AMERICAN PUBLIC HEALTH ASSOCIATION

and

THE NATIONAL ACADEMY OF MEDICINE

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RESPONDING TO COVID-19: A SCIENCE-BASED APPROACH

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WEBINAR #21: THE FOURTH WAVE - VACCINES, VARIANTS, AND THE FUTURE

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WEDNESDAY
SEPTEMBER 1, 2021

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The webinar convened at 5:00 p.m. Eastern Daylight Time, Esther Krofah, Moderator, presiding.

PRESENT
ESTHER KROFAH, FasterCures and the Milken Institute Center for Public Health, Moderator
PETER HOTEZ, Baylor College of Medicine
MITCHELL KATZ, NYC Health + Hospitals
GEORGE RUTHERFORD, University of California, San Francisco
CHARLENE WONG, Duke University School of Medicine

ALSO PRESENT
GEORGES BENJAMIN, Executive Director, American Public Health Association

P-R-O-C-E-E-D-I-N-G-S

5:00 p.m.

DR. BENJAMIN: Good afternoon, or good morning to those who are tuning in around the world. I'm Dr. Georges Benjamin. I'm the Executive Director at the American Public Health Association in Washington, D.C.

I want to welcome you to the 21st webinar in the COVID-19 Conversation series. This one is entitled The Fourth Wave: Vaccines, Variants, and the Future. It's brought to you by the American Public Health Association and the National Academy of Medicine.

Now, today's webinar has been approved for one and a half continued education credits for CHES, CME, CNE, and CPH. Now, please note the speakers have disclosed conflicts of interest. As you can see, there are none. And if you want continued education credit, you need to have registered with your first and last name individually. And everyone who wants credit must, of course, have their own registration and

watch today's event in its entirety.

All of the participants today will receive an email within a few days from cpd@confex.com -- that's cpd@confex.com -- with information on how to claim these credits. And all online evaluations must be submitted by October the 4th to receive continued education credits. And, again, that's submitting them, the evaluations, by October the 4th.

The COVID-19 Conversation series has been going on really for quite a while. We are going to take a break for the foreseeable future, however. And APHA and NAM have annual meetings in October. But we are planning at least one more webinar in November.

I would like to obviously thank my co-host throughout the series, my good friend Victor Dzau, and our Co-Chairs, Dr. Nicole Lurie and Dr. Carlos del Rio, for their active engagement and leadership. I'd like to thank our Advisory Committee. And let me just thank our staff, who worked tirelessly to put these series of webinars

on.

If you have any questions or topics you'd like us to address today or on future webinars, please enter them in the Q&A box or email us at apha@apha.org. Now, if you experience any technical difficulty during the webinar, please enter your questions in the Q&A box, and please pay attention to the chat for announcements on how to troubleshoot.

Now, this webinar is being recorded, and the recording and the transcript will be available on covid19conversations.org, which is our website. That's covid19conversations.org for the recording and the transcript. Now, more information on the series and recordings of past webinars are also available on that link.

I'd now like to take the opportunity to introduce our moderator for today's conversation, Ms. Esther Krofah. Esther is the Executive Director of FasterCures and the Center for Public Health at the Milken Institute. She has an amazing and deep experience in government,

nonprofit, and the private sector, for which she has led efforts to bring together diverse stakeholders to solve critical issues and achieve shared goals that improve the life of patients.

Most recently, she was the Director of Public Policy leading GlaxoSmithKline's engagement with the U.S. Department of Health and Human Services and relevant executive branch agencies on broad healthcare policy issues.

Over to you, Ms. Krofah.

MS. KROFAH: Well, thank you so much, Dr. Benjamin.

And what a delight to be with all of you today that are participating in this webinar. I think it's safe to say as we sit here today that COVID-19 is testing all of us in the public health and research community in ways we couldn't have imagined a year ago.

I certainly don't need to remind this audience of the devastating toll the pandemic has taken on lives and livelihoods here in the U.S. and certainly around the world over the last 18

months. And, sadly, those challenges continue. And, of course, there have been major advances sending highly effective vaccines safely over the finish line.

But, unfortunately, we're now in the middle of what has been described as the pandemic's fourth wave, largely for the unvaccinated population, and the enthusiasm that we all had for a summer and perhaps a fall of unmasked get-togethers, parties, and, quote unquote, normal activities with friends and families has been replaced with the stark realization that the fall and the winter may look a lot like what we all experienced a year ago. Of course, all of this is happening as our children are returning to school.

