

#COVID19: Looking Back to Look Forward

LINDSEY: When we first started production on The Antigen series, we could not have imagined how vaccine development would become top of mind for so many people around the world in response to COVID-19. We were simply hoping to provide expert answers for common questions about the importance of vaccination. Fast forward a few months and we're in the midst of a global pandemic that has impacted every aspect of our lives and reinforced the value of protecting against infectious disease.

Now, there are hundreds of podcasts, newsletters, and tv shows all dedicated to what's happening now and how the pandemic is evolving, including stories of the difficult challenges we face along with some bright spots on the progress we are making in combating COVID-19. You may have even heard that Pfizer is collaborating with BioNTech on a potential vaccine for coronavirus — we'll touch more on this in a future episode.

Hi, my name is Lindsey Dietschi and I've been at Pfizer for nearly 17 years and I've thought a lot about the role we can collectively play through scientific advancements to help people live longer and healthier lives. In my current position, I lead our Global Health Partnerships team, where we help bring Pfizer's medicines & vaccines to underserved populations in Africa, Asia, Latin America, and The Middle East, and I'll be your new host.

For this special mini-series of The Antigen, we're connecting with experts to give you accurate information on COVID-19 – for example, we'll share what we've learned from past global health emergencies, details on the quest for a vaccine, what's important for us to do before a vaccine is available and how companies and partners across the globe are working together to control further spread of this virus.

Kicking things off, today I'm connecting with Dr. David Swerdlow, he joined Pfizer in 2015 and is the Clinical Epidemiology Lead for Vaccines as well as an infectious disease expert. Prior to his time at Pfizer, David worked at the Centers for Disease Control for 25 years and was a part of the team that helped with the response to the outbreak of the MERS Coronavirus in 2013 and 2014.

LINDSEY: So, thanks very much for joining me today, David. In your work with the CDC you helped prepare for a lot of different pandemics. What does it mean to be prepared? And what does decision making look like when it comes to pandemic preparedness? Maybe you could share your thoughts.

DAVID: Well, thanks so much for inviting me. Yes, preparedness is incredibly important. I think, at CDC, we worked on bioterrorism preparedness plans and built up stockpiles of needed medications and other materials since the 1990s. We also developed influenza pandemic plans and we conducted exercises where we sought to see if we were ready for a pandemic. I led the MERS

response at CDC and we created a whole preparedness structure. We identified ways of identification of cases, with surveillance and laboratory testing, guidance for isolation of cases and quarantine of contacts, infection control guidance, traveler's guidance. So, in some ways, I think we had prepared a lot, but we also did some other activities. We also conducted infectious disease modeling.

We, in fact, published a series of papers in the Journal of Clinical Infectious Diseases, where we sought to see if the US was actually prepared for a pandemic. We created a baseline pandemic of mild to moderate severity and said, "How many hospitalizations would there be? How many deaths would there be? How many ventilators would you need?" That sort of thing. We determined that there would be between 700,000 and 4.3 million hospitalizations, between 54 and 538,000 deaths in the United States, but most importantly, we determined that we would need an additional 35,000 to 60,000 ventilators. We also estimated that we'd need up to 7.3 billion surgical masks or respirators. Maybe most important, we determined that a vaccine would not be able to be developed and tested and given to people in time to have a big impact. So, we wrote plans, we conducted exercises, but were we completely prepared? I think the answer is no.

LINDSEY: Yeah, thanks for sharing that perspective, David. It sounds like a lot of work was done in putting together a framework, and it's great to hear that thoughtful approach took place. In thinking about all the steps that we knew could have been taken, and then how this pandemic, in particular, has played out, the role of ventilators and protective equipment obviously seems to be an opportunity we're grappling with right now. So knowing the work that you've done in different pandemics and different areas, how would you say COVID-19 compares to other public health crises that we've seen in the past, maybe even Spanish flu? What do you see as similar, or even what's different?

