COVID-19 and the problem of clinical knowledge

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Abstract COVID-19 presents many challenges, both clinical and philosophical. In this paper we discuss a major lacuna that COVID-19 revealed in our philosophy and understanding of medicine. Whereas we have some understanding of how physician-scientists interrogate the world to learn more about medicine, we do not understand the epistemological costs and benefits of the various ways clinicians acquire new knowledge in their fields. We will also identify reasons this topic is important both when the world is facing a pandemic and when it is not.

Keywords Clinical knowledge · COVID-19 · Epistemology

As an attending physician in the emergency department of a major academic medical center in New York City, I spent the spring of 2020 combatting one of the most severe of the early outbreaks of COVID-19. Clinically, this was grueling, but bit by bit, by trial and error, we began to solve the clinical questions facing us. However, COVID-19 did not just present clinicians with a therapeutic and epidemiological challenge. It also presented an epistemological challenge. What was the most reliable and efficient way for those caring for patients to learn about COVID-19, in particular the trials and errors of those outside a practitioner's direct circle? There should have been a clear answer. There wasn't. This lack of clarity presented a

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challenge not only to clinicians, who did not know what to do, but also to philosophers of medicine, who did not know what to tell them.

Philosophy's failure to present guidance on this matter is surprising. The epistemology of medicine is one of the primary areas of concern of philosophy of medicine. Much work has gone into understanding the strengths and weakness of randomized controlled trials (Cartwright, 2010; Worrall, 2007) and Bayesian vs. frequentist trials (Teira, 2011), the problems with various evidence-based medicine hierarchies (Borgerson, 2009; Stegenga, 2014) and the role of mechanistic evidence in medical knowledge, (Andersen, 2014; Howick, 2011) to name a few of the questions that have generated the most literature. There is also consideration of the role of expert panels and consensus conferences in establishing accepting medical knowledge (Solomon, 2015). In other words, there is detailed examination of our methods of first-hand acquisition of information about the medical world by researchers. However, the equally important second-hand acquisition of this information by medical practitioners has never been examined. The clinical difficulties of dealing with COVID-19, especially in the early months, exposed this gap and the costs associated with it.

Of course, the rapid onset and wide spread of the COVID-19 pandemic that led to a herculean, or perhaps better, Atalantean, world-wide effort to understand and defeat the virus has placed stress on our accepted modes of medical research in addition to our means of learning about research. This "fast science" challenges our ability to maintain the rigor of the processes that provide us with reliable medical knowledge, whatever our analyses may determine those processes to be, when we cannot afford to take the time rigor generally requires. However, while this urgency may require us to consider what trade-offs we are willing to make in terms of accuracy, it does not fundamentally change our preexisting understanding of our epistemological methods. Vaccine development is proceeding at record pace, and we may not have all the safety data we would like, but they are still being evaluated in placebo-controlled double-blind studies. We can continue to interrogate the medical world in the same way as before, albeit with more urgency, and perhaps less accuracy. We can do this, however, only because we understand the epistemological background to our research methodologies.

Clinicians were not so lucky. They could not so easily adapt their epistemic practices. Generally, when they are not in the midst of a pandemic, once their formal training, with its curricula and bedside learning, is completed, clinicians expect to know, or easily find out, what to do to help their patients once they know what is wrong, even as that knowledge is being constantly advanced. This requires methods for keeping up to date, as medical knowledge is constantly changing (and, one hopes, advancing), and a physician cannot simply rely on what he or she learned during medical school and formal training. In normal times, that is, when medicine is advancing at the pace to which the century before COVID-19 accustomed us, clinicians have many routes available for updating their medical knowledge to take account of new results generated by the scientific methods mentioned above. Although no clinician can read all the research presented in their field's literature, they can, if they want, scan the titles and abstracts in their primary journals to identify the papers that appear to be worth reading. Perhaps more commonly, they can

wait for secondary journals or online resources—such as ACP Journal Club¹ or Evidence Alerts—to prescreen the literature and evaluate the key papers, attend reputable continuing education seminars, intermittently check online textbooks such as UpToDate, or listen to podcasts by trusted hosts. Any of these approaches is practicable and can supply new information within the timeframe clinicians need it, which is generally relaxed. There is also time for these methods to establish their general reliability.