As you know, the virus has changed. We're seeing the spread of the Delta variant create the pandemic of the unvaccinated, which now also includes children much more frequently. We're also seeing breakthrough cases, international borders closing again, and heated

debates about masks, mandates, and boosters.

And so, today, we will address many of these challenges with a distinguished panel of public health experts and highlight the path forward. I'm sure there will be many questions for our speakers, so I would like to remind all of you to use the Q&A feature to ask your questions as they arise throughout the presentations.

So, with that, I'd like to introduce our panelists, if you can go ahead and turn your cameras on.

First, Dr. George Rutherford is professor of epidemiology, preventive medicine, pediatrics, and history and head of the Division of Infectious Disease and Global Epidemiology in the Department of Epidemiology and Biostatistics at the University of California, San Diego. His expertise is in the epidemiology and control of communicable diseases of public health significance with a particular focus on low- and middle-income countries. He will speak about the

facts of the Delta variant and what comes next.

Pleased to welcome Dr. Charlene Wong, who is an associate professor of pediatrics and public policy at Duke University. She is a primary care pediatrician specializing in adolescent and young adult medicine, and among other distinguished positions, she serves as a Chief Health Policy Officer for COVID-19 at the North Carolina Department of Health and Human Services. Dr. Wong will address the impact of the pandemic on youth.

Next, Dr. Peter Hotez. We've, of course, seen him in many settings, as the Dean of the National School of Tropical Medicine and professor of pediatrics and molecular virology and microbiology at Baylor College of Medicine, where he's also the Co-Director of the Texas Children's Center for Vaccine Development, and Texas Children's Hospital endowed Chair for tropical pediatrics, a member of the National Academy of Medicine, and served in many different capacities in past administrations. He will talk

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about the impact of COVID on people 18 and older.

And, finally, we have Dr. Mitchell Katz, who serves as the President and Chief Executive Officer of the New York City Health and Hospitals, the largest municipal health system in the United States with 11 acute care hospitals, 5 skilled nursing facilities, an array of community health centers, and medical service serving inmates at Rikers Island Correctional Facility. He is the Deputy Editor of JAMA Internal Medicine and elected as a member of the National Academy of Sciences and a practicing primary care doctor. He will talk to us about what it will take to end this pandemic.

So, again, as I mentioned, we are delighted to have such expertise to talk about really critical, important topics we're all facing in this fourth wave.

With that introduction, I will turn it over to Dr. Rutherford, who will talk about the vaccine, variants, and the state of the pandemic.

Dr. Rutherford?

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DR. RUTHERFORD: Thank you very much. It's a real pleasure to be here. I'm actually at UC San Francisco. I had a note in the chat about San Diego, which is -- it led to that little -- that small issue. But that's what happens when San is in front of everything in the state.

So I'm going to talk today a little bit about current epidemiology and then a little bit on projections.

Could I have the first slide, please?

So, just to start off, since we're talking about variants today, I thought it'd be worthwhile to speak about variants. So variants are basically sort of small differences that exist within a single species of virus.

So SARS-CoV-2 has a long spike protein here in red that protrudes from its shelves and is the thing that is -- it's the part that attaches to cells, to human cells in our case, and allows it to inject its RNA.

So it's small variations in the amino acid sequences in these proteins -- remember, the

proteins are made up of a series of amino acids. In this case, it's about -- if I'm remembering correctly, it's 1,374. If you have a single change in that, it can change the configuration, the three-dimensional configuration of the protein and change its properties. And some of the things that Delta has done is it can make it more easily transmissible, and it can make it more difficult for antibodies to bind to. So the Delta variant specifically has three evolutionary advantages.

It has mutations in the receptor binding domain, which is the tip of the spike protein, the piece that binds to the receptor that makes it essentially stickier. It's a better covalent bond. It has a mutation in a cleavage site, the furin cleavage site, that makes it more efficient for entering target cells. And it also has a mutation in another part of the spike protein closer down to the base that makes it a little bit less recognizable by antibodies. So it has these three things going

for it.

The next one, please.

