease in a Spanish sample of chronically treated patients</p>
	<p>56% more cases (p=0.24). Survey of 319 autoimmune disease patients taking CQ/HCQ with 5.3% COVID-19 incidence, compared to a control group from the general population (matched on age, sex, and region, but not adjusted for autoimmune disease), with 3.4% incidence...</p>	
<p>Sep 7 2020</p>	<p>IHU, Expert Review of Clinical Immunology</p>	<p>Natural history and therapeutic options for COVID-19</p>
	<p>Review of the current state of knowledge regarding the natural history of and therapeutic options for COVID-19. Treatment with an oral combination of hydroxychloroquine, azithromycin and zinc may represent the best current therapeutic opt..</p>	
<p>Sep 5 2020</p>	<p>Synolaki et al., medRxiv, doi:10.1101/2020.09.05.20184655</p>	<p>The Activin/Follistatin-axis is severely deregulated in COVID-19 and independently associated with in-hospital mortality</p>
	<p>24% lower mortality (p=0.27). Retrospective 117 patients, 58 HCQ showing lower mortality for HCQ patients. Version 1 of this paper stated: "HCQ, AZ, [and ...] were found to be independently associated with survival when treatment commenced at FACTCLINyCoD scores ..</p>	

Sep 4 2020	Furtado et al., The Lancet, doi:10.1016/S0140-6736(20)31862-6	Azithromycin in addition to standard of care versus standard of care alone in the treatment of patients admitted to the hospital with severe COVID-19 in Brazil (COALITION II): a randomised clinical trial
	Small RCT comparing the addition of AZ for very late stage patients on ventilation or oxygen. No significant difference was found, OR 1.36, p=0.11. One notable result is that even within this extremely late stage population, results suggest..	
Sep 2 2020	Wang et al., Phytomedicine, doi:10.1016/j.phymed.2020.153333	Chloroquine and hydroxychloroquine as ACE2 blockers to inhibit viropexis of 2019-nCoV Spike pseudotyped virus
	In Vitro study providing novel insights into the molecular mechanism of CQ/HCQ treatment, showing that CQ and HCQ both inhibit the entrance of 2019-nCoV into cells by blocking the binding of the virus with ACE2.	
Sep 2 2020	Heras et al., European Geriatric Medicine, doi:10.1007/s41999-020-00432-w (date from preprint)	COVID-19 mortality risk factors in older people in a long-term care center
	96% lower mortality (p=0.004). Retrospective 100 COVID+ elderly nursing home patients, HCQ+AZ mortality 11.4% vs. control 61.9%, RR 0.18, p<0.001. Median age 85.	
Sep 2 2020	de la Iglesia et al., medRxiv, doi:10.1101/2020.08.31.20185314	Hydroxicloroquine for pre-exposure prophylaxis for SARS-CoV-2
	43% more cases (p=0.15). Analysis of autoimmune disease patients on HCQ, compared to a control group from the general population (matched on age and sex, but not adjusted for autoimmune disease), showing non-significant differences between groups. Other research ..	

Sep 1 2020	Hecel et al., Pharmaceuticals, 13:9, 228, doi:10.3390/ ph13090228	Zinc(II)—The Overlooked Éminence Grise of Chloroquine’s Fight against COVID-19?
	Review of zinc as an inhibitor of SARS-CoV-2’s RNA-dependent RNA polymerase, and zinc ionophores including CQ/HCQ, showing the latest evidence for zinc and CQ/HCQ having antiviral, and in particular anticoronaviral action.	
Sep 1 2020	Elbazidi et al., New Microbes and New Infections, doi:10.1016/ j.nmni.2020.100749	Pandemic and social changes, political fate
	Analysis of US states and countries. Country analysis shows a significant correlation between the dates of decisions to adopt/decline HCQ, and corresponding trend changes in CFR. US state analysis shows a significant correlation between C..	
Aug 30 2020	Sarwar et al., NCT04346667	Post-Exposure Prophylaxis for Asymptomatic SARS-CoV-2 COVID-19 Patients With chloroquinE Compounds (PEACE)
	125 participant HCQ prophylaxis RCT with results not reported over 3 years after completion.	
Aug 30 2020	Sarwar et al., NCT04351191	PRophylaxis of Exposed COVID-19 Individuals With Mild Symptoms Using chloroquinE Compounds (PRECISE)
	137 patient HCQ early treatment RCT with results not reported over 3 years after completion.	
Aug 30 2020	Albani et al., J, Clinical Medicine, doi:10.3390/ jcm9092800	Impact of Azithromycin and/or Hydroxychloroquine on Hospital Mortality in COVID-19
	18% lower mortality (p=0.15) and 9% higher ICU admission (p=0.7). Retrospective 1376 hospitalized patients in Italy, 211 treated with HCQ and 166 with HCQ+AZ.	

Aug 29 2020	Castillo et al., Journal of Steroid Biochemistry and Molecular Biology, 203, October 2020, doi:10.1016/j.jsbmb.2020.105751	Effect of calcifediol treatment and best available therapy versus best available therapy on intensive care unit admission and mortality among patients hospitalized for COVID-19: A pilot randomized clinical study
	RCT on calcifediol (25-hydroxyvitamin D) treatment for hospitalized COVID-19 patients showing significantly reduced intensive care unit admissions. All patients received standard care including HCQ+AZ. Significantly lower ICU admission wi..	
Aug 28 2020	Fried et al., Clinical Infectious Disease, doi:10.1093/cid/ciaa1268	Patient Characteristics and Outcomes of 11,721 Patients with COVID19 Hospitalized Across the United States
	27% higher mortality (p=0.001). Database analysis of 11,721 hospitalized patients, 4,232 on HCQ. Strong evidence for confounding by indication and compassionate use of HCQ. 24.9% of HCQ patients were on mechanical ventilation versus 12.2% control. Ventilation mortality ..	
Aug 27 2020	Ferri et al., Clinical Rheumatology, doi:0.1007/s10067-020-05334-7	COVID-19 and rheumatic autoimmune systemic diseases: report of a large Italian patients series
	63% fewer cases (p=0.02). Analysis of 1641 systemic autoimmune disease patients showing csDMARD (HCQ etc.) RR 0.37, p=0.015. csDMARDs include HCQ, CQ, and several other drugs, so the effect of HCQ/CQ alone could be higher. This study also confirms that the risk of..	
Aug 26 2020	Fiolet et al., Clinical Microbiology and Infection	Effect of hydroxychloroquine with or without azithromycin on the mortality of COVID-19 patients: a systematic review and meta-analysis
	Meta analysis of late stage studies (and one early treatment study with only 2 deaths), showing HCQ RR 0.83 [0.65-1.06], before exclusions RR 0.80 [0.65-1.0]. Authors claim "HCQ alone is not effective", but the result directly c..	

<p>Aug 25 2020</p>	<p>Ip et al., BMC Infectious Diseases, doi:10.1186/s12879-021-05773-w (date from preprint)</p>	<p>Hydroxychloroquine in the treatment of outpatients with mildly symptomatic COVID-19: A multi-center observational study</p>
<p>55% lower mortality (p=0.43) and 37% lower hospitalization (p=0.04). Retrospective 1,274 outpatients, 47% reduction in hospitalization with HCQ with propensity matching, HCQ OR 0.53 [0.29-0.95]. Sensitivity analyses revealed similar associations. Adverse events were not increased (2% QTc prolongation event..</p>		
<p>Aug 25 2020</p>	<p>Di Castelnuovo et al., European J. Internal Medicine, doi:10.1016/j.ejim.2020.08.019</p>	<p>Use of hydroxychloroquine in hospitalised COVID-19 patients is associated with reduced mortality: Findings from the observational multicentre Italian CORIST study</p>
<p>30% lower mortality (p<0.0001). Retrospective 3,451 hospitalized patients, 30% reduction in mortality with HCQ after propensity adjustment, HR 0.70 [0.59 - 0.84].</p>		
<p>Aug 24 2020</p>	<p>Connor et al., NCT04352946</p>	<p>HEalth Care Worker pROphylaxis Against COVID-19: The HERO Trial (HERO)</p>
<p>Estimated 374 participant HCQ prophylaxis RCT with results not reported over 3 years after estimated completion.</p>		
<p>Aug 24 2020</p>	<p>Catteau et al., Int. J. Antimicrobial Agents, doi:10.1016/j.ijantimicag.2020.106144</p>	<p>Low-dose Hydroxychloroquine Therapy and Mortality in Hospitalized Patients with COVID-19: A Nationwide Observational Study of 8075 Participants</p>
<p>32% lower mortality (p<0.0001). Retrospective 8,075 hospitalized patients, 4,542 low-dose HCQ, 3,533 control. 35% lower mortality for HCQ (17.7% vs. 27.1%), adjusted HR 0.68 [0.62–0.76]. Low-dose HCQ monotherapy was independently associated with lower mortality in hospi..</p>		

<p>Aug 23 2020</p>	<p>Pasquini et al., Journal of Antimicrobial Chemotherapy, doi:10.1093/jac/dkaa321</p>	<p>Effectiveness of remdesivir in patients with COVID-19 under mechanical ventilation in an Italian ICU</p>
<p>16% lower mortality (p=0.34). Retrospective 51 ICU patients under mechanical ventilation, 33 treated with HCQ, showing unadjusted lower mortality with treatment.</p>		
<p>Aug 21 2020</p>	<p>Ly et al., International Journal of Antimicrobial Agents, doi:10.1016/j.ijantimicag.2020.106219 (date from preprint)</p>	<p>Pattern of SARS-CoV-2 infection among dependant elderly residents living in retirement homes in Marseille, France, March-June 2020</p>
<p>56% lower mortality (p=0.02). Retrospective analysis of retirement homes, HCQ+AZ >= 3 days mortality OR 0.37, p=0.02. 1690 elderly residents (mean age 83), 226 infected residents, 116 treated with HCQ+AZ >= 3 days. Detection via mass screening also showed significant ..</p>		
<p>Aug 21 2020</p>	<p>Lane et al., The Lancet Rheumatology, doi:10.1016/S2665-9913(20)30276-9</p>	<p>Risk of hydroxychloroquine alone and in combination with azithromycin in the treatment of rheumatoid arthritis: a multinational, retrospective study</p>
<p>Retrospective study of RA patients using HCQ vs. sulfasalazine (another DMARD). HCQ treatment showed no increased risk in the short term (up to 30 days) among patients with RA. Long term use was associated with excess cardiovascular morta..</p>		
<p>Aug 21 2020</p>	<p>Gonzalez et al., medRxiv, doi:10.1101/2020.08.18.20172874</p>	<p>The Prognostic Value of Eosinophil Recovery in COVID-19: A Multicentre, Retrospective Cohort Study on Patients Hospitalised in Spanish Hospitals</p>
<p>27% lower mortality (p=0.06). Retrospective study focused on eosinophil recovery with 9,644 hospitalized patients in Spain, showing lower mortality for HCQ (14.7% vs 29.2%, p<0.001), and AZ (15.3% vs. 18.4%, p<0.001). With a multivariate model including potential conf..</p>		

