United States House of Representatives
Committee on Science, Space, and Technology

Coronaviruses: Understanding the Spread of Infectious Diseases and Mobilizing Innovative Solutions

Testimony of Tara Kirk Sell, PhD

Senior Scholar, Center for Health Security

Johns Hopkins Bloomberg School of Public Health

March 5, 2020

Good morning Chairwoman Johnson, Ranking Member Lucas, and members of the committee.

Thank you for inviting me to speak at this hearing and for your interest in supporting research. Although preparedness and response activities garner much of the attention in outbreaks such as COVID-19, research plays a critical role in developing the evidence base for the most effective and useful interventions. My focus in this testimony will be several areas of my research that relate to emerging infectious disease outbreaks—crowd forecasting and misinformation—as well as the ways to support important research to improve responses to diseases like COVID-19.

I am an Assistant Professor in the Department of Environmental Health and Engineering at the Johns Hopkins Bloomberg School of Public Health. I am also a Senior Scholar at the Johns Hopkins Center for Health Security. *The opinions expressed herein are my own and do not necessarily reflect the views of the Johns Hopkins University*. The Center for Health Security's mission is to protect people's health from major epidemics and disasters and build resilience. We study the organizations, systems, and tools needed to prepare and respond to these events. At the Center, I direct research on crowd forecasting through our disease prediction platform and communication, including misinformation, during infectious disease outbreaks.

My testimony is founded on expertise gained through my research and over a decade of work on pandemic preparedness but not specific epidemiological modeling of the COVID-19 outbreak. Additionally, my testimony is based on the situation as it stands today and my analysis of publicly shared information. I am not a part of the on-the-ground public health or clinical response to COVID-19. There is still a great amount of information to be learned that will shape our understanding of COVID-19 in the weeks and months to come.

Crowd forecasting using the Disease Prediction Platform

Traditional disease surveillance—the collection of information about the numbers of cases and deaths, their locations, and other health-related information—is a critical component of preparedness and response to infectious disease outbreaks. However, these data can be enhanced with additional sources of information about the projected course of disease outbreaks to help support decision making. One potential tool to help support decision making is crowd forecasting, which my team and I have used to establish a prediction platform that provides forecasts focused on infectious disease outcomes.

Early crowd forecasting efforts, such as the Iowa Electronic Markets, were started in the late 1980s and were often focused on political outcomes. Essentially, crowd forecasting consolidates diverse opinions, expertise, and informed guesswork of many into hard probabilities for future outcomes or events. This is helpful in gauging the most likely outcome but also for understanding uncertainty about that outcome. For instance, although crowd forecasting might predict the outcome of a political race, perhaps saying that one candidate is more likely to win than the other, it will also provide a probability of that outcome. If the probability that one candidate will win is a 51% probability and the other has a 49% probability of winning, then that outcome is very uncertain. Overall, the results of crowd forecasting should allow people to question or confirm basic assumptions and help raise new questions that should be considered.

One of the better-known uses of crowd forecasting is the Good Judgement Project, which was supported by the Intelligence Advanced Research Projects Activity (IARPA). This project highlighted the ability of so-called super forecasters, using open source information, to outperform intelligence analysts with access to classified data. The best forecasters were skilled in assimilating information and tapping into multiple sources to understand a range of outcomes.

We wanted to test this type of method for infectious disease. With the help of Hypermind, a company that is involved in the IARPA work, we developed the Johns Hopkins Disease Prediction Platform. Using this platform, we asked forecasters recruited from all over the world, including super forecasters from Hypermind's other forecasting efforts, more than 50 questions about ongoing disease outbreaks. At last count, we had more than 1,000 registered users from 88 countries and more than 500 active forecasters, although not every forecaster answers every question, and some attrition occurred over the course of the project. Forecasters were from a number of different fields; the most common were public health, medicine, and academia, but there were also participants from vector control, the pharmaceutical industry, biotechnology, veterinary medicine, and policy. We considered this range of geographic location and expertise an advantage in potentially developing real-time on-the-ground, crowdsourced prediction data from individuals with high awareness of the health issues in their local communities around the globe.

We asked forecasters to make predictions about a range of outbreaks and locations. For instance, we asked about the growth of the Ebola outbreak in the Democratic Republic of Congo, the spread of measles in the United States , how many US counties might see cases of Eastern Equine Encephalitis, and what the most prevalent influenza virus type at the end of 2019 would be. In order to make these questions work on the platform, we needed to have some way to determine the final correct answer once the time period for the question was over. This limited our questions to diseases that had active traditional disease surveillance efforts around them. On most occasions, forecasters accurately predicted the infectious disease outcome we asked about—on average about 3 weeks ahead of the outcome in question.