While all of these methods are available and indeed used by clinicians to keep their knowledge base up to date,² there has not been any philosophical investigation into which of these methods are most epistemically reliable. How *should* clinicians stay up to date, especially if their goal is to obtain durably reliable and broadly applicable information? There is of course a literature on trust in social epistemology, including in medicine (Solomon, 2015), but this is not the question here, or at least not the primary question. Understanding the problem of trust will allow us to decide *which* review journal or *which* website or online text to trust once we are deciding amongst options within a category of resources. But it will not tell us what sort of resources to use.

Again, in normal times, when being relatively slow to change practice is not problematic, this lack of analysis was not a crisis. Clinicians could choose their own methods of gathering updates, and as these methods deliver new information, adapt their practice. However, during COVID-19, especially in the early days, this was not an option. Not only was there no pre-established standard of care, but it was not clear how to establish one. Clinicians could not feel comfortable either that they were doing the best for their patients, or even that they were not harming them. None of the traditional methods for assimilating new research were available. Therapeutic trials were not being published (yet) in the peer-reviewed literature, and certainly the downstream sources were not available, as there was no input to process. How, then, did physicians learn about new therapeutic approaches to COVID-19 patients, who did not seem to be responding to the virus, or to treatments, as expected? The answer was unfiltered social media, either first- or second- hand. Doctors in the thick of the earliest hotspots, such as Italy and New York, would post their thoughts on what did and did not work on Facebook, and, especially, Twitter. Those who were a few days or weeks behind them on the pandemic curve would look to these postings, or their colleagues who were on social media, for guidance. While good ideas, such as (it would seem) steroids appeared here, so too did bad ideas, such as (it would seem) hydroxychloroquine. Unfortunately, there was no way to tell which was which. Not only because there was almost no data to back up these recommendations, but also because what data there were, and thus the recommendations, were

¹ ACP Journal Club was originally a standalone journal (ACP stands for American College of Physicians, but this was not part of the journal's name). More recently, it is a section in *Annals of Internal Medicine*.

² I should note that I am not aware of any literature as to how these methods developed or even documenting the ways physicians keep up to date. However, direct observation over more than 20 years as a teaching attending at an academic hospital makes this variety of methods clear, at least among those practicing in resource-rich environment I am familiar with.

constantly changing. One week the word was that a treatment helped, the next week that it hurt, and the next that it had no effect one way or another. As a source of ideas, social media was fine. But it was useless as a guide to helping patients.

Even once the initial weeks had passed and papers began to appear, problems persisted. Usually, there are a small number of studies on a given area, which change practice incrementally. Now, however, there was (and is) an unmanageable amount of data to digest and an urgent need to update practice rapidly. As of Nov. 3, 2020, Medline listed over 37,000 papers on COVID-19 in the medical literature. No source or method can assimilate that much information in a reasonable amount of time.

Thoughtful clinicians were at a loss. Without understanding what makes the usual sources of information better or worse, it was difficult to look for the best sources available in the new environment. Perhaps more troubling, those who might have designed new resources amenable to the initial uncertainty and/or the subsequent flood of data did not know in what direction to proceed.

I do not have an analysis to propose for how medical practitioners should best update their clinical knowledge, hence my call to philosophers of medicine to widen their focus and assist in this project. Assessing the epistemic merits and defects of all the various approaches clinicians use to stay up to date, considering other possible methods, and integrating these assessments into a broader assessment of ideal methods for acquiring practical clinical knowledge is not the work of a single year, and certainly not a pandemic year. I can say that I do not expect that there will be a simple hierarchy of methods, any more than there is within evidence-based medicine (Borgerson, 2009; Stegenga, 2014). If method X is generally superior to method Y as a method for updating clinical knowledge, a high-quality Y may still be better than a low-quality X. However, the fact remains that there is no analysis of the higher-order epistemology clinicians engage in. Even if we never again face the challenges COVID-19 has presented, such an analysis would be not only be philosophically interesting but could result in more informed clinicians. It could also combat some of the sense of nihilism that can result from constantly changing front-line reports from researchers, by helping us learn how to filter out more volatile reports. Finally, it would allow us to know not just what is best, but also what is acceptable. As we saw, this could be necessary to know in a future pandemic, but may also be needed to guide physicians in resource-poor areas who cannot afford the subscription fees or internet access that provide more fortunate clinicians with much of their information. A similar problem may arise for locations where clinicians do not read English or one of the other major languages most resources are written in. If we need to translate, we will need to know just what is truly needed to keep costs down.

Like mRNA vaccines, an improved understanding of practical clinical knowledge, potentially leading to improved patient care, could be a positive outcome of this terrible year.

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