Aug 20 2020	Dubernet et al., J. Global Antimicrobial Resistance, doi:10.1016/ j.jgar.2020.08.001	A comprehensive strategy for the early treatment of COVID-19 with azithromycin/ hydroxychloroquine and/or corticosteroids: results of a retrospective observational study in the French overseas department of Reunion Island
	88% lower ICU admission (p=0.008). Retrospective analysis of 36 hospitalized patients showing HCQ/AZ associated with lower ICU admission, p=0.008. Median age 66, no mortality. Confounding by indication, however it was patients with hypoxemic pneumonia that were treated with.	
Aug 20 2020	Prodromos, C., New Microbes and New Infections, doi:10.1016/ j.nmni.2020.100747	Hydroxychloroquine is protective to the heart, not harmful: A systematic review
	Review concluding that HCQ/AZ does not cause Torsade de Pointes or related deaths, HCQ decreases cardiac events, and HCQ should not be restricted in use for COVID-19 patients because of fear of cardiac mortality.	
Aug 18 2020	Pinato et al., Cancer Discovery, doi:10.1158/2159-8290 .CD-20-0773	Clinical portrait of the SARS-CoV-2 epidemic in European cancer patients
	59% lower mortality (p=0.0001). Retrospective 890 cancer patients with COVID-19, adjusted mortality HR for HCQ/CQ 0.41, p<0.0001. Confirmed SARS-CoV-2 infection was required, which may help focus on more severe cases. Analysis with Cox proportional hazard model. Potent..	
Aug 15 2020	El-Sherbiny et al., NCT04477083	Development and Validation of "Ready-to-Use" Inhalable Forms of Hydroxychloroquine for Treatment of COVID-19
	Estimated 40 patient HCQ inhaled late treatment RCT with results not reported over 3 years after estimated completion.	
Aug 15 2020	Peters et al., Clinical Microbiology and Infection, doi:10.1016/ j.cmi.2020.10.004 (date from preprint)	Outcomes of Persons With COVID-19 in Hospitals With and Without Standard Treatment With (Hydroxy)chloroquine

	<p>9% higher mortality (p=0.57). Retrospective study of HCQ use in 9 hospitals in the Netherlands, showing no significant difference in mortality with HCQ/CQ or dexamethasone. Late stage (admitted to hospital with positive test or CT scan abnormalities). 4 of 7 hospitals..</p>	
Aug 14 2020	Abd-Elsalam et al., American Journal of Tropical Medicine and Hygiene, doi:10.4269/ ajtmh.20-0873	Hydroxychloroquine in the Treatment of COVID-19: A Multicenter Randomized Controlled Study
	This study was retracted.	
Aug 13 2020	Roomi et al., J. Medical Internet Research, doi:10.2196/21758	Efficacy of hydroxychloroquine and tocilizumab in patients with COVID-19: A single-center retrospective chart review
	38% higher mortality (p=0.54). Retrospective 176 hospitalized patients (144 HCQ, 32 control) showing no significant differences with HCQ or TCZ. Confounding by indication.	
Aug 12 2020	Pablos et al., Annals of the Rheumatic Diseases, doi:10.1136/ annrheumdis-2020-218 296	Clinical outcomes of hospitalised patients with COVID-19 and chronic inflammatory and autoimmune rheumatic diseases: a multicentric matched cohort study
	126% higher severe cases (p=0.002). Retrospective 228 rheumatic disease and 228 non-rheumatic disease hospitalized COVID-19 patients in Spain, showing higher risk of severe COVID-19 with HCQ treatment.	
Aug 11 2020	Tarek et al., European Journal of Drug Metabolism and Pharmacokinetics, doi:10.1007/ s13318-020-00640-6	Pharmacokinetic Basis of the Hydroxychloroquine Response in COVID-19: Implications for Therapy and Prevention
	In Silico analysis of HCQ treatment showing concluding that HCQ may affect viral clearance if administered early enough when the virus is still confined to the pharyngeal cavity; HCQ's effects against SARS-CoV-2 might be exerted more thro..	

<p>Aug 11 2020</p>	<p>Bakhshaliyev et al., J. Electrocardiology, doi:10.1016/j.jelectrocard.2020.08.008</p>	<p>The effect of 5-day course of hydroxychloroquine and azithromycin combination on QT interval in non-ICU COVID19(+) patient</p>
<p>Safety study of 109 patients showing 5 days of HCQ+AZ did not lead to clinically significant QT prolongation or other conduction delays compared to baseline ECG in non-ICU patients.</p>		
<p>Aug 11 2020</p>	<p>Saleemi et al., medRxiv, doi:10.1101/2020.08.05.20151027</p>	<p>Time to negative PCR from symptom onset in COVID-19 patients on Hydroxychloroquine and Azithromycin - A real world experience</p>
<p>21% slower viral clearance (p=0.05). Retrospective 65 HCQ+AZ, 20 control patients, showing median time to negative PCR of 23 days for HCQ+AZ vs. 19 days for control. Confounding by indication. 100% of non-HCQ group had mild disease vs. 63% of the HCQ+AZ group. More comorbidi..</p>		
<p>Aug 8 2020</p>	<p>Lopez et al., Int. J. Antimicrob. Agents, doi:/j.ijantimicag.2020.106136</p>	<p>Effects of Hydroxychloroquine on Covid-19 in Intensive Care Unit Patients: Preliminary Results</p>
<p>Small retrospective study of 29 ICU patients comparing those with HCQ plasma concentration within target to those with a concentration below the target value, with no significant differences found. Mortality in the on-target group was 0% ..</p>		
<p>Aug 6 2020</p>	<p>Salvarani et al., Arthritis & Rheumatology, doi:10.1002/art.41475</p>	<p>Susceptibility to COVID-19 in Patients Treated With Antimalarials: A Population-Based Study in Emilia-Romagna, Northern Italy</p>
<p>6% fewer cases (p=0.75). Comparison of CQ/HCQ users with the general population in a region of Italy, showing no significant difference in the probability of COVID-19. CQ/HCQ users were mostly systemic autoimmune disease patients and authors do not adjust for the..</p>		

Aug 6 2020	McCullough et al., The American Journal of Medicine, doi:10.1016/j.amjmed.2020.07.003	Pathophysiological Basis and Rationale for Early Outpatient Treatment of SARS-CoV-2 (COVID-19) Infection
	Review of pathophysiological principles related to early outpatient treatment and therapeutic approaches including reduction of reinoculation, combination antiviral therapy, immunomodulation, antiplatelet/antithrombotic therapy, and admin..	
Aug 6 2020	Watanabe et al., Open Letter	Concerns regarding the misinterpretation of statistical hypothesis testing in clinical trials for COVID-19
	Open letter signed by 38 professors and doctors regarding misinterpretation of statistics in HCQ RCTs. Authors note [veja.abril.com.br] that data from RCTs for early treatment in outpatients to date actually show favorable effects, especi..	
Aug 5 2020	Singer et al., Annals of the Rheumatic Diseases, doi:10.1136/annrheumdis-2020-218500	Hydroxychloroquine ineffective for COVID-19 prophylaxis in lupus and rheumatoid arthritis
	9% more cases (p=0.62) . Comparison of the percentage of SLE/RA patients on immunosuppressants that were taking HCQ, for COVID-19 diagnosis versus other infections or outpatient visits, finding a similar percentage in each case. No mortality of severity informati..	
Aug 5 2020	Kalligeros et al., Journal of Global Antimicrobial Resistance, doi:10.1016/j.jgar.2020.07.018	Hydroxychloroquine use in hospitalised patients with COVID-19: An observational matched cohort study
	67% higher mortality (p=0.57) . Small retrospective database analysis of 36 patients receiving HCQ not showing significant differences. Confounding by indication is likely.	

Aug 4 2020	Kamran et al., medRxiv, doi:10.1101/2020.07.30 .20165365	Clearing the fog: Is HCQ effective in reducing COVID-19 progression: A randomized controlled trial
	5% lower progression (p=1) and 26% improved viral clearance (p=0.001). Study of 349 low-risk hospitalized patients with 151 non-consenting or ineligible patients used as controls. SOC included zinc, vitamin C and vitamin D. A statistically significant improvement in PCR negativity is shown at day 7 with HCQ ..	
Aug 3 2020	Berenguer et al., Clinical Microbiology and Infection, doi:10.1016/ j.cmi.2020.07.024	Characteristics and predictors of death among 4035 consecutively hospitalized patients with COVID-19 in Spain
	18% lower mortality (p=0.0001). Retrospective 4035 hospitalized patients in Spain showing reduced mortality with HCQ (data is in the supplementary appendix).	
Aug 3 2020	Yu et al., Science China Life Sciences, 2020 Aug 3, doi:10.1007/ s11427-020-1782-1	Beneficial effects exerted by hydroxychloroquine in treating COVID-19 patients via protecting multiple organs
	83% lower progression (p=0.05) and 85% lower mortality (p=0.02). Retrospective 2,882 patients in China, median age 62, 278 receiving HCQ, median 10 days post hospitalization, showing that HCQ treatment can reduce systemic inflammation and inhibit the cytokine storm, thus protecting multiple organs from..	
Aug 2 2020	Davido et al., Int. J. Antimicrobial Agents, 2020, doi:10.1016/ j.ijantimicag.2020.1061 29	Impact of medical care including anti-infective agents use on the prognosis of COVID-19 hospitalized patients over time
	55% lower combined intubation/hospitalization (p=0.04). Retrospective of 132 hospitalized patients. HCQ+AZ(52)/AZ(28) significantly reduced death/ICU, HR=0.45, p=0.04. Adjusted for Charlson Comorbidity Index (including age), obesity, O2, lymphocyte count, and treatments. Mean delay from admiss..	

