

COVID-19 Vaccines: From the Lab to Your Arm

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Cory Kasimov: Good afternoon, everyone, and welcome to J.P. Morgan's 39th Annual Healthcare Conference. Sorry for the short delay getting started.

My name is Cory Kasimov. I'm a senior biotech analyst here. I'm joined by my colleagues Lisa Gill, our healthcare technology and distribution analyst, and Chris Schott, our US pharmaceuticals analyst. It's our pleasure to host this keynote on all things related to COVID-19 vaccines.

We're very excited to have a really distinguished group of panelists today, including Dr. Moncef Slaoui, the chief advisor of Operation Warp Speed, Angela Hwang, group president of Pfizer Biopharmaceuticals, StÃ©phane Bancel, the CEO of Moderna, Karen Lynch, the current president of Aetna and incoming CEO of CVS Health, and Brian Tyler, the CEO of McKesson.

Thanks to you all for taking the time to join us today. Even more so, I think I speak for everyone when I say up front, thank you for all your efforts in fighting this pandemic.

Our hope with this keynote is to cover all aspects of COVID-19 vaccines, from development and production, to distribution logistics, and to longer-term outlook for the pandemic.

With that, Dr. Slaoui, perhaps you can take a couple minutes to set the stage for our discussion by providing some overarching perspective on where we are in addressing the pandemic and how you're thinking about some priorities at this point in time.

Dr. **Moncef Slaoui:** Thank you, Cory. Thanks for putting together this panel. I look forward to a good conversation.

In a few minutes I'll say, to an extraordinary pandemic that hit us, starting, say, in January of 2020, there has been an extraordinary response from the healthcare ecosystem, or from the biotech pharmaceutical ecosystem more specifically.

In that period of, no more than 11 months elapsed between identifying the sequence of the virus and having two vaccines approved and in use in the US population. It's truly an exceptional achievement.

Thanks to great efforts in the companies where there are large biotechs or large pharma, great efforts thanks to various US governmental entities within the Human Health Services or the Department of Defense, and also thanks to a very aggressive strategy put forward to incentivize and support -- financially, but also operationally -- the discovery, the development, the manufacturing, and now the distribution of the vaccines.

In May of 2020, there were, if my memory doesn't fail me, more than 120 different vaccine programs described in the world. There may still be close to a hundred of them at different levels of activity. Within the US, Operation Warp Speed was set up to try and accelerate development of a number of vaccines. Without getting into the details, six vaccines were selected.

Fast-forward to today. Five of these vaccines are in phase III trials or have completed the phase III trials. Two are approved [indecipherable] messenger RNA, and we have representatives from Pfizer and Moderna. I think that both spearheaded these programs to allow us to have the vaccines approved and in use.

Two more have completed the recruitment in their phase III and are accruing cases -- one by Johnson & Johnson and should be coming to fruition very shortly by the end of this month or early next month, and one by AstraZeneca already approved elsewhere and completing phase III trial here in the US and potentially getting an emergency use authorization in March.

Then, still a protein vaccine by Novavax. It's in phase III trials. More than 8,000 subjects recruited, and a Sanofi collaboration with GSK with a vaccine that's in phase IIb trials. Great progress in terms of developing the vaccine clinically.

Also, great progress in terms of manufacturing the vaccines in parallel and at high risk, either within the companies as has been the case for Moderna and Pfizer, or in manufacturing capabilities facilities of having accessed as part of US government contracting with contract manufacturers, either for production of the vaccine [inaudible] or also, critically, for the pre-finish activities are major bottlenecks.

It's the same activities used for all the vaccines. To date, as I said, two vaccines are approved. 40

million doses have been distributed already. Only nine million people have been immunized. There is a need to accelerate the immunization.

The distribution of the vaccine has been I think a remarkable also collaboration and partnership between McKesson, CVS, CVS, Walgreens, FedEx, and UPS, and here [inaudible] the operation, and DoD in general.

The companies have played a critical role in delivering exactly on time, as was described yesterday, in over 14,000 different locations the exact quantities of the vaccines on the dates that were suggested. Where things need to improve is in the capacity of the healthcare system in general, without getting to the politics of whether it should be the states or the federal, or whoever's fault it is.

We need to improve the speed with which we are able to deliver these vaccines into the arms of people. That's our number one key area going forward. I would say other areas that require absolute continuous focus are to continue to streamline and optimize the supply chain with the messenger RNA vaccine, but also with the other vaccine.

It's vital that we have more variety of platform technologies underpinning vaccines for use in the population in general. It is very important, in the context of a pandemic, to be able to have a one-dose vaccine. It's a development that could take place, frankly, with the current messenger RNA vaccine, given the performance observed over a short period of time with one dose.

