Perspectives and challenges in the race to develop a COVID-19 vaccine: An interview with Dr. R. Scott McClelland

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Abstract

Since the declaration of the COVID-19 pandemic, several vaccine candidates have entered development and received emergency authorizations. These include vaccines from companies such as Pfizer, Moderna, and AstraZeneca. Other promising vaccine candidates currently under investigation include Novavax and Sanofi. The rapid pace of vaccine development has provoked many questions concerning vaccine efficacy, logistics of distribution, and maintenance of safety standards. In the attempt to address these concerns, Dr. Scott McClelland, a principal investigator of the Novavax clinical trial, is interviewed. The resulting discussion explores his insight on the development of vaccines during the COVID-19 pandemic and their impact on future vaccine advances. Perspectives on vaccine distribution in low-income countries is also highlighted. The interview concludes by reviewing vaccine distribution strategies moving forward in the pandemic.

Keywords: COVID-19, vaccine development, global health

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Introduction

Dr. R. Scott McClelland MD, MPH is Professor of Medicine (Allergy and Infectious Diseases), in the Department of Epidemiology and Global Health at the University of Washington. He is also the clinical attending physician of Internal Medicine and Infectious Diseases Consult services at Harborview Medical Center in Seattle. Dr. Scott's research and academic career spans over three decades. His expertise is in women's reproductive health, with a focus on vaginal infections, sexually ransmitted infections, and human immunodeficiency virus (HIV). Since 1998, he has conducted research in Kenya, leading multiple large-scale National Institutes of Health (NIH)-supported studies. These include six clinical trials as well as numerous epidemiological studies addressing risk factors for HIV acquisition and transmission in women. Dr. Scott has published over 200 peer-reviewed manuscripts and has contributed to in several book chapters on sexually transmitted infections and HIV. His expertise has seen him serve in the working group for the Centers for Disease Control and Prevention STIs Treatment Guidelines for trichomoniasis. Dr. Scott has also served as a member of several Divisions of AIDS/ National Institutes of Health collaborations. Currently, Dr. Scott is the principal investigator for the University of Washington Vaccine and Treatment Evaluation Unit site implementing the Novavax COVID-19 Phase III vaccine trial. This randomized, placebo-controlled trial will enroll approximately 30 000 participants at approximately 115 sites in the United States and Mexico. It will evaluate the safety and efficacy of NVX-CoV2373, a vaccine candidate developed by Novavax, Inc.

The following interview was conducted on January 15, 2021. It has been lightly edited for clarity and length.

In your research career, you have been involved in many clinical studies that relate to infectious diseases. During this pandemic you led the Novavax COVID-19 vaccine trial. Can you share with us about how this experience compares to your past work in infectious diseases?

"As you know, my career has largely been around infectious diseases as they relate to women's reproductive health, which includes HIV susceptibility, sexually transmitted infections, and preterm births. This is different content-wise since it is a respiratory virus prevention trial. I will say, for similarities, I have been involved in prevention research virtually my entire ca-

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reer – so that is familiar.

The speed of preparation for these trials and the of size of what we are trying to do are different from things that I have done in the past. I think, scientifically, these trials are not cutting corners. Instead, everybody is working 16 hours a day, seven days a week to make things go faster than they do normally. I think one of the major differences between vaccine development on a traditional time scale, which would be 10 or 15 years for most vaccine candidates, is that the steps are being overlapped so that phase I, phase II, and phase III trials are overlapping to the greatest extent that is allowable. The size of the trial is also driven by the need to get answers quickly. With more people, end points are accrued more rapidly, providing more rapid answers about whether these vaccines are safe and efficacious."

Given the great progress that has been accomplished in the development of vaccines against COVID-19, how do you think these advances will affect future development of vaccines and treatments for infectious diseases?

"I'm uncertain of the answer. One of the things I would say with greater certainty is that in the setting of another pandemic or epidemic, these efforts have set a new standard for being able to do exceptionally strong science to develop, test, and roll out vaccines on a pace that was not really considered to be possible prior to this [pandemic].