Aug 2 2020	Sheaff, R., bioRxiv, doi:10.1101/2020.08.02 .232892	A New Model of SARS-CoV-2 Infection Based on (Hydroxy)Chloroquine Activity
	In Vitro study presenting a new theory on SARS-CoV-2 infection and why HCQ/CQ provides benefits, which potentially explains the observed relationships with smoking, diabetes, obesity, age, and treatment delay, and confirms the importance ..	
Aug 1 2020	Bernabeu-Wittel et al., J. Gerontol. A Biol. Sci. Med. Sci., doi:10.1093/ gerona/glaa192	Effectiveness of a On-Site Medicalization Program for Nursing Homes with COVID-19 Outbreaks
	59% lower mortality (p=0.03). Retrospective 272 nursing home residents showing significantly improved survival after establishing a treatment program including HCQ with or without lopinavir/ritonavir and with the addition of adjuvant and antimicrobial treatments depen..	
Jul 31 2020	Ajili et al., NCT04377646	A Study of Hydroxychloroquine and Zinc in the Prevention of COVID-19 Infection in Military Healthcare Workers (COVID-Milit)
	Estimated 660 participant HCQ prophylaxis RCT with results not reported over 3 years after estimated completion.	
Jul 31 2020	Mežnar et al., NCT04355026	Use of Bromhexine and Hydroxychloroquine for Treatment of COVID-19 Pneumonia
	Estimated 90 patient HCQ late treatment RCT with results not reported over 3 years after estimated completion.	
Jul 31 2020	Mazzitelli et al., Travel Medicine and Infectious Disease, 37, doi:10.1016/ j.tmaid.2020.101826	Apparent inefficacy of hydroxychloroquine combined with azithromycin on SARS-CoV-2 clearance in an incident cohort of geriatric patients with COVID-19
	Report on HCQ+AZ use in 41 elderly high-risk patients. 29 of 30 patients with treatment >= 5 days survived. Only 10% were PCR negative after one week, however the Ct value is not specified.	

Jul 29 2020	D'Arminio Monforte et al., Int. J. Infectious Diseases, doi:10.1016/j.ijid.2020.07.056	Effectiveness of Hydroxychloroquine in COVID-19 disease: A done and dusted situation?
	34% lower mortality (p=0.12). HCQ+AZ adjusted death HR 0.44, p=0.009. Propensity scores include baseline COVID-19 disease severity, age, gender, number of comorbidities, cardio-vascular disease, duration of symptoms, date of admission, baseline plasma CRP. IPW censori..	
Jul 28 2020	Başaran et al., Turk. J. Med. Sci., doi:10.3906/sag-2006-173	Outcome of Non-Critical COVID-19 Patients with Early Hospitalization and Early Antiviral Treatment Outside the ICU
	Observational study of 174 hospitalized patients in Turkey, median age 45.4, 23 treated with HCQ, 113 with HCQ+AZ, and 32 with regimens including favipiravir. 75% reduction in the median time to clinical improvement for HCQ+AZ vs. FAV, RR..	
Jul 27 2020	Novartis, NCT04358081	Hydroxychloroquine Monotherapy and in Combination With Azithromycin in Patients With Moderate and Severe COVID-19 Disease
	71% higher hospital discharge (p=0.42), 71% greater improvement (p=0.42), and 79% worse viral clearance (p=0.56). Early terminated RCT with only 20 patients.	
Jul 27 2020	Santos et al., Clinical Rheumatology, doi:10.1007/s10067-020-05301-2	Determinants of COVID-19 disease severity in patients with underlying rheumatic disease
	92% lower mortality (p=0.19). Prospective study of 38 hospitalized rheumatic disease patients with COVID-19 in Spain, showing no mortality with existing HCQ use compared to 32% without, not reaching statistical significance.	
Jul 26	Mitjà et al., NEJM, doi:10.1056/NEJMoa2021801 (date from preprint)	A Cluster-Randomized Trial of Hydroxychloroquine as Prevention of Covid-19 Transmission and Disease

2020	<p>46% lower mortality (p=0.39), 17% lower hospitalization (p=0.71), and 32% fewer cases (p=0.27). For positive symptomatic cases, a greater effect is seen for nursing home residents, RR=0.49 [0.21 - 1.17], vs. overall 0.89, possibly because the exposure events are identified faster in this context, versus home exposure where testing o..</p>	
Jul 24 2020	<p>Khurana et al., medRxiv, doi:10.1101/2020.07.21 .20159301</p>	<p>Prevalence and clinical correlates of COVID-19 outbreak among healthcare workers in a tertiary level hospital</p>
<p>51% fewer cases (p=0.02). Study of hospital health care workers showing HCQ prophylaxis reduces COVID-19 significantly, OR 0.30, p=0.02. 94 positive health care workers with a matched sample of 87 testing negative. Full course prophylaxis was important in this stu..</p>		
Jul 23 2020	<p>Cavalcanti et al., NEJM, doi:10.1056/ NEJMoa2019014</p>	<p>Hydroxychloroquine with or without Azithromycin in Mild-to-Moderate Covid-19</p>
<p>16% lower mortality (p=0.77) and 28% higher hospitalization (p=0.3). Late stage RCT of 667 hospitalized patients with up to 14 days of symptoms at enrollment and receiving up to 4 liters per minute supplemental oxygen, not finding a significant effect after 15 days. Authors note: "the trial cannot def..</p>		
Jul 22 2020	<p>Kadnur et al., Journal of Family Medicine and Primary Care, doi:10.4103/ jfmmpc.jfmmpc_1177_21</p>	<p>Hydroxychloroquine pre-exposure prophylaxis for COVID-19 among healthcare workers: Initial experience from India</p>
<p>62% fewer cases (p=0.01). Prophylaxis study with 334 low-risk healthcare workers in India, showing significantly lower risk of cases with treatment. Symptomatic patients received PCR results, but only some asymptomatic patients did, so there may have been addition..</p>		
Jul 22 2020	<p>Ou et al., PLOS Pathogens, doi:10.1371/ journal.ppat.1009212 (date from preprint)</p>	<p>Hydroxychloroquine-mediated inhibition of SARS-CoV-2 entry is attenuated by TMPRSS2</p>

	<p>In Vitro analysis showing that HCQ efficiently blocks viral entry mediated by cathepsin L, but not by TMPRSS2, and that a combination of HCQ and a TMPRSS2 inhibitor prevents SARS-CoV-2 infection more potently than either drug alone.</p>	
Jul 22 2020	<p>Hoffmann et al., Nature, (2020), doi:10.1038/ s41586-020-2575-3</p>	<p>Chloroquine does not inhibit infection of human lung cells with SARS-CoV-2</p>
	<p>The title of this paper does not appear to match the results. Fig. 1b @100uM shows CQ results in a ~4.5 fold decrease (on a linear scale) in extracellular virus, p=0.05, after 24 hours (we do not see the supplementary data at this time so..</p>	
Jul 22 2020	<p>Rivera et al., Cancer Discovery, doi:10.1158/2159-8290 .CD-20-0941</p>	<p>Utilization of COVID-19 Treatments and Clinical Outcomes among Patients with Cancer: A COVID-19 and Cancer Consortium (CCC19) Cohort Study</p>
	<p>2% higher mortality (p=0.92). Retrospective cancer patients, showing adjusted OR 1.03 [0.62-1.73] for HCQ. The study reports the number of HCQ+AZ patients but they do not provide results for HCQ+AZ (only HCQ + any other treatment). Significant confounding by indicatio..</p>	
Jul 22 2020	<p>Kelly et al., British Journal of Clinical Pharmacology, doi:10.1111/bcp.14482</p>	<p>Clinical outcomes and adverse events in patients hospitalised with COVID-19, treated with off-label hydroxychloroquine and azithromycin</p>
	<p>143% higher mortality (p=0.03). Retrospective 82 hospitalized patients HCQ/AZ, 52 SOC, not finding statistically significant differences. Confounding by indication - authors note that the HCQ/AZ patients were more severely ill, and do not attempt to adjust for confounde..</p>	
Jul 21 2020	<p>Bernaola et al., medRxiv, doi:10.1101/2020.07.17 .20155960</p>	<p>Observational Study of the Efficiency of Treatments in Patients Hospitalized with Covid-19 in Madrid</p>

	<p>17% lower mortality ($p<0.0001$). HCQ HR 0.83 [0.77-0.89] based on propensity score matched retrospective analysis of 1,645 hospitalized patients. Prednisone HR 0.85 [0.82-0.88], 14 other medications showed either no significant benefit or a negative effect.</p>	
<p>Jul 20 2020</p>	<p>Krishnan et al., J Clin Anesth., doi:10.1016/j.jclinane.2020.110005</p>	<p>Clinical comorbidities, characteristics, and outcomes of mechanically ventilated patients in the State of Michigan with SARS-CoV-2 pneumonia</p>
	<p>20% lower mortality ($p=0.48$). Retrospective 152 mechanically ventilated patients in the USA showing unadjusted lower mortality with vitamin C, vitamin D, HCQ, and zinc treatment, statistically significant only for vitamin C.</p>	
<p>Jul 20 2020</p>	<p>Desbois et al., Research Square, doi:10.21203/rs.3.rs-41653/v1</p>	<p>Prevalence and clinical features of COVID-19 in a large cohort of 199 patients with sarcoidosis</p>
<p>Jul 20 2020</p>	<p>Risch, H., American Journal of Epidemiology, July 20, 2020, doi:10.1093/aje/kwaa152</p>	<p>Response to: "Early Outpatient Treatment of Symptomatic, High-Risk Covid-19 Patients" and "Re: Early Outpatient Treatment of Symptomatic, High-Risk Covid-19 Patients that Should be Ramped-Up Immediately as Key to the Pandemic Crisis"</p>
	<p>Updated meta analysis including 7 new studies of high-risk outpatients, for a total of 12 studies, all showing significant benefit.</p>	
<p>Jul 18 2020</p>	<p>Watanabe, M., arXiv.org, arXiv:2007.09477</p>	<p>Efficacy of Hydroxychloroquine as Prophylaxis for Covid-19</p>
	<p>Secondary analysis of Boulware et al.'s PEP trial and treatment delay-response data, confirming that HCQ is effective when used early, $p<0.01$. The effectiveness found is especially notable considering the limitations of the study. Treatme..</p>	

