Teneo

COVID-19 Pandemic and Vaccines

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Kevin Kajiwara (KK): Well, good day, everyone. Welcome and thank you for joining the 2021 premier of Teneo Insights. I'm Kevin Kajiwara, Co-Founder of Teneo Political Risk Advisory in New York City. I hope you all had the opportunity to enjoy a little downtime over the holidays, and that you and yours are safe and healthy. Well, we are six days into the new year, and I don't know about you, but I'm already exhausted. Clearly, many of us are justifiably focused on the events of yesterday, a shocking if not surprising event that will go down, I think, as one of the most shameful days in American history. We are all preparing to adjust to a new administration which is now only two very long weeks away, and we'll have plenty to discuss on U.S. politics in the future additions of this call, to be sure. But we are starting this year with the pandemic, the subject of so many of our calls last year, because it remains the most profound and immediate global challenge indeed.

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While an insurrection was underway in the Capitol yesterday, the U.S. recorded its deadliest day so far, 3,963 deaths yesterday. Light is at the end of the tunnel and we will end 2021 better than we started because t he vaccines are here. They are being deployed and there are more on the way. While unfortunately, due to our own behavior, there's still an awful lot of illness, death and economic disruption to come between now, and that return to normal. But I'm joined for this discussion today by a very special guest. Richard Hatchett is the CEO of CEPI, the Coalition for Epidemic Preparedness Innovations. CEPI was launched at Davos in 2017. It was originally funded by the Bill and Melinda Gates Foundation, the Wellcome Trust, and a consortium of countries. It was launched as a global partnership between public, private, philanthropic and civil society organizations to develop vaccines to stop epidemics and to enable equitable access to them.

CEPI, along with the World Health Organization and Gavi, launched COVAX t o ensure equitable access to COVID vaccines and to end the acute phase of the pandemic by the end of 2021. CEPI's vaccine portfolio includes the Moderna, AstraZeneca Oxford, Novavax vaccines, amongst others. Prior to joining CEPI, Dr. Hatchett, an oncologist by background, was Acting Director of the U.S. Biomedical Advanced Research and Development Authority, which is better known as BARDA, and he served in the Obama and George W. Bush administrations. We're also joined by my colleague, Dr. Jerry Hauer, Senior Advisor to Teneo. Jerry was the Acting Assistant Secretary of the U.S. Department of Health and Human Services and the Commissioner of the New York State Department of Homeland Security and Emergency Services. I thank both of them for joining me today. If you have any questions for either of these guys, please submit via the moderator chat button on your screen.

So, gentlemen, we have had about 21 million cases in the U.S. and at over 355,000 dead, COVID is the leading cause of death in the United States at this time. Obviously, the vaccines are going to be critical to ending the pandemic. So, Richard, let me start with you, let's start at a high level and overview sense in this. Give us your sense now that we're a month into the vaccine rollout of how it's going, what you're seeing and how you see things playing out right now.

Dr. Richard Hatchett (RH): Great. Well, thank you, Kevin, and thanks to everyone who's joined the call. It's a real pleasure to be here. Just a little bit of background, I'm based in the United Kingdom but was home for about three weeks in Bethesda, Maryland. So, I was in the U.S. from December 12th and arrived back here just in time apparently, yesterday morning. So, I had a little bit of an opportunity to observe the beginnings of the rollout in the U.S., but I just want to caveat what I'm about to say by saying that my attention is principally been focused internationally.

Where we are in the pandemic, and I'm sure Jerry will want to add to this, we are, in the Northern Hemisphere, particularly in the United States, also in the United Kingdom where I am, in the midst of what will undoubtedly be the most intense and largest wave of the pandemic. Most countries experienced the wave in the spring, had some degree of a break over the warmer months, and now things have really picked up and are moving intensely and moving very, very fast. Kevin, you mentioned the nearly 4,000 deaths yesterday, which is just extraordinary, almost 80,000 deaths in the United States during December, and there's a very reasonable possibility that there could be many more than that in January. So, there is the greatest urgency, both in rolling out vaccines as

quickly as we can possibly get them out and in maintaining the social distancing interventions in the disease transmission suppression efforts that we have in place. They aren't working very well and likely, we will see bumps because of people moving around and visiting people during the holidays. That is going to add to the transmission burden.