Recently, we have focused our forecasting platform on COVID-19. This was possible only because we had previously received the resources and had time to build our forecasting platform and our forecaster pool before the emergence of COVID-19. When the epidemic started, we were ready to ask forecasters about this emerging disease. Early in the outbreak, we asked about the number of countries that would have cases of COVID-19 by the end of February and the number of cases that would be seen around the world and the US. For global case counts, forecasts showed high confidence that there would be rapid and explosive spread, which we eventually saw. We also asked questions that compared reported numbers of countries with COVID-19 to forecasters' estimates of actual on-the-ground numbers of countries with COVID-19. Although reported case counts are the only official count, our platform showed that the potential lack of reporting, possibly due to poor disease surveillance, was a significant area of uncertainty.

This project also underscores an essential research need for the current COVID-19 outbreak—that surveillance both within the US and globally is essential to understanding what is going on with the disease, planning necessary responses, and thinking ahead to what will happen. It is important to note that on a few occasions, we found that our predictions did not match up with the right answers or were very delayed in identifying the correct outcome. We think that this is probably because forecasters still need reliable information about what is going on in the outbreak in order to make accurate forecasts. Essentially, there is no magic here. If disease surveillance information is lacking or is delayed, forecasters don't have any information to go on.

<u>Misinformation during infectious disease outbreaks</u>

Another area of my research, misinformation during disease outbreaks, has emerged as an important challenge during the COVID-19 outbreak. Health misinformation can be defined as false health-related information and can encompass a wide range of messages—from the promotion of fake cures to spreading rumors about the origin of the outbreak. Some false information may also be defined as disinformation if it is intentionally false and created to mislead receivers of these messages. Although the existence of misinformation and disinformation is not a new problem, the emergence of new communication platforms and access-enabling technology, such as social media and cell phone apps, that connect networks of people who often share similar opinions and beliefs, has exacerbated and amplified this problem.

Misinformation and disinformation can substantially impede the effectiveness of public health response measures, reduce trust in public health leaders and responders, and increase stigmatization or scapegoating of affected communities. A number of researchers have been working in the field of health misinformation. Some have identified health issues, such as vaccines, as areas susceptible to the promotion of public discord. Misinformation spread during the Ebola outbreaks in West Africa and the Democratic Republic of Congo has contributed to violence against healthcare workers, social instability, and increased community transmission. Rumors and conspiracy theories have also fueled distrust of governments during outbreaks at a time when collaboration and cooperation are critical.

My research focuses on health misinformation during outbreaks. Specifically, I have led a team analyzing misinformation during the 2014 West African Ebola outbreak, one of the most recent examples of a fear-inducing disease event for the US public. We chose this outbreak because of the potential lessons it could teach for future fear-inducing outbreaks, including the current COVID-19 outbreak.

In our analysis, we found that about 10% of the Ebola-related tweets we looked at had false or half-true information. For example, this tweet with false information focuses on a debunked rumor: "Renown #NSA #Whistleblower: #Ebola Could Be Staged Event To Pillage Africa's Natural Resources | EPIC @Infowars #News." Half-true tweets generally included some true information but also suggested something that was not true. For instance, the following tweet correctly notes that a patient was being tested for Ebola but suggests that there was an actual case: "THERE IS AN EBOLA PATIENT IN A FAIRFAX COUNTY HOSPITAL I'M GOING TO CANADA."

We also saw that more tweets with misinformation were political and seemed designed to promote discord among readers. Discord-promoting tweets were those that aimed to generate a response from and conflict with other Twitter users. Another important finding, and one with parallels to COVID-19, was the identification of several specific types of false rumors. Most often rumors focused on government conspiracies, but they also included mention of rumors that Ebola was airborne—a transmission feature it did not possess. However, we did see an effort on the part of Twitter users to refute this rumor.

Although we have not been able to do a systematic analysis of misinformation during the current COVID-19 outbreak, we have seen evidence of a range of different types of false information. These include recommendations for false cures that could be harmful, like drinking chlorine dioxide, and scapegoating and blaming of specific ethnic groups, such as those with Chinese heritage. Other misinformation includes accusations of conspiracies that various governments created the virus as a bioweapon.