That would be a new kind of challenge and development. Also, vaccines are being developed as a one-dose vaccine such as J&J vaccine. Finally, another area where we are very focused is identification of clinical correlates of protection.

That's a really critical enabler for the future of other vaccines, given that the availability of vaccines now, particularly in the US, is making it effectively impossible to recruit high-risk subjects into placebo-controlled clinical trial. It would be the pragmatic way to demonstrate efficacy of yet more vaccines.

We hope that the last vaccine that started phase III, the Novavax vaccine, will not be derailed by the fact that subjects in the trial will leave the trial to get access to a known vaccine, versus an unknown vaccine or a placebo, and therefore, through that, make the vaccine study outcome highly improbable.

Identification of immuno-correlates of protection, which will be available to all players, may enable the development of a second-generation of vaccines that can support vaccinations here in the US, as well as on a worldwide basis.

All-in-all, this has been an opportunity for the industry as a whole to demonstrate to the world in general, and to the US population in particular, its critical role in effectively saving the country and the world from a pandemic that has just brought our lives to a stop. Has killed so many, infected so many, disrupted so many.

It's very important to highlight the level of collaboration, of partnership, of focus, of commitment, of selflessness that has characterized the work of the industry and the US government in tackling this pandemic. I'll stop there.

I just tried to refresh everybody's memory and mind on what has been done, and the critical areas of focus going forward. Looking forward to have a discussion with that.

Chris Schott: Thanks, Dr. Slaoui. Some great opening remarks. I thought I'd just cut to the chase up front here with a question for everybody. When you do you expect the population at large to be vaccinated? What do you see as the single main gating factor to getting there?

Maybe we'll start with, Angela, then go to Stephan, then Karen, then Brian, with just that initial question.

Angela Hwang: Thanks, Chris. Thank you, again, for bringing us all together to have a very important conversation about a very important topic. I think that Moncef's introduction on the state of where we are with the pandemic sheds a lot of light in terms of how we should think about where we are with the pandemic and how long it would take for us to vaccinate everyone.

You've heard him talk about the complexities of this vaccination campaign globally. We have billions of people that we have to be able to vaccinate because of the pandemic. The ability for us to vaccinate at the speed that we need in order to gain the herd immunity and to stop transmission is, obviously, up highest priorities.

As I think about everyone coming together, and I think that this panel is a great example of this industry, public-private partnership that we all need, because it truly needs all of us to be able to make this impact in the world. It's going to take time. There is a lot of people to vaccinate.

Vaccinations are complex, and by virtue of that, I hope that in 2021, we will put a lot of this behind us, but we should anticipate that there is going to be a lot of work to be done.

This focus on getting the rates of vaccinations up, to be able to support the point of vaccination, to increase the numbers of them, so that we can really increase the volume of people that can get through them, are going to be all important steps that will help us to achieve that.

Chris: Stephane?

Stephane Bancel: Chris, thank you. Thank you for having us today on the panel. It's good to see everybody on this panel. First, I would like really thank Moncef and congratulate him. I think maybe US has done an amazing job to build a portfolio of vaccines. I have a chance to talk to different regions in the world, and a lot of countries are scrambling because they don't do it as well as what the US did.

Kudos to what the US government has done and to the collaboration between all the agencies of US government, OWS, and industry. If you ask the question about the US, Chris...Because I think if it's a worldwide question, a US question is a very different answer.

Chris: Absolutely. Yeah.

Stephane: If you ask the question about the US, and if it's a question of people above 18 years of age, if you do the math at 70 percent vaccination rates, which will be wonderful given some of the polls we're seeing daily. That's 150 million people. That's 400 million doses in arms with a boost. Of course, less if you assume a single dose. If you look at what...

I think Pfizer and Moderna have said, "We will supply to US government by end of Q2. I cannot speak Pfizer, Angela can. I can tell you, for Moderna, we have said it. We will have, before the end of Q2, 200 million doses of the Moderna vaccine to the US government. We are so far totally on track to the plan we have given them. We confirm that almost daily with their team.

If you look at that number, if both companies can deliver the total of 400 million doses by the end of Q2, that will cover 70 percent of the population above 18 years of age. The US will most probably be one of the first country of size to get its population protected.

Smaller countries like Israel, Switzerland, and so on, are going to go pretty fast given how much vaccine they've ordered and the size of population. Europe is going to be much later. I would not

be surprised if it takes Europe potentially up to the end of the year to get a good immunization across a country. Then when we can take time for other countries in the world. I'll pass over to you, Chris.