Besides just the logistical challenge of getting the vaccines out to places where they can be administered, the challenge with the vaccines that have been currently approved, the Moderna and Pfizer vaccines in the U.S., the AstraZeneca vaccine being added to that in the U.K., is that they are two-dose vaccines. While we think you will receive some protective benefit from the first dose, the full benefit, the 94-95% protection that the Moderna and Pfizer vaccines afford is not thought to be provided until at least a couple of weeks after the second dose is administered. So, if you received a vaccine now, you would anticipate being protected in the middle of February, and that is an ineradicable barrier to protecting the entire population.

Then when you add to that the logistical challenge of distributing vaccines in different states in the United States, having different mechanisms in place and different plans in place or distributing that vaccine, adds enormously. And of course, in the U.S., lots of commentary about the perceived slowness of rollout to date and efforts to really ramp that up. Here in the U.K., they're talking about trying to get out 2 million, even 5 million doses a week because of the same sense of urgency.

The one other challenge that we're going to face, and this is a risk communication challenge, is that we are going to have multiple vaccines being distributed, and the vaccines may have different administration schedules, different side effect profiles, and they're all being introduced at the same time. I think the potential for that to play into a residual of vaccine skepticism, vaccine hesitancy in a context where the response with the pandemic has been highly politicized, creates a potential for a lot of resistance in a significant portion of the population to receiving vaccine.

I think it's going to be important for those of us in the public health community, you as corporate leaders, to communicate to your workforces and the populations that you have the opportunity to communicate with, getting vaccine is important to protect individuals. It's important to protect society, and it is what individuals can do to help fight the pandemic. The more we can do to increase the population's interest and willingness to be vaccinated, the quicker we're going to get out of the pandemic. Let me stop there, Kevin.

KK: Well, that's a superb laying out of the situation. I want to start unpacking a lot of what you just talked about there. You referenced the slow rollout that we have seen so far, and I just want to make clear, not talking about down the road yet, but are we seeing at this point a shortage of vaccine, or is it the logistics? I mean, in the U.S., there's been shipment of over 15 million doses, my understanding, but only four and a half million people have been vaccinated. Even here in New York City, which is not a difficult place to get the vaccines to or to store them and no shortage of health professionals, we've received 480,000 doses as of Tuesday, but only vaccinated 118,000. What's the hold up here?

RH: Well, I'm going to say that I'm not directly involved in any of the U.S. or state planning efforts, so I certainly don't have any privileged insight into what the immediate challenges are. I'll offer anecdotally talking to family members, seeking to find vaccine who are interested in being vaccinated. They've had challenges, and it may be because of the state communication plans, but even people that are interested

may not know where to go or how to access vaccine. And so, it's likely to be a multi-dimensional problem. I did work in the White House of President Obama. I was asked to help coordinate the response to the 2009 pandemic, that was the H1N1 or Swine Flu pandemic, that I hope people will mostly have forgotten about because we think it was reasonably well-managed.

Initially, vaccine first began to become available probably in late September of 2009. At the time, as we had planned for the fall vaccination campaign, we had hoped that we would have about a hundred million doses of vaccine ready for distribution by the beginning of October or even distributed by the beginning of October. We ran into manufacturing challenges that the vaccine yields were low. And by the end of October, we only had access to 30 million doses. So, there's a manufacturing component. How much is coming off the line? Then there's a rollout problem, a problem of a centralized procurement and then distribution to the 50 States and the territories, and that presented very significant logistical challenges. And then once the vaccines got to the states, there's a distribution and a last mile problem. We had that same challenge in 2009. I don't know if the root causes of the current situation are the same, but I wouldn't be surprised if they were.

KK: Yeah. Let me bring Jerry into the conversation then. So, understanding, Jerry, the supply chain complexity that Richard just laid out, what's your sense of the holdup or the slowness of the rollout so far?