<p>Jul 19 2020</p>	<p>McGrail et al., medRxiv, doi:10.1101/2020.07.17 .20156521</p>	<p>COVID-19 Case Series at UnityPoint Health St. Luke's Hospital in Cedar Rapids, IA</p>
<p>70% higher mortality (p=0.69). HCQ+AZ early in the epidemic had a fairly good success rate with few complications, 86% of HCQ patients survived and 92% of HCQ+AZ patients. Patients not receiving either had 93% survival but were not considered comparable because the tre..</p>		
<p>Jul 17 2020</p>	<p>Lyngbakken et al., Nature Communications, doi:10.1038/ s41467-020-19056-6</p>	<p>A pragmatic randomized controlled trial reports lack of efficacy of hydroxychloroquine on coronavirus disease 2019 viral kinetics</p>
<p>4% lower mortality (p=1) and 71% improved viral reduction rate (p=0.51). Small RCT of nasopharyngeal viral load not showing significant differences. The rate of reduction for HCQ was 0.24 [0.03-0.46] RNA copies/mL/24h, and 0.14 [-0.10-0.37] for the control group (71% faster with HCQ but not statistically signi..</p>		
<p>Jul 16 2020</p>	<p>Hong et al., Infect. Chemother., 2020, doi:10.3947/ ic.2020.52.e43</p>	<p>Early Hydroxychloroquine Administration for Rapid Severe Acute Respiratory Syndrome Coronavirus 2 Eradication</p>
<p>65% improved viral clearance (p=0.001). HCQ 1-4 days from diagnosis was the only protective factor against prolonged viral shedding found, OR 0.111, p=0.001. 57.1% viral clearance with 1-4 days delay vs. 22.9% for 5+ days delayed treatment. Authors report that early administrat..</p>		
<p>Jul 16 2020</p>	<p>Skipper et al., Annals of Internal Medicine, doi:10.7326/M20-4207</p>	<p>Hydroxychloroquine in Nonhospitalized Adults With Early COVID-19: A Randomized Trial</p>
<p>37% lower combined mortality/hospitalization (p=0.58), 49% lower hospitalization (p=0.38), and 20% improved recovery (p=0.21). Update: we have not received details for treatment delay. An author reports that treatment initiation time was not recorded: [osf.io]. Conflicting estimates are provided in a comment of the article and independent analysis, with reports i..</p>		

Jul 16 2020	Mitjà et al., Clinical Infectious Diseases, ciaa1009, doi:10.1093/cid/ciaa1009	Hydroxychloroquine for Early Treatment of Adults with Mild Covid-19: A Randomized-Controlled Trial
	16% lower hospitalization (p=0.64), 34% improved recovery (p=0.38), and 2% improved viral clearance. This paper has conflicting values, table S2 shows 12 control hospitalizations, while table 2 shows 11. The original report for this paper had more conflicting values, with values reported in Table 2 and the abstract corresponding to 12 co..	
Jul 15 2020	Gupta et al., JAMA Intern. Med., doi:10.1001/jamainternmed.2020.3596	Factors Associated With Death in Critically Ill Patients With Coronavirus Disease 2019 in the US
	6% higher mortality (p=0.41). Analysis of 2,215 intensive care unit patients showing no significant differences with this very late stage use of HCQ.	
Jul 15 2020	Kavanagh et al., Med. Hypotheses, doi:10.1016/j.mehy.2020.110110	Inhaled hydroxychloroquine to improve efficacy and reduce harm in the treatment of COVID-19
	Proposal to use an inhaled formulation of HCQ which has passed safety studies in clinical trials for the treatment of asthma. Authors advocate for early treatment or prophylaxis of COVID-19, using HCQ as an inhaled aerosol, to deliver the..	
Jul 14 2020	Trullàs et al., Research Square, doi:10.21203/rs.3.rs-39421/v1	High in-hospital mortality due to COVID-19 in a community hospital in Spain: a prospective observational study
	36% lower mortality (p=0.12). Retrospective 100 hospitalized patients in Spain showing lower mortality with HCQ+AZ.	

Jul 14 2020	Chowdhury et al., Eurasian Journal of Medicine and Oncology, doi:10.14744/ ejmo.2021.16263	A Randomized Trial of Ivermectin-Doxycycline and Hydroxychloroquine-Azithromycin therapy on COVID19 patients
	Small 116 patient RCT comparing ivermectin+doxycycline and HCQ+AZ, not showing a significant difference in time to PCR negative or symptom resolution. Time to symptomatic recovery was 5.93 days for ivermectin+doxycycline vs. 6.99 days for..	
Jul 11 2020	Lecronier et al., Critical Care, 24:418, 2020, doi:10.1186/ s13054-020-03117-9	Comparison of hydroxychloroquine, lopinavir/ritonavir, and standard of care in critically ill patients with SARS-CoV-2 pneumonia: an opportunistic retrospective analysis
	42% lower mortality (p=0.24), 6% lower treatment escalation (p=0.73), and 15% improved viral clearance (p=0.61). Retrospective 80 ICU patients, 22 SOC, 20 lopinavir/ritonavir, 38 HCQ. 28 day mortality 24% (HCQ) versus 41% (SOC), a 41% decrease, but not statistically significant due to very small sample sizes. No statistically significant differences..	
Jul 10 2020	Cravedi et al., American Journal of Transplantation, doi:10.1111/ajt.16185	COVID-19 and kidney transplantation: Results from the TANGO International Transplant Consortium
	53% higher mortality (p=0.17). Analysis of 144 hospitalized kidney transplant patients showing HCQ mortality HR 1.53, p = 0.17. Subject to confounding by indication.	
Jul 10 2020	Chen et al., PLoS ONE, doi:10.1371/ journal.pone.0242763	A Multicenter, randomized, open-label, controlled trial to evaluate the efficacy and tolerability of hydroxychloroquine and a retrospective study in adult patients with mild to moderate Coronavirus disease 2019 (COVID-19)
	24% improved viral clearance (p=0.71). 2 very small studies with hospitalized patients in Taiwan. RCT with 21 treatment and 12 SOC patients. No mortality, or serious adverse effects. Median time to negative RNA 5 days versus 10 days SOC, p=0.4. Risk of PCR+ at day 14, RR 0.76,..	

Jul 9 2020	Rivera-Izquierdo et al., Medicina Clínica, doi:10.1016/ j.medcli.2020.06.025	Agentes terapéuticos utilizados en 238 pacientes hospitalizados por COVID-19 y su relación con la mortalidad
	19% lower mortality (p=0.75). Retrospective 238 hospitalized patients in Spain showing lower mortality with HCQ, adjusted hazard ratio aHR 0.81 [0.24-2.76].	
Jul 9 2020	Raoult et al., Preprint	Hydroxychloroquine and Azithromycin as a Treatment of COVID-19: Results of an Open-Label Non-Randomized Clinical Trial: Response to David Spencer (Elsevier)
	Updated meta analysis showing significant reductions in mortality and viral shedding. Mortality OR 0.53 [0.4-0.71] for clinical studies, 0.92 big data studies, 18,211 patients. Persistent viral shedding OR 0.47 [0.28-0.79], 4,540 patients.	
Jul 8 2020	Smith et al., NCT04358068	Evaluating the Efficacy of Hydroxychloroquine and Azithromycin to Prevent Hospitalization or Death in Persons With COVID-19
	64% lower hospitalization (p=1) and 10% slower recovery. Early terminated NIAID RCT for HCQ. Patients >60 were only in the HCQ arm. 57% of patients were high risk in the HCQ arm vs. 22% for control. Treatment started up to 20 days after symptoms.	
Jul 8 2020	Marzolini et al., Antimicrobial Agents and Chemotherapy, doi:10.1128/ AAC.01177-20	Effect of Systemic Inflammatory Response to SARS-CoV-2 on Lopinavir and Hydroxychloroquine Plasma Concentrations
	Study of Lopinavir and HCQ plasma concentrations and CRP levels in late stage (treatment initiation median 8 days from onset) COVID-19 patients. The median HCQ plasma concentration was 171 ng/ml, which authors suggest indicates that HCQ l..	
Jul 8 2020	Li et al., Cell Death & Disease volume 11, doi:10.1038/ s41419-020-2721-8	Is hydroxychloroquine beneficial for COVID-19 patients?

Review of the anti-inflammatory, antiviral, and protective vascular effects of CQ and HCQ, noting that HCQ may be preferable for COVID-19 due to fewer side effects.

Appendix with more detailed information and analysis about the issues mentioned in this report

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In August of 2021, the FDA waged a "successful" campaign against the off-label prescription of the anti-parasitic drug ivermectin to treat people diagnosed with Covid-19. The FDA campaign used manipulative propaganda to conflate human ivermectin — a pharmaceutical medication with a long history of use and an accepted record of safety ^{1 2 3} — with animal formulations of the drug, and warned people against taking both. This campaign cast shadows of doubt and risk onto human ivermectin, by loudly broadcasting the message that it isn't safe for humans to take animal formulations of ivermectin in large doses, and that there are serious risks involved with taking human forms of ivermectin — mainly by failing to follow proper indications for consumption.

Both messages — not to take an animal drug, and to take any prescribed drug only as instructed — hardly seem necessary to publicize so urgently in a culture that is as deeply entrenched in the allopathic model of medicine as the United States. People know few things with as much certainty as what you are to do when you get sick — go to the doctor, get a prescription, go to the pharmacy, pay for the pills, take as advised — and most children are brought up with regular visits to the pediatrician like he or she is a member of the family.

[Off-label drug use not illegal](#)

The campaign also aggressively promoted the message that the FDA had not approved ivermectin for the treatment of Covid-19 diagnosis, seemingly to thwart doctors' legitimate and lawful off-label prescription of this drug. According to a 2012 study by Wittich and colleagues published in *Mayo Clinic Proceedings*, "Off-label drug use involves prescribing medications for indications, or using a dosage or dosage form, that have not been approved by the US Food and Drug Administration. Since the Food and Drug Administration does not regulate the practice of medicine, OLDU has become common. It occurs in every specialty of medicine."⁴ Leaving aside a discussion of whether or not it is ethical or safe, off-label drug use it is a

perfectly normal, legal and accepted behavior for practicing doctors. Suddenly, this matter of routine was heavily vilified, blindsiding the traditional institutional and cultural respect for doctors to use their agency, expertise and discretion in treating the people who seek their aid.

Rounds and rounds of loud and tenacious repetition of the FDA's anti-ivermectin messages by the legacy media and health authorities, when combined with a pharmacy ban on the drug, vilified and all but dammed-up access to a much safer alternative to the Covid-19 mRNA injections. The latter turned out to be perhaps the most dangerous pharmaceutical products ever to be so widely distributed across the country and the world. They were responsible for the injuries and death of millions of people.⁵

The FDA's poor record of protecting the public

Ordinarily, it might come as a surprise that an agency which authorizes the use of drugs as deadly as statins,⁶ chemotherapy drugs⁷ and non-steroidal anti-inflammatory drugs (NSAIDs)⁸ — and fails to adequately regulate or warn the public of things known to decimate health such as electromagnetic radiation⁹ from cell phones and WiFi, vaccines¹⁰ and pesticides¹¹ — would be so concerned for our collective welfare.