I don't know how that's going to impact other non-emergent vaccine or drug development efforts in the future. I think there are lot of added costs to doing things at this pace. You do it [vaccine development] fast and sort of spend what money you need to get it done quickly and done right. But that's sometimes more expensive than if we had a little bit more time to work with. Another huge thing to consider is that these vaccines initially seek emergency-use authorization in the United States and similar sorts of authorization in the European Union, United Kingdom, etc. And that makes sense in a pandemic. What an emergency-use authorization says, is that based on the available evidence, the benefits of using the vaccine appear to outweigh the risks. When you've got up to 4000 people in the United States dying of COVID-19 every day, that makes sense.

However, emergency-use authorization is not the norm for development of most drugs. Full approval won't be granted for vaccines until they have at least two years of safety data. So, if you are developing a vaccine for gonorrhea or chlamydia, there would be no reason to push quite this fast. You would be more methodical, and you wouldn't seek an emergency-use authorization (EUA) to get a vaccine out for chlamydia. The food and drug administration would say, 'Let's wait for another two years of data and make sure we are comfortable with it.'

So just to recap: I think it has shown just what is possible in a pandemic and where things can be accelerated (some of which will make sense and others won't make sense for more traditional types of work). There are some barriers, like the fact that normal drugs or vaccine development would have to seek full approval rather than an EUA. This would mean you wouldn't see new drugs get turned out in less than a year. It will be much closer to the old timeline for most things."

This pandemic has disproportionately affected poor and vulnerable communities around the world. How do you go about making COVID-19 vaccines more affordable and accessible for these groups?

"I think the biggest global effort for this is called COVID-19 Vaccines Global Access (COVAX). This is a consortium of countries that signed onto a World Health Organization-led effort to help countries access [COVID-19] vaccines and make these vaccines available at the lowest prices possible. That is certainly one element of it. However, that alone doesn't create any vaccines. They still need to compete to get vaccines. I have heard calls for wealthy countries to make 10% of the vaccines that they produce available for use in low and middle-income countries. I don't know the details of how that would be done, which isn't to say that I don't think it can be done. I do think that, looking at the big picture, countries should recognize both from an equity and humanitarian perspective that this is an important thing to do and that we won't end the pandemic until it's ended globally. So, the idea that 10% of vaccines should go through either COVAX or bilateral partnerships directed to low and middle-income countries is a great idea.

Finally, I think the best evidence in the world right now for vaccine efficacy is that from Pfizer, Moderna, and possibly AstraZeneca. There is a need for more different vaccines that are shown to be safe and efficacious because it creates more pipelines to generate additional vaccines. I also think that, with the mRNA vaccines, there are going be concentric circles of increasing difficulties to reach out to remote and rural locations. Vaccines that can use the existing infrastructures and systems to reach out to people will be a real strength. The important point about adenovirus vector vaccines and the protein and adjuvant vaccines [like AstraZeneca, Janssen, Novavax, and Sanofi] is that they are stored at refrigerator temperature, which means we could use more traditional vaccine pipelines to get it out to people. Whereas, the mRNA vaccines need to be in ultra-cold temperatures most of the time."

One of the major strategies for vaccine distribution is the notion that public health could vaccinate as many people as possible with the first dose and then worry about the second dose as vaccine supplies re-fill. What are your thoughts about this strategy?

"Interestingly, Dr. Anna Wald, who is the co-principal investigator with me for our Vaccine and Treatment Evaluation Unit, published one of the pa-

pers suggesting that maybe we should give everyone one dose [of the vaccine]. I think that there are two different ways of looking at that question and it's important to keep them separate. One way is: do you rush out the first doses, not knowing exactly when the second dose is available, but with the intent of getting a second dose into people on the recommended timelines? (This would be four weeks later for the Moderna vaccine and three weeks later for the Pfizer vaccine). Or, do you just give everybody one dose of the vaccine and worry about the other vaccine dose later?

I fully favor getting the vaccine that we have out and trusting that the supply will come in to be able to give people a second dose of vaccine. I am uncomfortable with the idea of taking a huge evidence-based intervention like this, for which we generated good safety and efficacy data for two doses, and then using it in practice differently from the way it was tested. I worry in particular about the durability of protection. If we end up vaccinating people, but there is a short durability of protection, that's not going to do us a lot of good. We really don't know how long they [vaccine protection] last yet. So that's kind of where I come down while acknowledging there are people who do not completely agree."

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