Jerry Hauer (JH): Well, thanks Kevin. Good morning, everyone. Richard, always great to be with you. When you look at what's going on now, unlike the H1N1 that Richard had helped manage through the White House, where there was a coordinated effort, there has been a very disjointed effort with the rollout of this vaccine. The states were basically told to prepare plans by November 1st and they, by and large, had those plans in place. The problem was that they were not given the funding and they were not given the infrastructure to help get those vaccines out to people. There's also been the challenge of the two vaccines themselves: the Pfizer vaccine having to be kept at an extremely low temperature, Moderna's vaccine, a much warmer temperature, which makes it easier to manage. So, distribution becomes a challenge when at this point in time the healthcare systems are so overburdened that they really don't have the staff or the ability, the infrastructure to deal with vaccine rollout, and there needs to be more federal assistance in getting out, whether it's military or the public health service, to assist in instituting the plans the states had written to deal with this pandemic. We're seeing, when you look at this, California has received over two million doses, but only used 29% of those doses. New York, 32% of the 934,000 doses they've received. Interestingly, Tennessee received 328,000 doses and has vaccinated, at this point in time, 169,000 people, or used 51% of the vaccine. So that's an interesting juxtaposition, because Tennessee has so much of a rural population, you would expect the challenge to be even greater there. And New York, with big cities, should be able to get a lot more vaccination done, and it just doesn't seem to be happening.

KK: I want to follow up on that, because obviously we also know that the U.S. has on order only enough to cover 185 million Americans by June. So, there is a pending shortage out there, unless that's rectified. I want to get to the vaccines themselves in a minute here, but obviously we've gotten to the point now where in the U.S. and the U.K., those who got the initial jabs, timing wise, it's time to get that second jab, and Richard, we're hearing a lot of talk out there, both in the U.K. and in the United States about trying to stretch the dosages out.

In other words, either cutting doses in half or extending the period between the first and second jabs from the three to four weeks that we originally heard about to up to 12 weeks I'm hearing in the U.K. right now. The argument being, I guess, getting more of the population at least some protection is better with the transmission rates being what they are, and the healthcare system capacity issues Jerry just mentioned. What do you think about this talk? Is it premature considering the lack of data, or is it safe? What's the public health perspective here?

RH: So this idea of maximizing the number of people that have at least some exposure to a vaccine, a first dose of vaccine, this is a trade-off that those of us, Jerry and I used to talk about this in public health preparedness all the time, and it's not just this virus. People have modeled this because we've always thought that most new diseases would require two doses of vaccine, and you would be in a scenario where you might want to cover a large percentage of your population. So, one dose versus two dose trade-offs is something that has been looked at extensively theoretically. Now the question that you've asked, is it safe, is it justified by the data? The AstraZeneca vaccine in particular, because of the way that clinical trials were conducted, and the U.K. largely looked at clinical trials that were completed in the United Kingdom and in Brazil, they actually had a pretty significant dispersion of subjects in the clinical trials, some of whom got their second dose four weeks after the first dose, but many of whom waited as long as 12 weeks.

So, they actually do have some data. That hasn't been presented publicly yet. My understanding is it's going to be put out very, very shortly to show the basis, or at least the data that was shared with the U.K. regulatory authorities which led the U.K. regulators to approve the vaccine with the fairly long potential dose interval, four to 12 weeks is what was approved in the U.K.. So, in the U.K., the vaccine is going to be used within the labeled indication as provided by the U.K. regulators, which is based on data. Now the question is, is that data sufficient? How robust is it? How confident are we that the 12-week interval provides the same degree of protection? It's something that people will debate about.

The idea of using just a single dose and dispensing with the second dose would not be justified by data. There have been discussions in the U.S., as you say, with using a half dose. Let me give you the context for why we're having these conversations. I described the situation in 2009 where we thought we were going to have a lot more doses by the beginning of October, and we ultimately didn't have this very substantial supply, and even then it was only enough to cover a third of the population by the end of October. The pandemic in 2009, which was a pretty mild pandemic altogether, caused about 12,000 deaths in the United States total. Peaked, I believe if I'm remembering correctly, around October 20th, right as vaccine was being rolled out, and then it declined pretty rapidly at the end of October and through November, and by the beginning of December, pretty much the fall wave was over.