Chris: Karen, your thoughts on the topic.

Karen Lynch: First of all, thank you for bringing this group together. I think it does demonstrate how we can collectively come together, as an industry, to address a pandemic. First of all, congratulations to Pfizer and Moderna for everything that they've been doing. I do think it is, what Dr. Slaoui said.

It's getting it into the arms of the individuals. Obviously, it all starts with the supply. We know that people are working incredibly hard to get that supply. Then, right now, it's the allocation decisions that are being made by the states to go after certain types of individuals so that we get in our front-line workers and we get at the most vulnerable population.

Then, obviously, it's the education of people. There are certain people in the US that are hesitant around the vaccine. I think we all have a responsibility to educate around the efficacy and the importance of the vaccine.

From a CVS Health perspective, we have a large reach. We have 100 million people who are Caremark and our Aetna members that we have the opportunity to educate. We have 10,000 stores across the US where 85 percent of the US population lives within those 10,000 stores. The distribution and the access, we can play an integral part in working in the communities to get people vaccinated.

Chris: Brian?

Brian Tyler: Chris, it's tough to go last after this esteemed, pristine panel.

[laughter]

Brian: I do want to start, though, with my sincere appreciation for what the teams at Pfizer and Moderna have done, for their great partnership, and also the great partnership with OWS and the US government. I do think this really has been a partnership. I certainly would echo the previous comments. It's going to take product.

It's going to take patience, two kinds of patience. It's going to take physical people patients to get shots in arms and willing people to get shots in arms. I think it's going to take a little bit patience in the early phases. This is a very new program. It's very complex.

There's obviously a lot of passion, energy, and some learning that is going to go on around this. I think it'll continue to get better and better as we go through that.

I do echo Karen's comments. I think all of us, particularly as healthcare leaders and leaders of large organizations, have to do our part to convince people that it's not just safe to take this, but there's also an element of responsibility to yourself and your community.

Inherently, this is a battle we're facing that we're in together. It's not so much an individual as it is a community that will beat this back.

Cory: I have a question, probably for Stephane and Angela. One of the most discussed topics right now in this ever-changing environment is the emergence of mutations. I'm curious how you're thinking about variants in the SARS-CoV-2 virus. Do you worry new strains could render the vaccines we have today less effective or even ineffective? Maybe Stephane first.

Stephane: Thanks, Cory. First, the virus has been mutating since January. This is not something that happened in last few weeks as reported by the media. The industry, again, with academia has been collaborating extremely well to document mutations with [inaudible] actions, sera, and viral strain to help us assess things.

I think it's important that people appreciate the difference between a monoclonal antibody and the vaccine. A vaccine, when you vaccinate and we make full-length spike protein in your body, you're not going to make one antibody, but a soup of antibodies. I need many epitopes for a virus.

We are following very closely as we have the last 12 month. We, as we said, do not believe that the current strains in the UK, South Africa -- I know there's a new one being discussed from Brazil - pose a problem to the current [inaudible] of a vaccine.

As you know, one of the beauty of mRNA technology is how quickly you can go. I'll remind everybody we went from sequence to shipping BNT product last year in 42 days. I believe we should be able to even faster at this time. [inaudible] .

I think the question is not for the short term. I believe, for those mutations, we're going to be fine. I

think the question is going to be more mid-term.

You have a UK strain now, but you might have a new strain coming out of the new strain, and then other strains coming out of it The question is, as you see the virus mutating over time, are we going to have, in six months, in nine month, in two years, such a drift from the original SARS-CoV-2 sequence that came out a year ago?

Are you going to need to have new vaccines and potentially combinations of vaccines? Is it a worry it's going to evolve basically like what's happening with flu or what you see, for example, with a product with Prevnar where you keep adding [inaudible] .

The beauty of mRNA is we can combine every molecule in a variable. We currently have been going to phase III of vaccine against CMV, Cytomegalovirus, but that's six mRNA in each variant. We have demonstrated that we can get that done, technically, and if the regulator are comfortable us taking products from the get-go with combination.

I'm not worried for the short term, but we are watching that very closely because I think that we might evolve into a world where we need new strain of vaccines down the road, but not in the short term.

Cory: Anything to add there?

Angela: Likewise, Pfizer is closely monitoring and studying these new strains, these new variants, and the mutations from these variants. Just last week we published data that demonstrated that, in vitro, the sera of those who were vaccinated by the Pfizer-BioNTech vaccine was able to neutralize...had immunity against the particular strain of the SARS-CoV-2 variant.