This outbreak has also highlighted another emergent theme from our research with Ebola: the idea that not all misinformation is the same. As I noted earlier, some health-related information may be completely false or even deliberately false, but there are many cases in which information is partially true or a misinterpretation of facts. This is a misinformation gray area. In the case of COVID-19, early erroneous reports of SARS cases in Wuhan were technically incorrect, but in hindsight, they had an element of truth in them that would have been helpful to understand earlier. In considering this, my team and I have come to believe that the response to misinformation requires a nuanced approach, one that we have yet to find the best formula for.

In an effort to chart that course, one of my team members, Divya Hosangadi, is currently cataloguing global misinformation management efforts—from rumor correction programs to criminalization of the publication of health misinformation—and she is reviewing the use of these actions in the context of the COVID-19 outbreak. We hope that this research will help us better understand the best interventions for managing misinformation so that policymakers can be ready for the next epidemic.

While the solutions to the problem of misinformation are complex and still to be determined, we know one thing that is critical in communication is the prevention of an information void that can be filled with false information. When people are faced with an uncertain situation, they engage in sense-making—that is, pulling in and testing information in order to develop an explanation for what they are seeing. Members of the public need accurate and timely information to help them make sense of what is happening in an outbreak. Just as I advocated for improved disease surveillance earlier, this is another case that shows the need for better collection of information about the disease in a transparent and rapid manner. This information should be provided to both the public and to policymakers—the latter, so that they can use the information to make smart policies and to use their position as influencers to spread true information.

Supporting research

From my experience in conducting research in response to emerging disease outbreaks, I believe that one potential area of improvement in the support of research is to reduce the impediments or disincentives to doing rapid and timely research during these events. For instance, one potential hurdle to overcome is the slow process to establish federal funding streams for research during a response. The research I have described today is funded by grants or gifts from private groups—Open Philanthropy and Founders Pledge—which were put in place prior to the outbreak and provided the flexibility to investigate how existing research streams intersected with COVID-19. Although the federal research space is not devoid of rapid research funding, in my experience, this process takes time. In a rapidly evolving world with fast-moving outbreaks, we need a more nimble and agile research support system implemented by the federal government.

These impediments are particularly applicable to social and behavioral research, which can often require data collection in the form of interviews, focus groups, and surveys. Several of my past research efforts have taken the form of research contracts. While these provide the opportunity to work closely with excellent technical staff at federal agencies, they also come with a number of hurdles to overcome. One particularly vexing difficulty is managing Paperwork Reduction Act (PRA) requirements, which measurably slow the process of doing research, increase costs in researcher time, and disincentivize research that would require PRA approvals.

During this response there has been an emphasis on reducing barriers and speeding the development of vaccines and countermeasures. While this is a critical area for research, the research I have discussed today highlights the need for reducing impediments to social, behavioral, and epidemiological research as well. The best treatment cannot be effective without an understanding of where the disease is and who it is affecting. The best vaccine cannot change the course of an outbreak if people refuse to take it. And the best public health response plan cannot be implemented if members of the public refuse to cooperate.

Recommendations

1) *Fund and support the collection of disease surveillance information*. Disease surveillance information underpins cutting-edge forecasting efforts that may help predict disease outcomes. This information is critical to understanding the disease, establishing the most appropriate responses, and planning for a range of potential scenarios.
2) *Transparently and rapidly share information about disease outbreaks.* Misinformation and disinformation breed in an information void. Timely and accurate information should be provided to both the public and to policymakers. Further research on misinformation and disinformation is needed to help develop an appropriate response strategy.

3) *Improve the speed and agility of federal research funding during outbreaks.* Outbreaks currently move more quickly than most federal research dollars. Improvements in this area will allow researchers to contribute their expertise to developing effective outbreak response strategies while they are ongoing, rather than after the event has subsided.
4) *Remove impediments that disincentivize rapid research during outbreaks.* Overwhelming approval requirements can prevent necessary research from occurring in the timeframe necessary to make an impact on an evolving outbreak and may disincentivize research altogether.

Conclusion

My bottom-line message is this: The federal research space needs to support the systematic collection and rapid dissemination of information about outbreaks, including case counts and epidemiological information, as an essential component to both outbreak response and research. Transparency in the ways that data are collected, the protocols for diagnostic testing, and potential data gaps is critical to ensure that researchers and practitioners can interpret data correctly. Information voids lead to uncertainty and suspicion, where misinformation can breed. As the issue of misinformation grows, a dedicated effort to understanding the best ways to combat it will be needed. Even after the COVID-19 outbreak is over, emerging outbreaks and associated misinformation will still be a continuing concern. The federal research space needs to evolve to meet this threat.

Thank you for your time and attention.