At the end of the day, when CDC went back later after administering 80 million doses of vaccine and after spending billions of dollars developing the vaccine, because that rollout was late, they estimated that the swine flu vaccine saved about 220 lives compared to the 12,000 people total who died. So, if you have a vaccine and if you're going to provide protection with that vaccine, it is urgent to get that protection out as quickly as possible. And we're right in the midst of this intense winter wave. So that's the urgency that is driving public health authorities to consider these alternatives, which sound pretty radical and sound untethered from the scientific data that

we've got, and it is critically important that we use science to inform our decision-making. That's absolutely critical. And if public health authorities are going to choose to make these kinds of recommendations, it's absolutely imperative that they collect the data to support those decisions in real time as quickly as they possibly can.

KK: Jerry, let me return to you here, let's step away from the vaccines for just a moment. Maybe you can give us an update on the state of the pandemic as you see it right now. Your dark prophecies last year of what the holidays, starting with Thanksgiving and going through year end, would portend were prescient as ever. So where are we as we're going through this post-holiday surge? When do you see the peak occurring at this point? What are you seeing out there?

JH: Well, Kevin, unfortunately I kept harping on behavior as we had our discussions last year, and the numbers seem to bear out the fact that people's behavior has caused this ongoing increase in the number of cases and the number of deaths. We had somewhat of a trifecta. We had Thanksgiving, then Christmas, then New Years. So, people gather at Thanksgiving, the virus spreads, increases the number of people with the virus, who then wind up at Christmas, with the virus. Then they gather again, the virus spreads even more. And then we wind up with New Years. And we have more people with the virus, and it continues to spread.

So, at this point in time, I think that the most difficult days are still ahead, and that could be right through to the early weeks of February. I think that if we can accelerate vaccine distribution and people try and use public health measures, mass distancing, and as we've seen in some places, more stringent lockdowns or restrictive gatherings, office closures. Obviously, there's a real balance between the economic impact of closing offices and businesses, but these are tough decisions that need to be made.

And I think if all of this is put in place and we can really get aggressive with vaccine rollout, with more stringent public health measures for a period of about three or four weeks, and fortunately there's no major events coming up, no major holidays, no major reason for people to gather, then we can start to see either a plateau in the number of cases or a gradual reduction during February, then March, then April. And we start to see the light at the end of the tunnel. But central to all of this is going to be behavior and vaccination. Having the vaccine available is very important, but you have to get the vaccine in people's arms for it to have the public health impact.

KK: So that raises a question that one of our audience members just brought up here, and I want to address that at this point, and this is to both of you. What are you guys seeing in terms of trends in uptake willingness? I mean obviously there's been a lot of talk about anti-vaxxers or those who are just concerned in the record time that these vaccines came to market, and particularly with the first two, with this messenger RNA technology. Novel in the world of vaccines. So, what are the polls saying on this, but also is there a demonstration effect. As all of us wait in line, we are seeing friends who were in the healthcare industry, or what have you getting the shots. They're doing well.

We also see some people trying to jump the line, sometimes famous people, people of means. So, all of a sudden, everybody says, "Well, wait a minute, if those people get it, I also want to get it as well." But we've obviously seen disparities in healthcare, particularly for communities of color, but they also happen to be on the front lines and most vulnerable in many cases. And

we have the added challenge, you guys have both spoken about the sheer array of vaccines available and that will be available, and we're seeing different efficacy rates. Pfizer and Moderna obviously set the bar high, but I'm assuming when you go into the doctor's office or into the pharmacy, there's not going to be a vaccine sommelier there. You're not going to really have a choice, are you? What are you seeing in terms of the uptake willingness here?

JH: At this point in time, there is still a lot of hesitancy, but I think we've seen a steady increase in the willingness of people to take the vaccine. The two current vaccines are both safe. We're not seeing problems with the vaccines. I think that's giving people a level of reassurance. We're certainly hearing from the anti-vaxxers, and I think that's something that's been a constant with any vaccine, particularly a new one. But I think the number of people willing to take the vaccine has risen steadily. But Richard, you might have a different perspective on it.