We know that, in this specific instance, it's working. Likewise and continued, we are looking at other mutations as well, and that's being studied. Actually, very shortly we'll be publishing on that. All to say that I think all of this coming together, we're bullish about what our vaccine is going to be able to do in its ability to respond to the various mutations and the variants.

That being said, what we have to realize is that this virus could change, and that we may need a new vaccine altogether. It is important that we continue to monitor that as well and to stay on top of whether it's really a mutation and a small change, or whether it actually moves to a place where we need a new vaccine.

Again, as we've said, that's where the beauty of the mRNA technology comes in. With the sequence we're going to be able to be able to make a new vaccine in very short order, in as little as six weeks.

That, together with working with regulatory agencies to really understand what are the studies, and maybe what are the data that they would need in order to create a regulatory pathway for authorization or approval, clearly that's what we've been doing for the last several months.

We'll continue to do, but obviously, do it in a way that helps us to get ahead of it. We should anticipate that there's going to be changes, and we need to be ready for these changes. And we are.

Cory: Dr. Slaoui, we obviously have representation here of the first two vaccines both based on this messenger RNA technology, both have demonstrated pretty remarkable efficacy.

I wanted to ask you, though, about your level of confidence in the non-mRNA approaches that are out there, and what you think maybe the bar for efficacy is given what we've seen so far. For example, what kind of role might a vaccine with efficacy on the order of 70 to 80 percent, not 95 percent, have in this market in the global fight against the virus?

Dr. **Slaoui:** It's a very important question, and frankly a very delicate and difficult one. I'm going to say having a 50 percent -- just to change from 75 percent, and the regulators have put the bar at 50 percent -- having a 50 percent vaccine is so much better than having no vaccine.

It would allow appropriate immunization throughout the population to save millions of lives over the years. But of course, once a 95 percent benchmark has been set, the individual benefit dimension take somehow instinctively the frontline in people's mind versus the population benefit.

The scientific answer to your question is a 70 or 80 percent vaccine can be highly effective in inducing herd immunity particularly if the vaccine, for instance, has a very efficacy against severe disease and decreases the [inaudible] .

I'm pretty sure studies will define this, but it's a very reasonable thing to expect that even a 70 or an 80 percent effective vaccine is actually going to substantially decrease virus, most people immunized.

We'll induce herd immunity if 80 or 90 percent of the population is immunized, but you don't have the level of certainty that you have when you have a 95 percent effective vaccine.

My projection as to the efficacy of the vaccine I would say is very high. I do remember in June having said that I expect the vaccine to be 85 to 90 percent efficacious. It was a shock I remember. [laughs] It was very satisfying to see that efficacy was very high. The number was not coming out of the blue. I believe that this virus, fortunately, is a somewhat slow virus from a pathogenesis standpoint.

If you are able to either have a low virus load inoculated or have an immune response that's able to control your virus load spread quickly so that by the time the bulk of your disruptive immune response against the virus is at its peak, not most of your lungs are infected, but only five percent of your lungs are infected, you are going to clear this virus out and most likely be asymptomatic or have very, very small cough.

If your olfactory nerve have been touched, you may lose a little bit of smell, as is the case, in effect in probably 85 to 95 percent of people that are naturally exposed to the virus and have still no immunity.

The reason I went through that is to say that my expectation, frankly, is that most vaccines, if they are immunogenic, particularly in the elderly, will be effective, have high efficacy in the 70s or the 80 percent. Some challenges observed with other vaccine may have other explanations than the intrinsic efficacy of the vaccine itself.

This is one of the reasons why we felt that it was appropriate to select one of the vaccines and test it as a one-dose vaccine. As you know, the Johnson & Johnson vaccine is being tested both as a one-dose and as a two-dose vaccine in large phase III trials.

The expectation is to have, I hope, 80, 85 percent, or maybe more, efficacy. What people need to realize is that, in real life, a very large percentage of people immunized with the first dose will not get their second dose, for various reasons.

Maybe in a pandemic, at the height of the pandemic, this will not be so. Maybe in the month of May, April, or June, as the percentage of the population becomes larger and large, a substantial number of individual may not get their second dose. Having a one-dose vaccine is therefore very important.

I believe that the Moderna vaccine and the Pfizer vaccine, if tested as a one-dose vaccine, are likely to also demonstrate very high efficacy. My expectation is high efficacy. My expectation is that anything north of starting with an 8, I hope will go through.

A 70 or a 65 percent vaccine that can be made into billions of doses very quickly can be transformative on a global basis, but I do think it will raise really North/South, Western world/developing world questions. If you look at it, firstly, from a public health/global health standpoint, any vaccine above 50, 60 percent will make a huge difference if available very quickly.

