4.26.20

The probabilities of clinical success using hydroxychloroquine with or without azithromycin +/- zinc against the novel betacoronavirus, SARS-CoV-2

Physician Hospital Academic institution Location Date of data reporting	Number of Patients seen	Number treated with HCQ +- azithromycin +/- zinc	Improved	Died	Success defined as % of no mortality or probability of preventing death, P(D-)
Qingdao, China 3.16.20	? total unknown Use 100 at least since they said greater than a hundred were treated	>100; 100 will be used	100 assumed	0	Up to 100% may have improved
Didier Raoult 3.17.20	26?	16?	15?	?	???
Didier Raoult 3.27.20	80	79	63	1	98.7%
[Didier Raoult 4.7.20	1,061 (may or not include the 80 from 3.27.20 paper)	1,061	1,040	5	99.6%]
Dr. Didier Raoult 4.20.20 Million M, Lagier JC, Gautret P, Colson P, Fournier PE, et al at IHU_Mediterranee Infection in Marseille, France	1,411	1,061 Rx HCQ+AZ	973	8 (46 with poor clinical outcome; 47 with poor virological outcome	91.7% .754% Risk of death in those tx with HCQ

Dr. Vladimir Zelenko 3.30.20 Monroe, New York	200 (65% of tests were + in his first 200 patients) 700 seen who were + or had clinical suspicion 500 were not treated with HCQ Rx 200 were high risk and treated with HCQ, Azithromycin and Zinc	200	194; 2 intubated; 4 with pneumonia but not intubated, improving	0	100%
Dr. Vladimir Zelenko Monroe, New York 4.12.20	1,354	405	399 (6 hospitalized of which 4 were intubated and then extubated and 2 deaths)	2	2/405 99.995% P(D-) 0.005% risk of death
Dr. Stephen Smith 4.2.20 Smith Center for Infectious Diseases	80 Rx HCQ and azithro 45% 29 % patients were prediabetic, 47% diabetic and obese; average BMI of severely ill 30.7 obese; prediabetics are also at risk	80	80, 20 patients are intubated	0! No deaths reported	100%
Dr. Zheng 4.2.20	11	11	0	?	?
Dr. Rob Richards	15	14	14	0	93%
Dr. Jeff Colyer, Overland Park, KS	14	14	14	0	100%
Dr. Daniel Hinthorn, Kansas City, KS	21	21	21	0	100%
Dr. Anthony Cardillo Mend	Number = ?	Rx HCQ + zinc	All those treated	0	100%

Urgent Care Sherman Oaks, Van Nuys, Burbank, CA 4.6.20	Unknown number of patients treated; Contact Mend Urgent Care for more info Sherman Oaks**:** 818-646-2562 | Van Nuys: 818-646-4928 | Burbank: 818-843-8555	He did not use azithromycin Treated very sick patients all of whom greatly improved within 8-12 hrs	improved		
Dr. Marc Siegel New York, New York	1 Rx HCQ	1	1	0	100%
Seattle, WA group; NEJM publication	?	58% of COVID-19 patients in ICU were diabetic with average BMI of 33, morbidly obese	?	?	?
Dr. William Grace, NewYork	?				
Dr. Alex Lechin, Texas	?				
Dr. Joe Mather, Louisiana	?				
Dr. Zhong Nanshan, epidemiologist and pulmonologist, discovered SARS virus in 2003, China	?				
Lee SH, Son H, Peck KR, Samsung Medical Center,	211, HCQ 400mg po qd prophylactic treatment in long term care hospital	211; 189 patients and 22	211 All viral tests were negative	0	100% success0 % death

Pusan National Univ. Hospital Republic of Korea 4.20.20	exposures	careworkers			
Paolo Zanotto and President Bolsonaro, Brazil	? HCQ in use without significant debate or delay	?	?	?	?
Drs. A. Kapoor, U. Pandurangi, V. Arora et al India	? prophylactic use of HCQ in progress	?	?	?	?
University of Minnesota	Enrolling for a prophylactic study	pending			
University of Queensland Centre for Clinical Research, Australia	Chloroquine study in progress				
Univ of Washington-NYU Grossman School of Medicine	2,000 Enrolling now				
Columbia University	?				
University of Pennsylvania	?				
Rutgers	?				
Washington University in St. Louis, MO (WUSTL) Multicenter international trial called CROWN CORONATION or CROWN CORONA Dr. Michael S. Avidan principal investigator	Hydroxychloroquine prophylaxis, An international, multi-site, randomized, double-blinded, Bayesian platform adaptive design clinical trial				