RH: No, Jerry, I don't. I think the ferocity of the winter wave that we're going through and these daily death numbers, coupled with the availability of the vaccine is certainly increasing the public's appetite. Just maybe offering a global perspective. I do think before the vaccines were available and before we were deep into this wave, which makes people more interested in receiving the vaccines, there was a potential for kind of a perfect storm. You have new technologies people aren't familiar with, rapid development of vaccines, people concerned that we'd be cutting corners, even though we were not, improving safety and effectiveness, politicization of the response creates a lot of distrust in vaccine uptake. Most informed authorities say the vaccine uptake is really a function of trust in the authorities that are recommending the vaccine to you. And when there is distrust, those vaccine uptake rates go down.

In some of the European countries, the polls were showing really low numbers. France probably has the highest rate of vaccine hesitancy or resistance of any country on earth. And their polls were saying that only about 40% of the population was going to seek vaccination. And I have heard from colleagues in Africa, they're getting signals of a lot of potential hesitancy for historical reasons and the same factors that impact communities of color in the United States. So, we'll see, but my sense is very much aligned with Jerry's, subjectively, a real increase in interest. And if we could make the vaccine available, there would be a lot of uptake.

KK: Jerry, then beyond the willingness of individuals to take it, I mean what are you hearing or what are your thoughts with regards to compelling vaccine use by employers, by say airlines and other businesses of allowing consumers to use their products, this concept of sort of a vaccine passport, and can corporations, in an effort to accelerate the rollout, can they themselves become points of dispensing to their employees?

JH: Well, Kevin, the federal agencies have made it clear that employers can require an employee to be vaccinated before they come back to work. In fact, in the kits that are being distributed, there is a vaccine card that shows that you've been vaccinated. I think that obviously in the healthcare setting, requiring vaccination is very easy. It's going to be a lot more difficult in office settings, particularly since people have the option of staying at home. But I do believe that at this point in time, a lot of businesses will require a vaccine certification. And I think at some point we might see the airlines, particularly in traveling overseas, asking for a vaccine card or certification. I know there's a lot of mixed emotion about that, but I think that the U.S. government in giving employers the go ahead to allow them to require

proof of vaccination has opened the flood gates somewhat.

KK: So, I want to return just to the virus itself here for a second, because obviously much is being made of the mutations, particularly the strain that was first identified in the United Kingdom. It's now clearly here in the United States as well. It's reputed to be highly transmissible, if not more deadly in and of itself. But Richard, I know that epidemiologists and virologists and whatnot fully expect mutations to occur, but is there any reason to think yet that the vaccines will be ineffective against any of these mutations? I mean, is it a dangerous moment, in a sense, when you've got a partially vaccinated population and rapid transmission? I mean, is there an evolutionary pressure on the virus to mutate in a more vaccine resistant direction?

RH: Right now, with so few people vaccinated, and frankly, so few people protected by natural immunity from actually having survived infection, there's not a lot of pressure on the virus. I think the mutations that we are seeing, I mean they are significant. What was of great concern about the South African and the U.K. variants that have emerged is both the number of mutations, which is significantly greater than the mutations that have been seen previously, which as you say, RNA viruses continually mutate. I mean, that happens at a certain rate, but what we were seeing was a concentration of mutations in parts of the virus that were going to have biological significance. And some of the mutations, particularly in the South Africa virus are, in regions that we believe would allow for escape from at least some of the antibodies that people would develop naturally and that the monoclonal antibody therapeutics that we've developed target those regions, and so might allow escape from the therapeutics that we've developed.

Most of the neurologists that I've talked to, because when you vaccinate somebody, you elicit what's called a "polyclonal response," your body generates tens or hundreds or thousands of different antibodies against the thing that you're being vaccinated against, and the diversity of that immune response is likely to overwhelm the mutations that we're currently seeing. So, most virologists are reasonably confident that the vaccines are going to have continued high rates of efficacy, but it does put us on notice that the virus can change. And one of the theories about why these mutations have emerged is that perhaps these were mutations that evolved in possibly immunocompromised patients with prolonged infections, or who received multiple therapies where selective pressure was put on the virus, and thus these new variants have emerged.