All drugs and medical devices must be reviewed for safety and efficacy by the FDA before being commercially marketed. The FDA in turn calls upon experts in different fields to review the drugs or vaccines or medical devices to give their opinions. The FDA will use these opinions in deciding to green light the product, or ask for additional studies. The FDA does not do any studies on its own, but instead relies upon a system wherein the group manufacturing the drug, vaccine or device does its own research. History has repeatedly shown that the people or party who are overseeing the development of a clinical study on a new drug can easily manipulate the study to get the outcome they want. For example, if a group was trying to evaluate a new drug in a clinical trial, they may conduct one hundred tests. Ninety-nine out of one hundred of those tests did not demonstrate positive results, but one test demonstrated slight evidence in the drug's favor. The drug developers will use that one test as if the other ninety-nine did not exist. They do not have to show how many other studies were involved but failed — that's considered proprietary information.^{12 13 14 15}

Every drug that is used now originally received FDA approval. But many dangerous drugs have been approved for widespread use, Vioxx^{16 17 18} and hormone replacement therapy,¹⁹ to name two examples. Eventually, drugs may be found to be dangerous and either black-boxed or removed from the market. What is done for the millions of people who had used that drug in the interim? There is no compensation, there are no apologies. The drug company simply withdraws the product from the market. In some cases, if there is a class action lawsuit, the company just pays a fine and continues on its way. Nobody is held truly responsible. That lawsuit payment is just the cost of doing business. So if one thinks that the FDA is objective, does good research, is somehow truly overseeing the safety of a drug, he would be sadly mistaken.

A substantial amount of the FDA's revenue is derived from the very companies whose products it is evaluating. There is an inherent conflict of interest and bias. We've seen this repeatedly over the decades with people supporting a drug approved by the FDA process who were later found to have had a conflict of interest, having profited from either that specific drug or similar drugs. The FDA is not known to select scientists for its advisory groups, with few exceptions, who are not biased or have a conflict of interest.^{20 21}

Deaths and injuries from Covid-19 mRNA injections

According to former BlackRock portfolio manager Edward Dowd and his team of PhDs and data scientists analyzing disability, actuarial and other official data sources,²² as of March, 2023, the Covid-19 vaccines were responsible for three hundred thousand excess deaths, 26.6 million injuries, and 1.36 million disabilities.²³ He also believes they are the cause of an 84 percent increase in deaths among millennials in the United States in the third quarter of 2021.²⁴

In an interview with Dr. Naomi Wolf, founder of the news organization DailyClout, Edward Dowd disclosed that new numbers out of the UK reveal the problem is getting worse over time: "adjusted cardiovascular excess deaths in the UK are up in a signal that cannot under any circumstances be ignored. 'We observed 13 per cent increase above normal trend line in 2020, 30 per cent in 2021 and forty-four per cent in 2022... Anything above 3 standard deviations is a signal... a 3.8 standard deviation is the same as you getting hit by lightning once in your lifetime. When I say ten standard deviations this is an improbable event from the norm... Ten [standard deviations from the norm] is crazy.'"^{25 26}

Emergency Use Authorization of dangerous products and treatments

The FDA's anti-ivermectin moves effectively kicked out of the way perhaps the biggest roadblock to the Emergency Use Authorization of the Covid-19 injections. Emergency Use of a drug can only be authorized if there are no other "adequate, approved, and available alternatives"²⁷ capable of successfully treating the illness in question. Ivermectin, an FDA-approved drug, was being used successfully as an early treatment for thousands of people in the medical practices of Drs. Mary Talley Bowden, Robert L. Apter and Paul E. Marik and many, many others.^{28 29} This successful use of ivermectin was one of the greatest threats to Big Pharma's effort to force through the emergency use authorization of the Covid-19 mRNA injections.

Aside from the Covid-19 mRNA injections, the other officially-recommended pharmaceutical paths to recovering from a diagnosis of Covid-19 were few and deadly. They included no treatment, sending a person home after he was diagnosed with what was promoted at the time to be an extremely deadly illness; solitary confinement in a hospital; the administration of remdesivir, a toxic drug known to cause kidney failure; and intubation, regardless of whether the person had dysfunctional lungs; among others.

Natural alternatives completely ignored

Those doctors who were using ivermectin successfully for early treatment were also using several natural treatments, such as vitamins C and D and quercetin. Some natural treatments, such as iota-carageenan (extract from red seaweed), nigella sativa, diet, sunlight, curcumin, and melatonin demonstrate good safety and efficacy, but have not been studied half as much as ivermectin and hydroxychloroquine,³⁰ both of which, though they are some of the safer pharmaceutical drugs, do carry some side effects and risks,^{31 32} as almost any pharmaceutical product does. As is usually the case in the world of allopathic medicine, natural approaches were completely ignored or written off as "complementary" and "alternative," though earnest and thorough exploration of these may have led to an even safer, gentler and more effective treatment protocols.

The FDA's campaign not protected by "sovereign immunity"

The FDA is directly responsible for obfuscating the truth and for taking action that, lawfully or not, put a stranglehold on doctors and tied their hands from treating people with means far and away safer than what the FDA, the American Medical Association, the Department of Health and Human Services, the National Institutes of Health, the National Institute of Allergy and

Infectious Disease and the Centers for Disease Control and Prevention were recommending. Now it has been determined that indeed the FDA's anti-ivermectin campaign was not protected by sovereign immunity, the principle that a government agency cannot be prosecuted when carrying out legitimate action in fulfillment of its official purposes. "FDA can inform, but it has identified no authority allowing it to recommend consumers 'stop' taking medicine," said U.S. Circuit Judge Don Willett, one of a panel of judges who decided the appeal.

These cumulative mistakes appear as malfeasance and mismanagement of a declared health emergency, leading to the wrongful injuries and deaths of millions of Americans, by harmful hospital and drug treatments, by lack of treatment, and by swinging the door wide open to the deadly Covid-19 mRNA injections. Altogether, this malfeasance amounts to medical genocide.

Ivermectin: lauded anti-parasitic of the past

The name ivermectin may never have reached the ears of most Americans prior to 2020, unless they were involved in medicine or routine deworming. But the first form of ivermectin was marketed by Merck in 1981. Before the end of the Vietnam war, a microbiologist named Satoshi Ōmura found bacterium in a soil sample he collected from the forest near a golf course in Kawan, Japan. The family of compounds made from this bacterium were later named avermectins, a-verminous, or worm-free. Ōmura sent the sample to Merck to test for its antiparasitic effect, which it was found to have in great measure. These discoveries were the basis for the drug ivermectin,³³ which was first prescribed for humans in 1988.³⁴

A 2017 systematic review on ivermectin — titled "Ivermectin: old drug, new tricks?" — by Roz Laing, Victoria Gillan and Eileen Devaney of the University of Glasgow was published in the journal *Trends in Parasitology*. The authors called ivermectin a "versatile drug," writing, "Ivermectin is one of the most important drugs in veterinary and human medicine for the control of parasitic infection and was the joint focus of the 2015 Nobel Prize in Physiology or Medicine, some 35 years after its remarkable discovery."³⁵ Ivermectin is also known for having made it onto the World Health Organization's inventory of essential medicines.³⁶

2021: Ivermectin's reputation takes a nosedive

Considering ivermectin's wide use, reputation and record of safety, it is not surprising that some doctors started trying it out off-label during the well-orchestrated global panic around the threat of a newly-announced disease. America's Frontline Doctors were made famous by their promotion of ivermectin as one part of their recommended early treatment protocol. The problem was, doctors using ivermectin were doing too well. Their early treatment protocol was unmasking the very advantageous Covid crisis as rated not a 'ten' but a 'one' in danger.

Because the real aim of this affair appears to have been to bring the mRNA injections onto the market and universally mandate them, not to make people well, ivermectin's safety and efficacy as an early treatment was a hurdle that had to be overcome to secure emergency use authorization. So the FDA stepped in and fired a fierce round at ivermectin and the people prescribing it. The doctors who had been helping people avoid hospitalization and death were punished for their success.

New court decision: FDA steps over the line, sued in Apter v. HHS

If your doctor wouldn't prescribe ivermectin starting around 2020 or 2021, he or she may be hearing more than a few rounds of renewed complaint right now.

On Friday, September 1, 2023, a federal appeals court in New Orleans ruled that the U.S. Food and Drug Administration (FDA) had overstepped its authority through the language it had used in its public messaging to condemn "the use of ivermectin off-label to treat COVID-19."

This ruling remanded the previously-dismissed suit of three doctors, initially filed in June 2022, which alleged that Health and Human Services (HHS), two health officials, FDA Commissioner Robert Califf and HHS Secretary Xavier Becerra, and the FDA had interfered with the doctors' "authority to prescribe an approved medication and the doctor-patient relationship."³⁷ The three doctors, Mary Talley Bowden, Robert L. Apter and Paul E. Marik, also allege the actions of the agencies and officials directly resulted in harm to their reputations and careers, including penalties from their employers such as suspensions and loss of hospital privileges. The new ruling allows the case to move forward, after a district court had dismissed it, siding with the FDA. The FDA had argued the case should be dismissed "because [the doctors'] complaints didn't overcome the FDA's 'sovereign immunity,' which protects government entities from many civil lawsuits regarding their responsibilities."³⁸

Details of the FDA's campaign against ivermectin: legitimate warning or propaganda?

The FDA is not normally remembered for its tweets. In the September 1, 2023 ruling, Judge Don Willet wrote for the panel he represented that "even tweet-sized doses of personalized medical advice are beyond FDA's statutory authority." "FDA is not a physician. It has authority to inform, announce, and apprise — but not to endorse, denounce, or advise. The Doctors have plausibly alleged that FDA's [social media] posts fell on the wrong side of the line between telling about and telling to. As such, the Doctors can use the APA [Administrative Procedure Act]³⁹ to assert their *ultra vires* [action taken beyond one's legal power or authority] claims against the Agencies and the Officials."⁴⁰

Propaganda disseminated by the FDA to dissuade people from using ivermectin was presented as evidence in the case. These public messages are referred to in the court proceedings as "the Posts." They include two documents posted to the FDA website and three social media posts. The documents are an informal "Consumer Update" titled "Why You Should Not Use Ivermectin to Treat or Prevent COVID-19,"⁴¹ and another titled "FAQ: COVID-19 and Ivermectin Intended for Animals."⁴² Its social media posts, read:

"You are not a horse. You are not a cow. Seriously, y'all. Stop it."⁴³

"You are not a horse. Stop it with the #ivermectin. It's not authorized for treating #COVID."⁴⁴

"Hold your horses, y'all. Ivermectin may be trending, but it still isn't authorized or approved to treat COVID-19."⁴⁵

With each of these witty one-liners, the FDA's social media wizards included an image of a horse.