Cory: Thanks for that. Maybe as we transition the discussion a little bit to logistics here, this seems to be something we're hearing from the media almost on a daily basis about the challenges of delivering some of these vaccines.

Maybe just another quick comment from everybody about how much of a concern you see these logistic dynamics. Is it a short-term issue? Is this a longer-term issue? Maybe, Brian, we'll open up with you for initial comments here, then go to Karen, Angela, and Stephane.

Brian: It's top of everybody's mind for very obvious reasons and, not unexpected, getting a lot of scrutiny and commentary. I will say, this is my day three of the J.P. Morgan conference. I've had a lot of chances to talk about this over the course of the last few days.

One of the things that I've noticed is a little bit of confusion in the language between distribution and administration. Dr. Slaoui referenced this. The distribution has actually gone quite well. I think it's now that last inch, so to speak, of getting it from the provider site into people's arms.

Just to maybe clarify the way the process works, for everybody's benefit and to frame the conversation and the comments that will follow, the jurisdictions based on their local decisions on how they want to address this will filter up requests, so to speak, to Operation Warp Speed and the CDC, who will then make allocation decisions based on a variety of factors, turning those allocation decisions into orders that are pushed down to McKesson.

That's when our role starts. We receive that order. We walk into the dedicated facilities that we built that are securely storing this vaccine. We do the pick, pack, and ship, believe it or not, in a freezer to maintain the temperature controls around this virus.

Then we work our partners, UPS and FedEx, to get those products out to the provider sites,

usually within 24 hours. I believe our accuracy rate right now is in excess of 99.99 percent. I'd say the distribution component has been remarkably well. That's kudos to great coordination from all the companies on this call, Moderna, Pfizer, certainly the Operation Warp Speed team.

We're proud of what we've been able to do. We've just talked a little bit about the need to build the practice and refine the process to compress further the time to get that at the provider site to get the administration to catch up to the distribution.

Karen: I'll pick it up from there. We've had a lot of experience with the long-term care facilities. We've obviously been working very closely with Operation Warp Speed and the CDC. How that process worked was that the nursing homes would select the pharmacy carrier that they wanted to administer their vaccines over 40,000 selected CVS Health.

What happens is the states need to determine the allocation to those facilities. Once the states turn on or activate those nursing homes, then we're able to go in with our pharmacy techs, our pharmacists and nurses, and put the shots in the arms of those in the individual nursing homes. That's the way the process has been working.

We're very hopeful that the federal program will open up soon. That will open up more of a direct distribution into pharmacies across the country, and then that will open up the ability for access of individuals to go to their community-based pharmacy so that we can have more people getting vaccinated.

I shared with Lisa yesterday we have the capacity to do 20 to 25 million vaccinations a month throughout all of our retail locations. What that means is we can do a million a day.

Just to put that in context, we're just coming up to a million vaccines this week on all of our long-term care facilities. We can open up the aperture to get more shots in the arms as soon as the federal program is fully in play.

Cory: Stephane.

Stephane: Just to add a quick word, we are not in charge of distribution of vaccinations so I will just speak from far away saying that first, the job that Brian and his team at McKesson have been doing has been fantastic in the coordination. You have some teething problems, I would characterize them as such. I don't think it's a good idea to bet against America.

It was just because of very tight supply, and Moncef can talk better about it. Because of very tight supply, the allocation was a big struggle. In some places, people spend too much time thinking about allocation and staying in line versus shooting vaccine in the arms.

As more and more supply are available and as we use the enterprise like CVS over pharmacy chains, stadiums, and other things just to get vaccination, then the numbers are going to go up pretty quickly over.

Cory: Angela.

Angela Hwang: Just to add more color to what was already discussed just from a Pfizer perspective to give you some numbers, to date globally, we have distributed, so shipped out, 30 million doses to about 10,000 different points of vaccination.

This is through using logistics partners like UPS, FedEx, DHL, so on and so forth for us to take it from our site in Kalamazoo, Wisconsin, or in Belgium to get it to the various sites. I have to say that like everyone who's been saying consistent with what you've heard, it's gone remarkably well.

All the doses have gotten to where they needed to get to exactly on time with almost negligible variances. We've had almost no product returns. We've had everything arrive on time at the right temperatures. The couple of boxes where we had excursions and literally, it was a couple, we've monitored and we've tested those to realize that the product was still intact.

Honestly, this has gone almost as perfect as it could possibly go. As you know, however, we've invested a lot in making sure that this works for us. We have our shippers that are temperature monitored. We are tracking all of these boxes wherever they're going.