And what's very clear, based on the epidemiologic data, is that they do really appear to be more transmissible. And certainly with the U.K. variant, when you are looking at viral loads, there is clear evidence that viral loads are increased, which could both enhance transmission and potentially result in more severe disease, although that hasn't been demonstrated yet and would be very difficult in the midst of an intense fall wave, where you're already overwhelmed in your healthcare system. Very difficult to make a determination about that at a population level at this point. But it puts us on notice that we need to be ready to implement changes in the vaccines if vaccine resistant strains emerge. And of course, we have an experience with that with flu all of the time, which is under continual immune pressure and continually evolves to the point that we have to make adjustments in the vaccine.

We need to be prepared. We need to be thinking about how we're going to do that with the new COVID vaccines and do that as quickly as possible in the event that these vaccine resistant strains emerge. But right now, the virology community has reasonable confidence

that the vaccines will continue to work. And we at CEPI are actually funding work to evaluate that through a number of partner institutions, where we're actually testing the viruses and I think a global surveillance effort will be initiated formally very shortly.

JH: Richard, let me ask you quick question. If the variants are not so great that there's a need to change the vaccine, what is your thinking at this point about the need for boosters on a yearly basis, or some schedule at this point in time?

RH: Well, we know that the immune response to all vaccinations will wane to some extent. For some vaccines, it can provide lifelong immunity. We have some initial data about some gradual waning of immunity with the vaccines we've got, or to natural infection as well. I mean, but we've only experienced this virus for a year. So, we just haven't accumulated enough time to really understand what the likely put of re-infection will be for the population at large. We've had isolated instances, clearly, where people have been infected twice, but I think time will tell. If I had to sort of take the temperature of the virology and immunology communities, I think they anticipate this is the kind of virus that we will likely need boosters for over time. What isn't clear yet, Jerry, is what that interval is going to be. Is that going to be a short interval or is it going to be a five-year or 10-year interval? But odds are we'll likely need boosters. We'll always have portions of the population that are at risk. So, I do think there's an anticipation that there will be an ongoing need for effective vaccines, essentially out as far as we can see.

KK: And Richard, we made the point at the beginning, early in the call that the Pfizer and Moderna vaccines are notable, not only for how fast and how effective they seem to be, but also the fact that they are using a novel technology, the messenger RNA basis. And obviously tens of thousands of people were involved in the trials, but we are now getting to the point in terms of deployment where we can start to see the proverbial one in a million type effects. Is there anything that's appeared? Anything that's an issue in your mind that would not have been anticipated with those two in particular?

RH: No, not really. I mean people have heard about the reports of allergic reactions, and a publication has just come out that's beginning to look at that. And of course, as part of the post-marketing requirements for the vaccines, we will continue to monitor for these very rare side effects. I mean, one of the challenges, particularly in the context of a pandemic when you're rolling out new vaccines very, very rapidly, is that if you give vaccines to millions of people, the kinds of events that would occur if you were just observing a population of millions of people will continue to occur. And so, if you vaccinate five million people in a month, some number of those five million, it might be just a handful, but they're going to drop dead within a few days of receiving the vaccine. It doesn't necessarily mean that the vaccine caused their death.

And so, it becomes really, really important to try to understand the background rates of heart attacks and strokes and sudden death and any other event that you might be concerned about in the population that you're vaccinating. The priority groups for COVID vaccine are going to be older populations, which are going to have higher rates of risk for these events. And the reason I mention this is the power of the anecdote in making somebody maybe decline to pursue vaccination can be pretty powerful. If you hear a news story about someone in your community who was vaccinated and then had a really bad event or developed a neurological condition and they show images of that individual, that's going to have a strong impact on you. You need to resist the instinct to connect the bad event, necessarily, with the

vaccination until that can be properly evaluated and looked at. And there will be very significant efforts to look at all of these new vaccines, look at these adverse events, severe adverse reactions, and try to determine whether they are likely connected to the vaccine or just bad luck, as it were.