These horse-oriented posts were referred to by the FDA's communications team as "a new engagement strategy," which, they were pleased to see, was effective in influencing medical organizations, pharmacy boards, and hospitals, and were widely cited in newspapers, magazines, digital media outlets, and medical and professional advisories. Additionally, federal and state courts began citing the posts in cases involving ivermectin, and they were referenced in legal complaints and judicial opinions across the US.⁴⁶ A list of over 3907 "media partners" and partners of the "Covid Community Corps" received chunks from a pot of 4.6 trillion dollars in HHS funding for relaying official messaging to an unsuspecting public.^{47 48 49}

According to Judge Don Willett, writing for his panel of judges, by using imperative and directive language such as "stop it," these tweets "fell on the wrong side of the line between telling about and telling to." While the masses on Twitter may have gotten the message to "Stop it" in somewhat sophomoric terms, anyone who visited the FDA's website was similarly advised in a more sober and professional manner.

The words in the title of the FDA's "FAQ: COVID-19 and Ivermectin Intended for Animals" were skillfully arranged to present the phrase "ivermectin intended for animals," in such a way that, if not read carefully, could be quickly scanned to read as "ivermectin *is* intended *only* for animals." The first point of this advisory puts things bluntly: "Q: Should I take ivermectin to prevent or treat COVID-19? A: No."⁵⁰

Strangely, the following question was also included in this FAQ: "Q: What should I do if the ivermectin products I purchase for use in my animals are not available at my typical retailer? A: ... Due to potentially elevated interest in ivermectin following the new research [on ivermectin against Covid-19], some [animal ivermectin] products may not be available..."⁵¹ Now, why, when humans, if they want ivermectin, should be able to get a script from their doctors, is the FDA suggesting people may be buying — or having trouble buying — animal ivermectin to treat themselves?

The opening words of the separately posted "consumer update" strongly imply that in turning to ivermectin, doctors and people seeking treatment are using "drugs not approved or authorized by the Food and Drug Administration." Of course, ivermectin *is* approved by the Food and Drug Administration for medical use in humans — including for parasitic worms, head lice and rosacea. The document admits as much further down the page. Though this may be good propaganda, this deceptive phrasing is not, according to the ruling, unlawful for the FDA to publish, even if it may be an incorrect representation of science and medicine. However, the FDA communications did step over the line by imperatively advising the public, in addition to lawfully presenting their opinion, though why it would so misrepresent the actual science is an important question.

The 'consumer update' presents legitimate information, such as that the FDA has not approved ivermectin for the treatment of Covid-19, with a conspiratorial undertone, and between somewhat outlandish warnings which a trusting and uncritical reader might mistake for difficult-to-avoid and dangerous pitfalls of being prescribed ivermectin by his or her doctor.

These warnings include statements of the obvious: "Taking large doses of ivermectin is dangerous." This could be said alike for aspirin,^{52 53} Tylenol,^{54 55 56 57} and Benadryl.⁵⁸ Even low doses of aspirin can be dangerous.⁵⁹

"If your health care provider writes you an ivermectin prescription, fill it through a legitimate source such as a pharmacy, and take it exactly as prescribed." "Never use medications intended for animals on yourself or other people. Animal ivermectin products are very different from those approved for humans. Use of animal ivermectin for the prevention or treatment of COVID-19 in humans is dangerous." "There's a lot of misinformation around, and you may have heard that it's okay to take large doses of ivermectin. It is not okay."

All of these statements of the obvious seem strange, considering the circumstances. Why when people can get ivermectin from their doctor, would they take animal ivermectin? Did anyone really need to be reminded not to go the the hay and feed supply to get their prescription filled? Or is it just that the FDA just didn't want you taking ivermectin?

In hindsight, one might find a different message communicated in that "consumer update." Perhaps the FDA was telling us what not to do when a pharmacy ban on human formulations of ivermectin was put into effect.

Doctors using ivermectin, and the pharmacy ban intended to stop them

Drs. Bryan Tyson and George Fareed of the United States treated 20,000 people with ivermectin, reporting 99.9 percent improvement and that none of those people went to the hospital. Dr. Shankara Chetty of South Africa reported treating 8,000 with zero mortality and 100 percent improvement. Dr. Jeff Davis of the United States reported treating 6,000 people with 100 percent improvement and zero mortality. Dr. Ben Marble of the U.S. reported treating 150,000 people with zero mortality and 99.9 percent improvement. A case series of 39 physicians and their teams from around the world, all of whom used ivermectin as part of an early treatment protocol, including those physicians just mentioned, were found to have a mean improvement of over 94 percent, treating a total of 237,521 people.⁶⁰

On September 1, 2021, the AMA, the American Pharmacists Association (APhA) and the American Society of Health-System Pharmacists (ASHP) released a joint press release strongly opposing and "calling for an immediate end to"⁶¹ "the ordering, prescribing or dispensing of ivermectin to prevent or treat COVID-19 outside of a clinical trial."⁶²

From its founding, the AMA was not so much a tool to empower physicians or to broaden the scope of their knowledge, but rather one to control them and the practice of medicine in the United States. The AMA was instrumental in paring down the field of medical practice, once characterized by broad, heterogeneous and regional and individualized techniques, and forcing it into a Carnegie-funded, Flexner-approved one-size-fits-all mold, funneled through AMA-sanctioned medical schools, with little to no examination of which techniques previously in use were more effective or safe.⁶³

Still, it is unheard of for the AMA to so boldly and publicly try to preempt the independent agency and good judgment of licensed doctors on one specific issue through a coordinated national campaign. In the recent past, there has been prohibition of tobacco sales at pharmacies,⁶⁴ but not to our knowledge of an FDA-approved pharmaceutical product which doctors have the freedom to order for their patients at their discretion.

Though physician membership in the AMA has diminished considerably since its initial founding, to 15 percent of practicing physicians in 2011 from 75 percent in the early 1950s,⁶⁵ (now that number may be around 12 percent),⁶⁶ the AMA is a powerful political and economic organization, with deep financial ties to the pharmaceutical/medical device, hospital, and insurance industries. It also exerts considerable direct power over physicians. It is a state requirement that physicians pay for an official AMA Physician Profile in order to receive a state medical license, which serves both to make doctors dependent on the AMA, but also as part of the AMA's lucrative data collection activities.

This licensure requirement is enabled by the AMA's Physician Masterfile,⁶⁷ a database of "current records of the educational histories, specialty fields, practice locations and other information of more than 1.4 million doctors and [medical] students. Data are stored in the Masterfile from the moment a student begins her first year of medical school indefinitely into the future, even after her death."⁶⁸ This data is sold by the AMA to pharmaceutical companies and accounts for a significant source of its revenue. It also allows for "drug companies to match physician information with prescription data available from pharmacies, thus creating a prescribing history for every physician in the U.S."⁶⁹

When the AMA and the pharmacy associations "called for an immediate end to the prescribing, dispensing, and use of ivermectin for the prevention and treatment of COVID-19" and for "physicians, pharmacists, and other prescribers—trusted health care professionals in their communities—to warn patients against the use of ivermectin outside of FDA-approved indications and guidance"⁷⁰ these were not hollow words a doctor could safely ignore if she wished. The AMA would have record of when she prescribed ivermectin to a patient, and licensure could be at stake.

Indeed, the CEO of the American Board of Internal Medicine (ABIM), Richard Baron, publicly called for doctors disseminating "misinformation" about ivermectin and other Covid-19 heresies to lose their licenses and certifications. The ABIM and the Federation of State Medical Boards (FSMB) promoted a position statement adopted by state medical boards which threatened physicians "'who generate and spread COVID-19 vaccine misinformation' with suspension or revocation of their medical license."

Baron, it has been recently reported by investigative journalist Paul Thacker, was financially involved with Weber Shandwick, a PR firm specializing in "misinformation and disinformation," with ties to the CDC, Pfizer, and Moderna. For example, the CDC awarded "a \$50 million contract to Weber Shandwick in September 2020 to push vaccines."⁷¹

Dr. Pierre Kory was sanctioned by the FSMB, which revoked his certification in August 2023, and character assassinated in the legacy media for prescribing ivermectin and generally refusing to adhere to the official Covid narrative. Dr. Kory wrote a book titled "The War on Ivermectin." He believes that Weber Shandwick was behind the FDA campaign conflating ivermectin with horse dewormer. He wrote that he doesn't have hard evidence, but thinks it may be forthcoming via subpoena.⁷²

Dr. Meryl Nass of Maine was also publicly martyred, having her license suspended on this basis called for by Baron after she prescribed ivermectin and hydroxychloroquine to three people. Tellingly, the actual grounds on which her license was suspended, which have been amended three times, are not for prescribing unapproved drugs. Rather it would appear she won the lottery to be singled out among doctors who are not keeping "adequate records" via telehealth services. Nass said of the allegations against her that they have "no legal justification" and are a "spurious, illegal, unjustified, without-grounds prosecution" to go after her license.⁷³

The AMA's history of corporate entanglement: Smoking promotion

The AMA resembles a professional lobby for the medical industrial complex more than an unbiased organization representing the views of doctors. It has been found guilty and paid fines for restraint of trade and conflicts of interest. They violated the Sherman anti-trust law.⁷⁴

Tobacco companies knew they were making an addictive product.⁷⁵ For decades, the AMA promoted smoking: Chesterfields, Lucky Strike, Marlboros, all were supposedly soothing to the lungs.⁷⁶ How many people began smoking or continued because the AMA said that many doctors smoke Lucky Strikes and it soothes your throat, only later to find that it caused their emphysema, lung cancer, and heart disease? In 1949, the AMA received 33 times more income from JAMA's advertising of cigarettes than from membership dues.⁷⁷

Was there really an increased incidence of ivermectin poisoning to justify the FDA's warnings?

In 2021, the media reported that poison control centers were seeing increase in the number of calls about ivermectin. From these reports, we might take it for granted that there was a real

crisis of humans overdosing on, or at least ingesting, animal formulations of ivermectin prior to the issuance of the FDA's warnings. But it is worth a second look. Try to sort out the numbers and you may get a headache, so be warned.