We've also provided a tremendous amount of training and support at the points of vaccination, because we believe that our job ends when the vaccine is administered, not just where we drop off. This entire infrastructure from beginning to end is what has helped us to achieve the outcome that we had hoped for at the points of vaccination.

Cory: Thanks, Angela.

Lisa Gill: Great. Thank you very much for all those comments. I just wanted to dig in a little bit, Brian, to what you talked about throughout in this whole process and maybe just better

understand where the product is being delivered to the safeguards around that product. One of the things we hear about is concern around a potential counterfeit product and then dealing with public health.

When you're delivering that, how is it determined that it's going to a hospital or to a CVS? When we start to think about those logistics, how coordinated is that effort? Is that something that you're coordinating and they just tell you, "Here's the drop spot?" or is that something that McKesson has a more involved process when we think about dealing with public health?

Brian: That was a lot of questions. Let me try to peel them back one at a time. You started with the safety and security. One of the attractive features of the logistics design that was selected is there's very few points of handoff. We're not handling the Pfizer vaccine. They're handling their own distribution.

With Moderna, we're picking it up at Stephane's factory on our controlled transportation vehicles, bringing it into our secure facility. The next place it arrives is at the provider site. There are very few points of encouragement or opportunities for that chain of control, so to speak, to break down.

When you asked about where do they end up going, remember in the early phase, this is the Ia phase, the target for the program was our frontline healthcare workers, the elderly, and sick.

Stephane made a great comment about the teething pains in the administration in the sites. We rolled it out literally in the middle of the holidays. The target audience was those who are most busy taking care of the sick patients. Maybe the teething pains should have been expected, and we're continuing to see that get better and better.

The way our program is designed and another attractive feature to the model that OWS selected, in our opinion, is there's very little lost inventory filling up the supply chain. It literally goes from us to the provider site in 24 hours. In early stages where supply is limited, that's a critical feature.

McKesson has no role in deciding who gets it. That's the role of Operation Warp Speed. The local jurisdictions develop their local plan. I can tell you that the state of Texas has 7,000 providers that at some point will be involved in this. That's their decision. The allocations are the decision of the CDC.

We view our job and we built our facility and our infrastructure to simply take those orders and

make sure we could get it out to hundreds of thousands of sites of care within 24 hours.

Lisa: Great.

Dr. **Slaoui:** If I may add something there just to complete what was said with which I completely agree but it's important for people to understand, to realize, to put into context the various discussions that happened in the media.

There are 70,000 locations that have been validated and they had to meet certain criteria that were offered by the 63 or 64 jurisdictions in the country as potential recipients for the vaccine. Every single dose of vaccine that is shipped is shipped because there has been a pull, not a push.

In other words, a state says, "I would like to have 257 doses of vaccine in address 255 blah, blah, blah, zip code this," which is one of the 70,000 areas, and that's shipped into there.

The assumption behind that is that whoever sat down, and we went and visited all the health departments of the various states and jurisdiction, the assumption is when you decide I want to have X hundreds of doses in this particular location is because you, at the same time, have organized to immunize those number of doses in the area.

It is in that transition from deciding to ask for a number of doses in a given place and administering them that we need to optimize. Clearly, the holiday season wasn't a great thing. Clearly, the surge that's happening overwhelming the healthcare workers in the healthcare facilities and hospitals is a problem.

Therefore, the decision to accelerate this, going to broader population and, as was said, open the aperture further is the right thing to do to decrease the pressure. Continue working into the healthcare workers and hospitals, but also distribute elsewhere and immunize elsewhere.

Lisa: Dr. Slaoui, most of us understand the different rankings by the CDC as far as when people should be vaccinated, just at least the first 1a, 1b, etc. Can you reiterate that, number one, for people? I'd like to bring Karen into the discussion because one of the concerns that a lot of healthcare investors have is concerns about the underserved populations.

Karen, you talked a little earlier about how you educate people around taking the vaccine, but less educated people have a tendency to not be vaccinated in the same way as educated people.

How do you meet those underserved populations? Dr. Slaoui, if you can start with just the understanding of who is getting vaccinated and then, Karen, if you can add to that, that'd be great.

Dr. **Slaoui:** Very important questions again. Very early on, we realized that it was going to be super important to have a well-thought-through, ethically defined approach to giving access to the vaccine into the population because, obviously, you're not going to have enough vaccines quickly to immunize 330 million people, let alone the global world.

We involved the US Academy of Medicine to have a discussion that was at that time a conceptual discussion to suggest how to go about it.