DAVID: Yeah, well, we got lucky in a lot of ways with previous epidemics and pandemics. The 2009 H1N1 was transmissible, but not severe. SARS, which occurred in 2002 to 2003 caused about 8,000 cases and 800 deaths, and MERS, which has been going on since 2012 with about 2,500 cases and 850 deaths, were both severe, but they were not transmissible. They were not highly transmissible. With SARS, patients became pretty ill and so they could be easily identified. The virus was located in the lower respiratory tract, and viral loads were low in the first week of illness. So, by the time viral loads increased in patients, they were already sick in the ICU and not likely to transmit to others.

COVID is different. It's detected ... the virus is detected in the upper respiratory tract, especially the nose, so it's easier to transmit than a virus that's present only in the lower respiratory tract. It's detected in the first week of illness, so it can transmit before the patient becomes ill, and mildly ill and asymptomatic infections are common. The virus is detected from those patients and

transmission has occurred from these people. So all these factors makes transmissibility higher and the virus difficult to control. Every outbreak has different characteristics. COVID is remarkable for the high severity of severe illness, the higher death rates in men, the low impact on children, and although seen with some other viruses, the high death rates in the elderly and persons with underlying conditions is important. The racial disparities with deaths occurring at much higher rates in Blacks, for example, have also been profound. With other influenza pandemics, there were at least treatments available.

With COVID, we don't have any real clear treatments yet. There's a couple of potential treatments that are ... there have been good studies lately, but overall, we don't have any clear treatments. I think, finally, COVID is just having a much larger impact on society. In other pandemics, we tried other measures, such as closing schools and wearing masks, but I never thought that our society would tolerate being almost completely shut down the way that it has. It really has been a profound response, which I think has flattened the curve in many areas, but we must recognize that the economic and personal consequences, especially job loss, have been tragic.

LINDSEY: Yeah, absolutely. Thinking about what you mentioned, related to the economic cost to society and the personal cost to society, and reflecting even on maybe some of the work that you did around Ebola in West Africa, what were some of the approaches, or even lessons learned, around containing the Ebola crisis there? And even the return to normal, everyday interactions socially and even for routine health-related visits.

DAVID: Yeah, well, Ebola, but also SARS and MERS were able to be controlled for the most part using really similar measures. This included identification of cases and their contacts, isolation of cases and quarantine of contacts, as well as good infection control. So that was similar for all three. They required huge public health efforts and coordinated responses, but in the end, they were controllable. H1N1 was different. It was too transmissible to contain, so efforts focused on making sure we could mitigate the impact. Efforts were focused on protecting pregnant women and individuals with neurodevelopmental disabilities, and making a vaccine. So, I think that each outbreak is a little different, but many of them have some of the same characteristics, in terms of controlling, but unfortunately, when a virus is really transmissible, I think it's difficult to contain without tremendous societal disruption, which is what we're seeing now with COVID.

LINDSEY: Right. Absolutely. It sounds like, with the transmissible nature of H1N1 and the mitigation strategies that were in place then, that seems like we're very much taking a page out of that book and trying to mitigate the impact of COVID now. Picking up on a point you shared earlier around not having an established treatment approach for COVID and not yet, despite a lot of company's efforts to discover a vaccine, not yet having a vaccine. Even thinking about the work that you did in Haiti

around cholera and the outbreak there, are there any lessons we learn from how you contain an outbreak and even the availability of vaccines in helping to contain a disease once there's already an outbreak of it?

DAVID: Well, I do think the situation in Haiti was a little different. I guess I can separate that between how we responded, and then make some comments on the vaccine, but when I first started to lead the CDC's response to the cholera outbreak in Haiti, the death rate was extremely high, over 4%, but by then, data was already coming in. People had established epidemiologic studies, and we had already learned that many of the deaths were occurring in people that were simply ... that people simply couldn't get to care in time, especially at night. So, cholera kills very fast without rehydration therapy, so based on experiences responding to refugee camp outbreaks of cholera in Africa decades before, we established a system of rehydration stations so that everyone was within an hour or two of a rehydration site by tapping into already established HIV/AIDS treatment sites. So we used those sites to be able to become rehydration facilities. I think that led to a marked improvement in the availability of rehydration sites that people could get to before it was too late. Presumably, that helped decrease the death rate.