The reports of increased cases of animal ivermectin formulations ingested by humans came to us from America's Poison Centers. The CDC and FDA are listed first among the partners of America's Poison Centers.⁷⁸

Zooming in on just one case: the situation in Mississippi — "a state with the nation's second lowest rate of vaccination against the coronavirus"⁷⁹ said Gates-funded NPR⁸⁰ — was featured in a number of news articles about the alleged problem of humans ingesting animal ivermectin in August and September of 2021, published around the time the FDA issued its August 2021 ivermectin guidance.^{81 82 83 84} NPR reported that Mississippi was "pleading" with residents not to take animal ivermectin.⁸⁵ Initially, according to NPR, "the department said that at least 70% of recent calls to the state poison control center were related to people who ingested a version of the drug that is formulated to treat parasites in cows and horses. But it later clarified that ivermectin-related calls were actually 2% of the total calls to the state poison control center, and 70% of those calls were related to people who took the formula intended for animals." In other reports, different statistics are cited, giving a difficult to understand picture of the actual numbers of reported exposures, and whether these exposures to a medicine were the same as verified poisonings from that medicine.

According to The Washington Poison and Drug Information Center (WAPC) an "exposure" and a "poisoning" are distinct terms. An exposure is "Actual or *suspected* contact with any substance which has been ingested, inhaled, absorbed, applied to, or injected into the body, regardless of toxicity or clinical manifestation... All poisonings are exposures, but not all exposures are poisonings."⁸⁶

When looking at the primary documentation, NPR's interpretation that 70 percent of callers had ingested animal ivermectin seem slightly questionable: the linked source in the NPR article is an official statewide alert by the Mississippi State Department of Health dated August 20, 2021.⁸⁷ This document states that there was an increase in the number of "recent" calls "relating to" "potential ivermectin exposure." How recent is not specified; what types of exposures is not specified in detail; whether these were queries for information or reports of poisoning is not specified; whether it was humans or animals ingesting the product is not specified. It is all implied, that humans consumed ivermectin purchased from livestock supply stores.

But even if we take it for granted that this is an honest and transparent report from a CDC/FDA partner organization, reporting straightforwardly what it appears to be reporting: as a health crisis, it was somewhat underwhelming. The alert, providing a "clarification," states that the daunting 70 percent increase in the numbers of "recent" calls "related to" the ingestion of livestock ivermectin formulas purchased from livestock supplies was exactly fourteen calls. Fourteen calls regarding ivermectin had been fielded by the Mississippi Poison Center during an unspecified time frame, and of those fourteen calls, 85 percent, or 12 of the callers had "mild symptoms."

Whether each of the counted calls was from a separate individual is not mentioned, but assuming that they were: it is not specified, but is implied, that the mild symptoms resulted from ingestion of animal ivermectin, and not from Covid-19, which is presumably the reason why these people went so far out on a limb as to ingest an animal drug. But only "one individual was instructed to seek further evaluation due to the amount of ivermectin reportedly ingested" [emphasis added]. "No hospitalizations due to ivermectin toxicity have been directly

reported to the Mississippi Poison Control Center or the Mississippi State Department of Health." So *this* is one of the prime examples of the abuse of medicine requiring a nationally coordinated campaign to staunch it? Not one hospitalization?

Two days prior to the issuance of this report, the Mississippi Free Press reported: "At least one individual has been hospitalized in Mississippi after ingesting ivermectin... The Mississippi State Department of Health later confirmed... that the person was hospitalized in the state for ivermectin toxicity, but it is not clear whether or not the new patient was a resident. MSDH did not reveal when the incident happened or the patient's current condition." Then, two days later, an official alert about animal ivermectin toxicity for humans indicates there are no hospitalizations. So which is it?

At the end of this Mississippi health alert, authored by Paul Byers, MD, a state epidemiologist, are links to the two FDA documents — the FAQ and the consumer update, "Why You Should Not Use Ivermectin to Treat or Prevent Covid-19," the subject of the case of Drs. Bowden, Apter and Marik against the FDA. The health agencies' campaign against ivermectin must have been so effective in preventing further injury from animal ivermectin to humans, there was no need to keep reporting on the situation into the future, despite the fact that the culture wars over ivermectin escalated over the following months. If only they had issued such effective warnings about the Covid-19 mRNA injections, hundreds of thousands of lives could have been saved.

For context, in Switzerland, an average of 2.5 calls are received for oral acetaminophen (Tylenol) per day.⁸⁸ In the United States, the annual report of the American Association of Poison Control Centers' National Poison Data System records 50,396 single exposures to acetaminophen alone and 22,951 single exposures to acetaminophen in combination with other drugs in 2014. That makes an average of 138 single exposures to acetaminophen reported to Poison Control Centers of America per day.⁸⁹ According to another study, acetaminophen "is responsible for 56,000 emergency department visits, 2,600 hospitalizations, and 500 deaths per year in the United States. Fifty percent of these are unintentional overdoses. More than 60 million Americans consume acetaminophen on a weekly basis, and many are unaware that it is contained in combined products."⁹⁰ Where are the FDA and HHS? Where is the health establishment's coordinated campaign against Tylenol?

Another NPR article titled "Poison Control Centers Are Fielding a Surge of Ivermectin Overdose Calls,"⁹¹ reports that "there was a 245% jump in reported exposure cases from July to August — from 133 to 459." However, the link for the statistics has since gone missing. An archived copy of these statistics can be retrieved from the Internet Archive, displaying the reported leap in exposures, but it is not clear whether these exposures represented any kind of serious threat to health.⁹² In fact, only 8 percent were recorded to have "a moderate effect" and one percent "a major effect," though what these effects were and how they were determined to be from ivermectin exposure, whether other medicines or illnesses were also implicated, is not indicated. We are also again faced with the question of whether there have been any reported cases or poisonings outside of the FDA/CDC's own jurisdiction.

This NPR article reports that the National Poison Data System (NPDS), the data collection system for the FDA/CDC-affiliated poison centers, says that "1,143 ivermectin exposure cases were reported between Jan. 1 and Aug. 31. That marks an increase of 163% over the same period last year." However, just like a Covid case was distinguished from a Covid illness, an exposure does not necessarily mean illness from that exposure. Ivermectin prescription was rising during this same period, and so more people were being exposed to ivermectin than previously. If they were asked on the phone what drugs they had taken recently when they

called, they may have given a list of five medicines that included ivermectin. Was each mention of ivermectin counted as an exposure?

A 2022 study of Oregon adults hospitalized with ivermectin toxicity is published by authors affiliated with the Oregon Poison Center, one of FDA/CDC-partnered America's Poison Centers.⁹³

The CDC reported two cases of people who had ingested animal ivermectin intended for livestock and presented with serious symptoms and were hospitalized.⁹⁴ A letter to the *New England Journal of Medicine*, linking to this same CDC report, recorded six people were hospitalized for toxic effects from preventative ivermectin use, according to the Oregon Poison Center. But official statistics are not clearly linked.⁹⁵

An article by the AMA reads "The FDA has identified multiple reports of patients who tried to self-medicate with ivermectin products intended for livestock and were subsequently hospitalized." In the article, the link for more information about these "multiple reports" leads to the FDA's website, to one of the FDA's posts mentioned in the court case, titled "Why You Should Not Use Ivermectin to Treat or Prevent COVID-19." In this communication of the FDA's guidance it is stated that "the FDA has received multiple reports of patients who have required medical attention, including hospitalization, after self-medicating with ivermectin intended for livestock."

However, no specific documentation, no official reports or statistics on those specific cases are linked to or presented to substantiate these claims. Nor is it specified whether the medical attention or hospitalization received by those who "self-medicated with ivermectin intended for livestock" was required specifically in order to treat ivermectin poisoning, as is implied here, or whether medical attention and/or hospitalization were sought simply because these people were seeking treatment for Covid-19, which may have been why they were taking ivermectin.

The American Veterinary Medical Association claimed one person who called a Poison Control center in Texas had swallowed a whole tube.⁹⁶ Of the "substantial number of calls" alleged to have been received in August 2021 by poison control centers, people were experiencing "side effects" from consuming veterinary-use ivermectin, "mostly mild illnesses." Whether these mild illnesses were confirmed to result from ivermectin alone or from another illness or exposure is not clarified.

A headline in the UK Independent read "Two dead from taking ivermectin in New Mexico." But the article gives no evidence for this claim. In fact the two people were hospitalized "after taking ivermectin:" "The two people who died were among 14 who were hospitalised *after* taking the animal drug... both been infected with Covid-19 and took it upon themselves to treat the disease with ivermectin, with one of the people suffering kidney failure as a result" [emphasis added].⁹⁷ Kidney failure is not a known side effect of ivermectin, but it is a known side effect of remdesivir, which, if these two people were hospitalized for Covid-19 in a hospital, they almost certainly received as it was standard procedure.

USAToday published an article titled "Fact check: No evidence Oklahoma hospitals are backed up due to ivermectin overdoses"⁹⁸ debunking prominent articles by Rolling Stone and others which claimed that Oklahoma hospitals were so overwhelmed with ivermectin poisonings that gunshot victims were being turned away.⁹⁹ The title of the Rolling Stone piece was changed from "Gunshot Victims Left Waiting as Horse Dewormer Overdoses Overwhelm Oklahoma Hospitals, Doctor Says" to "One Hospital Denies Oklahoma Doctor's Story of Ivermectin Overdoses Causing ER Delays for Gunshot Victims."¹⁰⁰ But the initial shock of such headlines

was still impressed upon the mind of the public, and many may never have heard about the fact-checking or learned the truth.

There are enough red flags here to warrant further investigation of the claim of whether there were even any poisonings verifiably attributable to ivermectin.

So was there really a spike in human use of ivermectin intended for animals, and did it represent a significant danger to public health? The answer may be that we're going to have to ask the FDA and CDC to find out. If anyone has the statistics, it is them. The same agencies which told us there was a very dangerous situation emerging around ivermectin are the same ones which failed to regulate and protect the public from the Covid-19 mRNA injections, the very agencies which were promoting remdesivir, with a lower rate of efficacy, known risk of kidney failure, and a price-tag of nearly \$500,000 per life saved. This is the same CDC which destroyed documents revealing the connection between autism and the MMR vaccine.^{101 102} Maybe the call records could be subpoenaed, or obtained through a FOIA request. If the whole thing was entirely fabricated, was simply a statistical hoax designed to bias the public against ivermectin, this could be strong evidence of conspiracy and malice of forethought.