There was the first reports that came, I believe, in the month of August or something like that describing the healthcare workers, the elderly and frail, first-line workers as the first three areas in 1a,1b, 1c, and then looking after the overall population, first those with comorbidities at higher age and then at lower age, etc.

That was further refined once we had the vaccines by the CDC and its ACIP committee. The issue about the minority population and underserved population is a critical one. As Stephane can attest to, the starting point of paying attention to that challenge, which is a real problem that we must address overall, was at the level of the clinical trials.

Enormous efforts have been put and continue to be put to make sure that there is appropriate representation of the minority population and underserved populations in the clinical trials and in that process, to have engagement at the level of the community leaders from those underserved population to engage with the population, participate into the trial, and have appropriate representation.

All the companies have worked very hard to achieve those objectives and to have at least double-digit representation in percentage of African American, of Hispanic population, and in general, of the underserved population. That was the critical starting point, but we cannot stop there.

At this moment, the key is to continue the engagement into the communities at the very local level. One of the learnings we got from the clinical trials is that, frankly, it is irrelevant for somebody at the national level to stand up and say something. It's interesting, but it's interesting for three or four people to do it.

What is meaningful is for a church leader, a sports leader, or just a community leader to whatever process to be engaged and understand what the vaccine is, why vaccination is important, to get the vaccine themselves, and engage with their neighbors and other members in their community to be vaccinated.

There was a challenge in the work that took place to have the vaccine. There was a real challenge to engage the population before we knew we had the vaccine because it's a double-edged sword to talk about what the vaccine can do when we don't know, and then once you know, you're going to have to change your message.

For quite a period of time, it was very difficult to have a concrete conversation that is relevant to people that can understand it, feel it, and sense it. Once we had data on efficacy and safety, and once discussions happened in the open at the FDA for the VER-Pack process, that opened the way for more engagement.

We are talking to companies that are experienced in simplifying, visualizing, translating into every day words complex medical or scientific messages in order to help, again, with the engagement process as it is critically important.

Karen: Lisa, I'll just echo Dr. Slaoui's comments. It's an important responsibility and obligation of all of us to make sure that we are in the local communities serving the underserved population. It is all about working with community leaders about education.

We've had a lot of experience during testing. When we were doing testing in the local communities, we've learned a lot about how to use the community leaders, how to work with the community leaders. As Dr. Slaoui mentioned, it's about those local community touchpoints that people are familiar with.

As you think about even in our retail pharmacies where the pharmacist is one of the most trusted clinicians in the local community, that is another avenue for people to think about how to use them to educate and coordinate the vaccines.

It is an important responsibility, as Dr. Slaoui said, for us to have that herd immunity. We need to make sure that everyone gets vaccinated. It is responsibility for all of us to make sure that we're vocal and in the communities and working with those community leaders to educate and ensure that vaccination process occurs.

Lisa: Thank you.

Cory: We don't have much time left. We want to make sure that we get to another question, we get all the time, and that's how long COVID-19 is going to persist as a significant public health concern? I know it's the unanswerable question, but we're going to ask it anyway and keep [inaudible] we've been doing.

We're going to go around, don't worry. At least what I see on my Zoom screen, maybe start with Stephane, Karen, Brian, Angela, then wrap it up with Dr. Slaoui. Stephane, on the duration here?

Stephane: You should have started with the doctor before asking the business guy. Our thesis as a company is that SARS-CoV-2 is not going away. We are going to live with this virus forever like flu and RSV and other vaccines.

The key is going to be to stay close to the mutation, as we talked before, and to be able to very quickly find a regulatory pathway to evolve a product so that we can keep protecting people. What is unknowable today is what's going to happen in terms of duration of vaccination. We just don't have enough data.

As you know, the phase III started in end of July. We have a good sense now looking at neutralizing antibody that's why it's more safe to say getting a surrogate is very important for our industry, but we have a sense that the antibodies, at least our vaccine I can speak for, will go down slowly.

The nightmare scenario that was in the media in the spring that the vaccine might not even work three months, that scenario is off the table. The question of frequency of injection and what different strains you need of a vaccine to be able to protect people is going to be probable question moving forward.

Cory: Karen?

Karen: Cory, I wish I had the answer to that. I would agree that we'll have the virus for a long time and it's important for us to remain vigilant. We're in the heat of it right now. As a society, we need to remain vigilant about keeping social distancing, wearing masks, and doing the things that we've been doing.