As far as vaccines are concerned, there was a lot of controversy about using vaccines in Haiti. Many people thought that you should focus on making sure that there's clean water and sanitation, but eventually pilot projects were performed, whereby vaccines were administered in certain areas, and those projects were considered a success, but the problem was, was that even if the vaccine worked, there wasn't adequate vaccine to have a big impact. So, the conclusions of all that was that the international community began to stockpile vaccine so that, in the future, it would be available right from the start. I think that's one of the critical features. By the time there's an outbreak, it's very difficult to be able to obtain vaccine, deliver vaccine, administer the vaccine, develop an immune response, and really be able to have an impact from vaccination.

Now, a little bit of a different topic, but now we have CEPI, which is an NGO group that works with public health and industry to prioritize and fund vaccines that cause pandemics and epidemics. So, they already were working on MERS vaccines, for example. So, groups like CEPI can potentially really help think about what vaccines need to be made and help fund companies develop those vaccines, so that could have a big impact in the future.

LINDSEY: Yeah, David, it's a really good point. I know when I heard about the coalition for epidemic preparedness innovation, called CEPI, it was really encouraging about how can we look towards the future and threats that could face the public and help to address those and start good, scientific research to come up with solutions. How do you see COVID affecting people differently in different parts of the world? And even ideas you have from your work around pandemic preparedness and

how we can help best support people who might not be able to social distance as easily, or even have access to clean water and soap to wash their hands, to help support them having the best possible outcome, given the circumstances?

DAVID: Yeah, I completely agree with what you just said. I'm very concerned about the impact COVID may have in places like Africa. They don't have the capacity to identify and test patients. They may not have the ability to isolate cases from other household members because of household crowding, and the hospital bed and ICU bed capacity is extremely low to none in some countries. Even with H1N1, the mortality in Africa was extremely high, so I am very, very concerned about the impact of this virus in other parts of the world.

Building a critical medical infrastructure, including laboratory and testing capacity, as well as public health capacity, and, if possible, hospital beds, even makeshift hospital beds, can make a big difference. I think all of those things needs to be done in advance. Although certainly, COVID has reached Africa, I still think that there's the time to be able to do some of those activities in order to prevent the ultimate loss of life. So, I think building up critical medical infrastructure, laboratory testing, public health capacity, could make a big difference, and I think it should be started as soon as possible.

LINDSEY: Yeah, thanks for sharing those reflections, David. I know a lot of us are focused on how the science is going to guide us, not just to better understanding how this COVID-19 is developing, but also what it's going to look like when we see those reduced hospitalizations, reduced cases, and as you said, an established way to treat it and hopefully prevent it down the road. The science is certainly giving us a lot of hope to look forward to on this one, and I'm looking forward to all that. So, David, thank you so much for joining me today. It was great to hear your perspective as an infectious disease specialist, and look forward to keeping a close pulse on this one so we can learn more and have the science lead us through this one.

DAVID: Thank you. Thank you so much for including me. I enjoyed talking to you.

LINDSEY: I hope you liked hearing from David today, he is just one example of the kind of scientific expertise we hope to bring each episode. Staying on top of the science will be an important part for this mini-series. Before we wrap up, I want to share with you what else is going on at Pfizer — We recently announced together with our partner BioNTech that the first participants have been dosed in our U.S. Clinical Trial Program for a potential COVID-19 vaccine. To learn more about this, head over to [pfizer.com slash coronavirus](https://www.pfizer.com/coronavirus).

Next time, on this special series of The Antigen, we'll continue to explore the ever-evolving conversation around COVID-19.

In the meantime, please take a minute to rate, review and subscribe to The Antigen. It helps new listeners to find the show. Special thanks to The Antigen team at Pfizer and Wonder Media Network for producing this series, along with my predecessor Yasmeen Agosti for passing the mic to me. Thanks very much for listening and hope you'll join me again next time!

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