KK: So I want to move on to the experiences you're having and the challenges you're facing with regards to COVAX and vaccine deployment around the world, because I know this is very important to you and to the efforts of CEPI, but maybe the segue here is to talk a little bit more about the vaccines for just a moment, because clearly, vaccines beyond the Pfizer and Moderna ones are going to be of critical importance to a lot of the rest of the world, some of which are still anticipated. And I'd love to hear your thoughts on some of these, like say the Johnson & Johnson, which is a one jabber without the cold storage requirements, potentially very valuable in hotter places around the world, but also, we're hearing a lot about these Chinese and Russian vaccines as well. There's obviously a dearth of data, of trial data, on the other hand there's years and decades of experience developing pharmaceutical products in both of those countries. Any reason to think that these aren't effective or aren't safe products in terms of what we're seeing so far in their rollouts around the world?

RH: Well, I mean, I think we do want to see the data. First of the Chinese vaccines, the Sinopharm vaccine, which is an inactivated vaccine. Basically, they took the virus and you kill it and then you would administer the virus that can no longer cause disease and produce immunity. It's a classic way to develop a vaccine. It's long established. It can be tricky. It's not always easy to develop inactivated vaccines, but theoretically it should work. The Sinopharm vaccine has now been licensed in the United Arab Emirates and in a couple of other countries in the Middle East and also licensed in China and they have reported, although I haven't seen a peer review presentation of the data yet, efficacy between 79 and 86%. That's a really solid vaccine and there's no reason to think that it shouldn't work.

The Russian vaccine is actually a really interesting vaccine, scientifically. It requires two doses, but the first and second dose are slightly different forms of the vaccine and there's good theory behind why you would do that. The Gamaleya Institute, which has developed the vaccine, is well reputed internationally for its scientific work and I've talked with colleagues in the pharmaceutical industry who are quite complimentary of the Russian clinical trial capabilities and who often perform clinical trials in Russia because of the quality of the clinical trial results that they receive. We haven't seen the data, but the people that are making the vaccines are experienced. The theory behind the vaccines is good.

One of the concerns that's often articulated about vaccines coming from China, from India, from Russia, relates to the quality control mechanisms that are in place for manufacturing and I think it will be really, really important for those vaccines, if they are to be embraced globally, to go through processes with stringent regulatory authorities that are recognized by the WHO. WHO has a regulatory group and it's basically a seal of good housekeeping, called pre-qualification. If these vaccines can achieve pre-qualification, that should increase global confidence in their use outside of the countries of origin.

KK: Tell us a little bit about what you're seeing and what you're experiencing and the challenges you're facing with CEPI and COVAX around the rest of the world. I mean, you've already brought up a couple of things and these are more in rich countries, but it just goes to show the disparity of

experience, right? I mean, France, you mentioned where the U.K. has had well over a million vaccinations and France has done under a thousand, something like that. Israel on the other hand has vaccinated approaching 20% of its population already, albeit a small country.

Talk about what you're seeing out there, but particularly with regards to the lesser developed world. For the benefit of our audience, is there a role for corporate America to play, in terms of improving that situation in much of the rest of the world?

RH: Well, the biggest concern that we have, we would argue that the reason that we have created the vaccines is to end the pandemic and that while vaccines are a scarce resource, we want to use them to greatest effect towards the goal of ending the pandemic. We don't think there will be enough vaccine globally to end the pandemic globally, by the end of 2021, if by ending the pandemic you mean ending transmission of COVID. COVID will continue to circulate, but we do believe that there will be enough vaccine to protect all healthcare workers around the world, which means healthcare systems continuing to function and not having to implement the kinds of draconian economic lockdowns that we've had to put in place. We also think there'll be enough vaccine to protect the most vulnerable populations, potentially in every country.

If you can do that, if you can take the morbidity and mortality and stress on the healthcare systems out of the pandemic, you can transform it from being this terrible event that we've all been living through, to something a lot more like 2009, which most people have forgotten about. To do that quickly you have to distribute the vaccine globally in an equitable fashion. What we have happening right now is, we call it the equity clock is ticking. You see images being transmitted around the world of people being vaccinated in the U.S., in the U.K., in Israel and the vast majority of countries where the vast majority of people live, don't have access to vaccine right now. COVAX was created to try to accelerate the delivery of these life-saving medical products globally in a fashion that would promote all of the countries rapidly vaccinating their healthcare workforces and their most vulnerable populations.