The real problem the CDC and FDA were facing seems to have been not an increase in ivermectin poisoning, but an increase in ivermectin use. The CDC reported that a "recent study examining trends in ivermectin dispensing from outpatient retail pharmacies in the United States during the COVID-19 pandemic showed an increase from an average of 3,600 prescriptions per week at the pre-pandemic baseline (March 16, 2019–March 13, 2020) to a peak of 39,000 prescriptions in the week ending on January 8, 2021. Since early July 2021, outpatient ivermectin dispensing has again begun to rapidly increase, reaching more than 88,000 prescriptions in the week ending August 13, 2021. This represents a 24-fold increase from the pre-pandemic baseline."¹⁰³

This, of course, would mean that many more people in general were exposed to ivermectin. Prominent research in the summer of 2021 had presented evidence that taking ivermectin prophylactically could prevent illness from Covid-19.¹⁰⁴ If increased exposure, as distinct from poisoning, showed up in call records to poison centers, it would therefore not be a surprise. Whether or not the ivermectin consumption was the cause of the poisoning would have to be carefully determined in each case, and only examination of the full details of each caller's report could reveal this.

But since none of the media outlets who ran these stories bothered to investigate to this level of forensic detail, the informational flooding campaign against ivermectin by the FDA et al proved an effective strategy in casting aspersions on ivermectin. It appears to have been a deliberate tactic. With the mRNA injections due out in December, the rising use of ivermectin was a threat to the Emergency Use Authorization of this untested new product.

So if Ivermectin is so "dangerous," what treatments were the FDA and CDC recommending instead?

Here were our officially recommended treatment options. We were told on March 19, 2020, that clinical trials on chloroquine were underway, but that FDA was granting expanded emergency use access to the antiviral drug remdesivir. "250 patients" had been "given access" even then, in mid-March. Other options included "convalescent plasma and hyperimmune globulin, antibody-rich blood products that are taken from blood donated by people who have recovered from the virus."

And, of course, Americans were to wait for the vaccine. In mid-March of 2020, just days after the coronavirus was declared a national emergency, "NIH announced the start of a Phase 1 clinical trial in Seattle in 45 healthy adult volunteers to test the safety of an investigational vaccine designed to protect against COVID-19 infection."¹⁰⁵

Remdesivir was officially recommended by the FDA for treatment of people diagnosed with Covid-19. Prior to the announcement of SARS-CoV-2, remdesivir had been used to treat the ebola virus in Africa. According to the website Covid-19 Treatment Research, treatment with remdesivir results in 12 percent lower mortality and 10 percent lower risk of serious disease. However, though a small mortality improvement has been noted, there is decreasing efficacy when using remdesivir over a long period, and it doesn't improve outcomes with respect to ventilation or ICU admission.¹⁰⁶

If U.S. health agencies with a nearly unlimited budget of billions of dollars, and thousands of scientists and physicians at their beck and call, could find the studies in the peer-reviewed literature (presented in the condensed report above), the the system appears to be corrupt. In the supplement there is an extended list of studies on ivermectin compiled on the website c19ivm.org, as well as lists on other safer or natural treatment options. This list does not exclude studies with negative outcomes.

Mounting evidence of the FDA and health officials conspiracy, malfeasance, and malice

The WarRoom/DailyClout Pfizer Documents Research Volunteers, a group of 3000 highly credentialed doctors, RNs, biostatisticians, medical fraud investigators, lab clinicians and research scientists have published many reports about what is revealed in the 55,000 internal Pfizer documents which the FDA had asked a court to keep from the public for 75 years. Dr. Wolfe laments that

"Pfizer (and thus the FDA) knew by December 2020 that the mRNA vaccines did not work — that they 'waned in efficacy' and presented 'vaccine failure.' One side effect of getting vaccinated, as they knew by one month after the mass 2020 rollout, was 'COVID.'

Pfizer knew in May of 2021 that 35 minors' hearts had been damaged a week after mRNA injection — but the FDA rolled out the EUA for teens a month later anyway, and parents did not get a press release from the US government about heart harms til August of 2021, after thousands of teens were vaccinated. [<https://dailyclout.io/pfizer-vaccine-fda-fails-to-mention-risk-of-heart-damage-in-teens/>]¹⁰⁷

Now, the WarRoom/DailyClout team has also reported that "46 pages of FOIAed emails between CDC leaders, Dr. Anthony Fauci [National Institute of Allergy and Infectious Disease Director], Dr. Francis Collins [Director, National Institutes of Health], and White House, NIH, HHS, show they knew about vaccine-induced myocarditis and thrombotic thrombocytopenia, a blood clotting disorder" and that this set of released emails arrived to the requesting lawyer, Edward Berkovich, over 80% redacted. "Of the 46 pages, only two pages were released without any redactions. Seven pages were partially redacted pages, and 37 pages were fully redacted."¹⁰⁸ Celia Farber has called for a mass movement to apply pressure to have the redactions published as well to reveal the full extent of what they knew.¹⁰⁹

The more we know, the more it appears that the FDA willfully endeavored to deceive the public. There is blood on their hands. When safe alternatives were available, they appear to have deliberately suppressed them and allowed a deadly drug and lethal intubation protocols to be used as a first line of defense instead. There is evidence that health officials willfully ignored the science on ivermectin, which could have laid to rest the need for untested, poisonous injections. There is some question as to whether there was even an emergency of ivermectin poisoning, which led to the coordinated national campaign against the drug. There is mounting evidence that the health officials knew the harm their policies were causing, and that they sought to bypass barrier after barrier to fast-tracking and blanket marketing these injurious

shots. The FDA may have thought it could get away with this, but their actions have been ruled outside their jurisdiction, not protected by sovereign immunity. This evidence points to the undeniable conclusion that these agencies and officials colluded in actions which resulted in the wrongful deaths of millions globally.

Caveats regarding the official Covid death statistics

These 7 million of deaths attributed to Covid by the WHO must be carefully scrutinized. They have been estimated by a variety of altogether deceitful means. They cannot be trusted in any way. Most significantly, they were determined based on a fraudulent test, the PCR test, which is not a diagnostic test at all but an amplification technique designed to replicate bits of genetic material present in the system.¹¹⁰ It cannot tell you if there is any pathogenic activity, infection or disease. This fact alone simply evaporates the notion that any deaths determined by this test can be attributed to Covid-19 at all.

Many deaths of people who died "with Covid" erroneously determined by the bogus PCR test, were then counted as dying "from Covid," no matter how dire their other co-morbidities. People who died from heart disease, diabetes, kidney failure, drug overdose, carbon monoxide poisoning¹¹¹ — or even car crashes or homicide as was reported in some places¹¹² — were counted as deaths from Covid. Dying "from covid" is not the same as dying "with covid."^{113 114 115 116} A scientific advisor to the minister of health in Italy said "On re-evaluation by the National Institute of Health, only 12 per cent of death certificates have shown a direct causality from coronavirus, while 88 per cent of patients who have died have at least one pre-morbidity — many had two or three."¹¹⁷ People were killed by the Covid hospital protocols, including unnecessary intubation, the administration of remdesivir, even from fear and a lack of will to live from forced isolation. Such deaths were also attributed to Covid. People who were ill and sought medical treatment were diagnosed with Covid by the sham PCR test and then told simply to go home without treatment.

They did not go out to exercise because gyms were closed; they did not go spend time in the sun and fresh air in nature because they were barred or intimidated from doing so. They didn't go get fresh organic fruits and vegetables from the farmers market because the farmers markets were forcibly closed, while Walmart and Costco kept their doors open, somehow magically "virus-free." When sequestered indoors at home, peoples' illness may have naturally progressed, aided by fear, loneliness, lack of social contact and the touch of their loved ones, wholesome nutrition, sunlight and fresh air, all of which might have boosted their immune systems. They may have experience oxygen deprivation¹¹⁸ from newly-installed small cell antennas broadcasting unlicensed¹¹⁹ oxygen-absorbing¹²⁰ 60 GHz frequencies from on top of their apartment buildings.¹²¹ They went to the hospital, where they received the lethal standard Covid treatments — solitary confinement, remdesivir, intubation. Simple and non-toxic early treatments could have prevented the progression of their illnesses in the first place. People who may have died from poisoning by unprecedented air pollution,¹²² a novel VIQCC flu vaccination campaign as was rolled out in Italy in September 2019,¹²³ and new blanket 5G networks,¹²⁴ as existed in Wuhan and other Covid hotspots just prior to the first declared SARS-CoV-2 cases, were counted as deaths from Covid-19. All of these cofactors must be considered when determining whether a death can be attributed to Covid-19.

Shortcomings of Nuremberg Trials

A trial such as Nuremberg is called for, but it must be even more rigorous and far-reaching if it is to result in real and lasting change. The Nuremberg trials were woefully insufficient to prosecute and bring to account most of the hundreds of thousands of people who were responsible for the war crimes and crimes against humanity of World War II. Both people in the

rank and file and many top officials were never tried or held to account, many even coming to live in the U.S. and South America.^{125 126} For this reason, many consider it to have been a facade of justice. Many in the Nazi leadership escaped to Argentina where they were naturalized, and the United States made no effort to pursue them.¹²⁷ At least 1500 Nazi scientists, engineers and technicians were recruited by the United States through Operation Paperclip and installed in high positions at NASA.¹²⁸ The U.S. military covered up information about the backgrounds of former Nazis determined by Americans to be national security assets.¹²⁹ Because their backgrounds were scrubbed, it's plausible there were many more who went unaccounted for. Nazis were recruited into the CIA.¹³⁰

Bayer, the makers of Aspirin, was part of a powerful German chemical conglomerate that supported the Third Reich and paid to have their medicines tested on human subjects in concentration camps.¹³¹ It manufactured Zyklon B, the chemical agent used to kill the Jews and other "undesirable" people in the gas chambers. Today Bayer brings in over \$53 billion in revenue and has \$140 billion in assets.¹³² It is responsible for GMO foods and the poisoning of the environment and food supply with the herbicide Roundup.¹³³

IBM, a major US corporation, directly supplied the Nazis with the rudimentary punch-card computer systems they used to efficiently transport millions of people to their deaths at Auschwitz and Treblinka.^{134 135 136} What happened to IBM at Nuremberg? Was it dismantled and thrown to the wind? No. It wasn't tried. It is remembered for manufacturing the simultaneous translation system used during the proceedings.^{137 138} IBM today is one of the world's largest technology companies and is the owner of 150,000 patents. Its products center around automation, robotics, artificial intelligence, cloud computing, blockchain, computer hardware, software, and quantum computing.¹³⁹ In other words, IBM is doing just what it did during World War II: it operates the very industries erecting the dystopian architecture of the "Fourth Industrial Revolution," better described as a global digital prison.¹⁴⁰

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