

The Parallel Pandemic: Medical Misinformation and COVID-19

Primum non nocere



Jennifer S. Love, MD , Adam Blumenberg, MD MA, and Zane Horowitz, MD

Department of Emergency Medicine and Toxicology, Oregon Poison Center, Oregon Health and Science University Portland, OR, USA.

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INTRODUCTION

As COVID-19 spreads globally causing fear and loss of life, so too does the parallel pandemic of medical misinformation. Similar to coronavirus itself, few are immune to medical treatment rumors which can wreak havoc on critical decisions made with limited information. The COVID-19 pandemic occurs in the social media era, allowing for swift propagation of unproven clinical care guidelines and overt misinformation. Proposed treatment strategies have been amplified and distorted according to testimonials rather than scientific rigor. While social media offers interconnectedness, real-time communication, and advocacy opportunities, it also has unintended consequences.

WHAT'S THE HARM?

The misinformation accompanying the coronavirus pandemic has caused hundreds of fatalities. In Iran, a rumor that alcohol kills coronavirus led many Iranians to drink counterfeit alcohol containing toxic methanol. Over 300 people died, over 1000 required hospitalization, and many are expected to have permanent vision loss. The Iranian healthcare system was faced with the additional challenge of caring for patients with methanol poisoning during the height of its COVID-19 crisis.

Similar promotion around the curative health effects of chloroquine (CQ) and hydroxychloroquine (HCQ) against coronavirus have had deadly consequences. These drugs have demonstrated *in vitro* activity against coronavirus.¹ However, the therapeutic effect of these drugs in patients with COVID-19 remains speculative at best.² Basic science research has been broadly extrapolated by media, politicians, and even physicians as evidence of prophylaxis and treatment against COVID-19. Clinicians are prescribing these drugs against COVID-19 to such a degree that pharmacies are reporting shortages.² These drugs have known dangerous adverse

effects (such as QTc prolongation, seizures, hypokalemia, and death) as well as properties which may theoretically exacerbate COVID-19 (immunosuppression and interaction with other drugs). Sadly, these drugs have a narrow therapeutic index and there have already been poisoning fatalities and critical illnesses related to their use against COVID-19.³

Medical history is brimming with examples of once promising therapies that led to patient harm such as Drotrecogin alfa (Xigris) and rofecoxib (Vioxx). The 1918 Spanish influenza pandemic provides historical precedent to erroneous medical practice during times of desperation. That year the surgeon general supported aspirin for influenza treatment, recommending doses from 1.0 to 1.3 g every one to three hours.⁴ We now know that this dosing regimen is expected to cause life-threatening toxicity, especially in a patient with respiratory insufficiency caused by influenza pneumonia. An epidemiological analysis of the 1918 influenza pandemic concludes the likelihood that a significant portion of fatalities were due to aspirin poisoning.⁴ The noblest intentions healed none and harmed many.

HOW MEDICAL RUMORS SPREAD

A central fallacy of applying unproven treatment to COVID-19 and many other diseases is that most patients recover spontaneously. As of April 6, 2020, the CDC reports 330,891 cases of COVID-19 and 8910 deaths with a case fatality rate of about 2.7%.⁵ This means that 97.3% of confirmed cases are expected to survive. Without a control group, this rate of positive outcome translates to apparent efficacy of any treatment, including placebo. For example, if 10 patients receive a placebo, the probability of all ten surviving is $(97.3\%)^{10} = 76\%$. In order to demonstrate a 25% mortality reduction from 2.7 to 2.03% with an alpha of 0.05 and power of 80%, a randomized placebo-control trial would need to enroll 16,146 patients. Despite this, some clinicians are sharing testimonials which attribute positive outcomes in as few as 5 patients to a particular treatment.

Currently over 20 treatments (such as CQ/HCQ, remdesivir, convalescent plasma, nitazoxanide, and others) are being investigated as potential therapeutics for COVID-19. Many clinicians are claiming treatment efficacy on social media without adequate evidence. The reporting of perceived

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therapeutic success on small numbers of patients is scientifically invalid yet has the potential to unduly influence other clinicians. These reports lack standards, review, verification of accuracy, appraisal of bias, accounting of failures, or description of treatment adverse effects. The spread of these unproven medical myths from one clinician to another functions like rumor.

Models of how rumor spreads demonstrate similarities to the spread of an epidemic.^{6, 7} Like an infectious disease, a rumor may have a basic reproductive rate (R_0), and individuals may be susceptible or resistant.^{6, 7} Social media allows a rumor to be broadcast to a large potentially susceptible audience and has been shown to spread rumors contagiously.⁷ Some rumors propagate because they are scientifically plausible or have preliminary supportive data (e.g., convalescent plasma and CQ/HCQ), others because the rumor is charismatic or famous. Some clinicians may be receptive to these rumors due to desperation and desire to alleviate suffering, the erosion of skepticism, and a wish to believe in any potential therapy that promises to help. Translating rumor into clinical practice may lead to patient harm.

WITHOUT THE CHANCE OF BENEFIT, ANY RISK OF HARM IS UNACCEPTABLE

Understanding medical science means more than knowing factual data about the human body such as normal heart rate and oxygen saturation. It means understanding the basis for assessing various possibilities, testing of hypotheses, appropriate experiment design, rational evaluation of evidence, and critical appraisal of unproven theories. These elements of the scientific method provide clinicians the skills needed to make reliable conclusions about how to treat disease. In the setting of a pandemic where the fatality rate outpaces research, it is all the more crucial to fill knowledge gaps scientifically rather than speculatively.

The large number of casualties of COVID-19 causes desperation. The need for rapid effective treatment understandably undermines the patience needed to conduct appropriate studies. Nevertheless, it is only through appropriate scientific studies that optimal treatment can be identified. Treating thousands of patients with unproven medications may expose thousands to adverse effects without any benefit. Despite the time-dependent aspect of the COVID-19 pandemic, rolling out a dangerous or ineffective treatment quickly only serves to harm greater numbers of patients quickly.

The morbidity and mortality of COVID-19 are already being compounded by the parallel pandemic of medical

misinformation. Fear and desperation prevail as in the 1918 influenza pandemic, but with the added swiftness of rumor propagation by social media. Physicians have the opportunity to diminish some of these harms by providing appropriate supportive care to COVID-19 patients and maintaining healthy skepticism of unproven treatments. Clinicians should avoid promoting unproven treatments and honestly acknowledge the risk of serious adverse effects related to experimental therapies. Though there may be situations where a trial of an unproven therapy is warranted outside of research, physicians should keep in mind the precarious results associated with these treatments.

Corresponding Author: Jennifer S. Love, MD; Department of Emergency Medicine and Toxicology, Oregon Poison Center, Oregon Health and Science University Portland, OR, USA (e-mail: loveje@ohsu.edu).

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