One of the big challenges that we're seeing as we have entered into this intense winter wave is the political panic that goes along with that, which is creating a scramble or a constraint vaccine supply, which of course is what we anticipated. Fortunately, just before Christmas, we were able to announce that COVAX had secured around 2 billion doses of vaccine through agreements with AstraZeneca, Sanofi, Johnson & Johnson and Serum Institute of India, which will provide both the AstraZeneca and Novavax vaccines over the next couple of years. We have access agreements, where we can't announce the names of the companies yet, for another billion doses in 2021. That's 3 billion doses in aggregate that COVAX will be able to distribute globally, which offsets, I think, to some extent, this scramble for vaccine that we're seeing.

KK: I want to spend the last few minutes here asking both of you a question that I think a lot of our audience, a lot of corporate America, is grappling with. It's tempting obviously to always fight the last war in a sense and obviously we have to get through this pandemic and I don't want to downplay how much further we have to go, obviously, but as we think further out, if we think about the changes that corporate America has had to go through after various crises in the past, whether it's 9-11 or other issues, what's the takeaway here from this in terms of biological threats?

I mean, it seems like we've treated these as a series of one-off anomalies, where the reality of it is, I think in the conversation

you and I had the other day, Richard, you put it very well in the sense that it's more like the cyber threat. It's constant, it's coming and it's a cost of doing business to protect against that now. What's your recommendation or view and Jerry, I'd love to hear your view here as well, in terms of how corporations need to think about and think about mitigating ongoing biological threats?

RH: Sure. Maybe I'll jump in and answer quickly and then let Jerry have the last word. I think the analogy to the cyber threats that you mentioned is a really good one. We have constructed a highly connected world with dense cities, mega cities in developing countries, continuing to make incursions into previously remote areas. You can get anywhere to anywhere in the world in 24 hours. We've created a perfect opportunity ground for new viruses and the steady drumbeat of emerging diseases that we've seen over the last two decades, H1N1, Bird Flu, Ebola, MERS, Zika, now COVID. This is the reality that we live in and if we want to have a world that operates like the world was operating before COVID, if we want to get back to that or even close to that, then we need to address these risks systematically and in a much more comprehensive way and that's where the cyber analogy is useful because we've internalized that we have to address cyber risk and so we do.

I think the cyber is also a good analogy because we haven't just turned that over to governments. We've figured out ways to monetize it. We've created public-private partnerships. Government has a role. The private sector has a role and I think corporations globally and corporate America need to think about how they can step up because we all want to get back to that free flowing efficient world that we lived in before, but if we don't address biological risks systematically we will have an event that is bigger than COVID and more damaging than COVID and that is a certainty.

KK: Jerry, the challenge then is given what Richard just said, the certainty and bigger than COVID, but the timing of that is just an obvious unknown, how do companies integrate that into the threat matrix that they're having to adjust to every day?

JH: Well, Kevin, historically companies put their most attention and the most funding into high probability events and often ignore low probability impacts and low probability events. I think Richard's point rings true in that this is here, we've seen it, we saw it back during the anthrax attacks. People's memories are short. They forgot about planning for these types of events and now we've had a significant reminder of the impact of an event like this. Biological events, whether it's naturally occurring or it's an intentional event, those threats are here to stay and corporations need to ensure they bring that planning way up to the top, along with some of the more common things they plan for because I think most corporations have now seen the financial impact these types of events can have on their bottom line.

KK: Understood. Well, we are at the bottom of the hour. We could go on all day about this and I'm sure we'll be talking about it a lot more in the future. I want to thank both Dr. Richard Hatchett and Dr. Jerry Hauer for joining me today. It was very interesting. If you have questions for either of these gentlemen and didn't get them answered, please don't hesitate to reach out to your Teneo contact or reach out to us at teneoinsights@teneo.com.

Please join me for our next Teneo Insights call, which will be on Thursday, January 21st. In the meantime, thank you very much for joining. Have a great day and stay safe. Thanks guys.

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