Missouri, Australia, Canada, Ireland, South Africa, United Kingdom, Zambia					
Washington University in St. Louis, MO (WUSTL) Barnes-Jewish Hospital Dr. Rachel M. Presti, Dr. Jane O'Halloran, co-leaders of the trial	Chloroquine, HCQ, and AZ will be studied in those with novel betacoronavirus infection				
Asan Medical Center, Seoul, South Korea	Enrolling comparison study Kaletra vs. hydroxychloroquine vs. placebo	?			
Chen Z, Hu J, Zhang Z et al, Renmin Hospital of Wuhan University, Wuhan, China Released mid April 2020	HCQ 400mg / day 62 patients in study; 31 HCQ, 31 control group	31 tx with HCQ	25 improved (vs. 17 in control group, p = 0.0476	0 deaths	25/31 80.65% success rate
Dr. Mehmet C. Oz New York, New York	2	2	2	0	100%
Dr. Mohammed A. Arsiwala, internist, in Livonia, Michigan	Dr. Arswiwala says he has treated 16 patients so far including Rep. Karen Whitsett in MI, data on others not available yet	1	1	0	100% (N=1)

Mark Campbell, former Buffalo Bills football player, self report, physician name ?	1 Treated with HCQ	1	1	0	100% (N=1)
Magagnoli J, Narendran S, Pereira F, et al. VA Health Care System, Columbia, South Carolina	368 Veterans	210 with severe disease treated; Ventilation in 13.3% of HCQ group and 6.9% of HCQ+AZ group	158	52	75.24%
Dr. Idir Bitam Algeria 4.26.20	170	170 treated w/ HCQ + AZ	165 “returned to health”	?	97%
Others					

Conclusions as of 4.26.20 See figures in bold	**Total patients** seen by these physicians = **3,868** ---------- Which includes Dr. Zelenko's new data as of 4.12.20 2,065 + 654 = 2,719 + 350 which includes new Raoult data from 4.20.20 3,069 + 211 from Lee Son and Peck 3,280 plus 62+16+1+368 + 2 (Oz) – 31 (duplicate) + 170 (Dr. Bitam) = **3,868**	**Total patients treated with HCQ,** plus or minus azithromycin and/or zinc = **2,333** ---------- 1,533 +205 Dr. Zelenko's series update = 1,738 1,738 + 211 = 1,949 + 31+1+1+210 -31 duplicate +2 (Oz) + 170 (Bitam) = **2,333**	**Total patients clinically improved = 2,137** ---------- **91.6 %** treated with HCQ improved or never contracted CoVID-19 despite being exposed 2,137/2,333 = **91.6%**	**Total deaths in those treated with HCQ or HCQ + AZ +/- zinc = 63** 63/ 2,333 P(D) = **2.7%**	**Updated probability of success** in preventing death, P(D-), from CoVID-19 using HCQ or HCQ + AZ = **91.6 %**

This table is provisional and is being updated as new data surface.

Please note that the Veteran's Administration study conducted by Magagnoli J, Narendran S, Pereira F, et al. in South Carolina assessed a very sick population and the hydroxychloroquine was given late the course of the illness. Many patients were ventilated. We believe the 52 deaths reported in this population are not indicative or predictive of the average death rate observed in populations diagnosed in the early to mid stage of the CoVID-19 disease and treated with hydroxychloroquine. Based on the experienced clinicians observational data summarized above, the death count was only 11 out of over 2,000 patients treated with hydroxychloroquine.

Dr. Stephen Smith's patients who were treated with HCQ and azithromycin did not require mechanical ventilation. He reports that severely ill CoVID-19 patients under 70 yrs of age were diabetic or prediabetic with high BMI. He is convinced

hydroxychloroquine works for his patients. His level of certainty is very high. – personally reported on 4.2.20 and again on subsequent dates in April 2020.