The most important part here, and that's what we've been talking about, is making sure that we

get people vaccinated and that we continue to drive the education and work on getting people vaccinated all across the country and, quite frankly, the world. That's my hope that we can at least slow the pace that we're feeling right now and the vaccine is our light at the end of the tunnel.

Cory: Brian?

Brian: I don't have any more informed opinion than my first two colleagues other than to say I'm incredibly encouraged by what the industry has accomplished in a relatively short period of time to at least begin to arm us with the tools that we need to fight this back.

Stephane's comments about the science and its ability to adapt, and I know our colleagues at Pfizer are tracking it closely are equally important. The question for me becomes not do we ever live in a world where we're not battling some variant of this, what have you, but how do we get through this crisis phase?

That is going to be as production comes online, as hopefully more vaccines get approved, as availability increases, and then our ability to make sure that our teams and the people in our communities and around us are getting vaccinated and practicing the important social responsibility measures Karen just talked about -- wash your hands, stay distanced, wear a mask, because until that herd immunity comes, that's also very, very important.

I don't want us to get overconfident in the science and let go of those social behaviors because we should be focused on those as well.

Cory: Angela?

Angela: Likewise, I believe that this is something that is going to be with us for a long time. We know that it's a global pandemic, it spreads everywhere. We know that it's changing. Whether it's changing a little or a lot, that is something that we're anticipating so we may be in a place where we may need a new vaccine, and then we have to get so many people vaccinated.

With all of this, generating the data that will help us to understand the cause of disease is also important.

That's why, at least from our perspective, the data that we have now in terms of where we are with our phase III, but also the extension, following our patients for another two years, and

understanding that is going to be important.

Understanding the transmissibility, understanding the durability of response, but also making sure that we are staying on top of the tracking, so that if we do need to make a new vaccine, we can.

All of these things are going to add to the body of evidence that will give us the confidence to be able to manage this disease as it progresses.

What's clear is that it won't be the crisis that we are in today, forever, but what is also clear is that very rigorous surveillance and response is going to be absolutely important. From a business perspective and from where we sit here at Pfizer, we see this as a durable business and something that is...It's a business and a piece of research that we're going to have to continue to do for a long time.

Cory: Final word from Dr. Slaoui.

Dr. **Slaoui:** First, I completely agree that in the short-term social distancing, wearing the masks, washing our hands, being aware and self-aware are critically important.

I do want to remind this, however, that SARS-CoV-2 is only one of the very, many viruses that are deadly viruses, which we have been living forever. We need to also remember that without vaccines to the many pathogenic viruses that exists in the population, we will be living all our lives in a confined environment much more than we have experienced over the last 11 months.

Therefore, this gives me optimism that as the vaccine gets more and more used -- and here, I'm talking about the global basis, not on a singular country basis -- the circulation of this virus intensity of transmission will, by definition, decrease, and we will, little by little, get ourselves in situation like we have with RSV, for instance, which is a virus for which we do not have a vaccine yet.

Yet we live with this virus, and we have lived with this virus, and we continue to live with this virus. People may not know but the very frail elderly people, for instance, have significant morbidity and mortality associated to RSV infections and a number of companies are working on an RSV virus, but did not stall the population.

What's the difference? The difference is, as we are born, we meet the RSV virus step-by-step. As with SARS, when you're a baby, unless you're really a very, very, very young baby, you are

usually not ill with these viruses.

You learn to live with them. You are primed, and once you're primed, usually your protection from these viruses will last your lifelong life until you become frail or comorbidities interfere with your immune system. Then you become susceptible.

I do think that we will get to that stage with this virus. Thanks to the vaccination, we will get there quickly. It will not be true birth cohorts, but we'll do it in two or three years.

What we absolutely must remember is how to all the time indeed surveil this strain, this virus, new strains, or other viruses. There is a very long list in the WHO of potential pandemic agents. They will come again. There will be more pandemics. Impossible to predict when. We need to be even faster and better-equipped for the next one than we have been for this one.

I'm optimistic we'll get this virus under control. It will not disappear. Completely agree, but it will stop changing our life and turning it upside-down.

We cannot forget. We forgot with Ebola. We forgot with Zika, which were orange lights. We got a huge red light here. We cannot forget. We should be ready.

Lisa: On behalf of the J.P. Morgan healthcare team I want to thank all of our panelists today. It was incredibly insightful. This is probably the most important topic going into 2021. I'm really hopeful that we'll have the opportunity to see each other face-to-face in 2022, thanks to the great vaccines that are out in the marketplace. With that, thanks again.

Dr. **Slaoui:** Thank you for having us.

Brian: Thank you.

Angela: Thank you.

Karen: Thank you.

Stephane: Thank you.

[music]