Clinicians are natural Bayesians and such philosophical and qualitative statistical analysis is consistent with our medical training, bedside clinical skills including history taking, examination, differential diagnosis, probable primary diagnosis, laboratory evaluations including serologies, EKG, chest X-ray, CT scan of lungs, objective gold standard test interpretation and clinical decision making. In other words, waiting for fixed randomized controlled trials during a pandemic when time is of the essence, a Bayesian approach to the assessment of diagnostic and therapeutic probabilities is wise and efficient and will save time, money and lives if the physicians are given a chance to retain their autonomy and practice medicine to the best of their abilities.

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Disclaimer: these results are preliminary and provisional because observational data from experienced clinicians are dynamic and may or may not be incomplete or of insufficient granularity to make more specific associations and interpretations. Moreover, some of the papers are undergoing the peer-review process, but have been shared with the world to reduce delays in clinical decision making. Likelihood ratios and Bayes' factors cannot be computed yet since fixed randomized controlled trials (RCTs) are just starting around the world.

A flat prior (0.5 probability where 0 is impossible and 1 is certain) could be used to represent one's beliefs about whether hydroxychloroquine (HCQ) would result in clinical improvement and/or prevention of death from CoVID-19 based on knowledge up to December 2019 and January 2020. Based on the new observational studies and reports from several (more than 10) different medical sources in February, March and April 2020, the prior will be updated using Bayes theorem yielding a posterior probability density when sufficient data to calculate likelihood ratios emerge. At present, physicians have a significant amount of basic science and human observational data to incorporate into their baseline knowledge of hydroxychloroquine safety and efficacy plus the current info included in this table will facilitate the physician as beliefs are updated accordingly.

Based on the current clinical information available, the success rates for a favorable outcome/clinical improvement are approximately 91.6% using hydroxychloroquine (HCQ) without or without azithromycin (AZ) and/or zinc and the death rate in this treated group is approximately 2.7%.

In comparison, the probability of death is 0.5-0.85 or 50 to 85% when patients with CoVID-19 are on mechanical ventilation and the probability of death based on Johns Hopkins University data worldwide is 206,544/2,971,477 or 6.95% as of 4.26.20.

At this time, the data from 9 observational reports and one controlled trial suggest that hydroxychloroquine is dramatically more effective at preventing death from CoVID-19 than mechanical ventilation. It is encouraging to note that ventilated patients treated with hydroxychloroquine have been able to undergo successful extubation and transfer out of the intensive care unit onto the floor. Moreover, CoVID-19 viral loads have been reduced to low or undetectable levels after 5-15 days of treatment with hydroxychloroquine.

The NIH initiated a study today to investigate hydroxychloroquine for prophylactic and active treatment for the novel betacoronavirus, CoVID-19.

Numerous CoVID-19 studies utlizing hydroxychloroquine for either prophylaxis or treatment are listed on the clinicaltrials.gov site but many of them have not started enrolling patients yet.

One trial out of Washington University in St. Louis, MO is a Bayesian adaptive design trial using hydroxychloroquine as a prophylactic drug against CoVID-19.

The table shows several international studies that are underway reportedly but this list is provisional and no data is available yet from these centers conducting randomized controlled trials.

As new data surface, we will be able to update the table and make additional Bayesian inferences that may assist physicians in clinical decision making.

As Ben Carson, MD, pediatric neurosurgeon and HUD Secretary, has recently reminded us, physicians treating suspected or confirmed CoVID-19 patients should ask themselves during this pandemic:

What is the best clinical outcome that can happen if I use hydroxycholorquine?
What is the worst clinical outcome that can happen if I use hydroxychloroquine?
What is the best clinical outcome that can happen if I do not use hydroxychloroquine?
What is the worst clinical outcome that can happen if I do not use hydroxychloroquine?

This table is a continuous work in progress.

Comments or additional contributions to the data set may be forwarded to the Association of American Physicians and Surgeons (AAPS) in Tucson, AZ, established 1943, dedicated to preserving the patient-doctor relationship and liberty in medicine, see www.aapsonline.org for more information.

Sincerely,

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