And what has that done? So, in the United States, we're now in the fourth wave -- or maybe the fifth wave; it depends on what you want to think about April when we had an Alpha variant outbreak -- the fourth or fifth wave of the epidemic. And luckily, if this were calculus, we could talk about the rate of change declining. It looks like it's starting to slow down, although we're still having increases. The cases have increased by 12 percent over the last 14 days, hospitalizations by 22 percent, and deaths, unfortunately, by 91 percent.

The next one, please.

And so, if you say, where is this happening, these are maps that -- these are conveniently located in the New York Times every day. If you look at where the case counts per -- new cases per 100,000 people by county in the United States have been -- and the darker here is the more cases.

As you can see, they're heavily concentrated in the Southeast, and then also in the inner mountains, sort of the upper inner mountain region of the West with breakthroughs, say, in -- like we can see sort of Southeastern New Mexico, and a few in Hawaii, and at least on the big island of -- a few in Alaska, and at least on the big island of Hawaii.

So it's pretty diverse. But if you're going to ask where they are really specific foci, I'd say it's in the Southeast and in the inner mountain West.

The next one.

The other way to look at this is where there's risks. And I'm sorry that somehow Nebraska doesn't submit data to these systems. You can say, where's the risk the worst for people who are unvaccinated, which is really what we're talking about now. We can talk about breakthroughs all we want, but still, the large majority of cases are among people who are unvaccinated.

So it's across all the Southeast and into the sort of lower Midwest, and then, again, into the inner mountain West and out into the -- frankly, out into the West with areas of California in the Central Valley and then also in Southern California and in Imperial and Riverside Counties.

But you can see where all these -- where the risk is here, and this corresponds to areas where there's, A, active transmission and, B, fairly low levels of vaccination.

The next one, please.

So this is an interesting take. So this is driven by the Delta virus, the Delta variant. And if you look on the left in this histogram, this is one of these things that sums to 100 percent. You can see how Delta, which is the orange one, really came on strong and displaced the -- it really displaced the Alpha variant or the UK variant, which is in this sort of aqua blue.

And it's now become far and away the

leading variant in the United States, and accounts for at least 98 percent of all current isolates. And I put in the part about the United Kingdom over here on the right so you can see what's happened. Now, of course, we've flipped the colors just to make it really confusing. But in these panels, the orange is the Alpha variant and the blue is the Delta variant.

You can see in the United Kingdom, in the top two panels, how the Delta came in and displaced the Alpha variant. But what I wanted you to see was on the right, which is it was associated with a large outbreak. The same is true in the United States. This is as of July 14th, so it's six weeks ago. And since then, we've had our huge outbreak as Delta has displaced Alpha.

The next one, please.

So how can we summarize this, what's going on in the U.S.? We've had the rise of the more transmissible Delta variant. Now it's almost 100 percent of all isolates in the U.S.

And as people have said for generations, this is -- for vaccine preventable diseases -- this is a cause of failure to vaccinate rather than vaccine failure.

While there is some vaccine failure, failure to vaccinate is far and away more important. And by failure to vaccinate, I'm also including people who have had one dose of a two-dose series. They are not particularly well protected.

We're continuing to have mixing of unvaccinated people with resultant transmission. We have less than full adherence to nonpharmaceutical interventions, such as masking. And then, as we move off of those as sort of the big four, we have some proportion of the population -- CDC estimates between 2 and 4 percent of people, of adults -- in whom failure to develop immunity was because of immunocompromise, solid organ transplantation, therapeutic use of drugs like tocilizumab.

But those are reasons that they are

less likely to mount a robust immune response. Those people are the ones who need an extra dose, a third dose. And we should think of this, for people like that who have those underlying issues, as a three-dose series rather than a two-dose series.

And then, depending on how reliable the data are, there's some evidence of declining vaccine effectiveness, which has been temporally associated with the rise of Delta virus. In some quarters, this is referred to as waning immunity. There's also, at least theoretically, the possibility of vaccine escape mutations. And this is what's led to breakthrough infections, or this has contributed to breakthrough infections.

The next one, please.

When we talk about breakthrough infections, I think it's incredibly important to understand that if you have a population that's 100 percent vaccinated, all cases will be breakthrough cases, in essence. So this is what we see in measles is that when there's a large

outbreak of measles, the people who get it are typically people who have been -- well, there are some people who have not been vaccinated, but we see a large proportion of cases among people who have been vaccinated. That's because there's a finite failure rate of measles vaccines of maybe 5 percent or so.

Similarly, here, as we have more and more virus circulating, especially a very transmissible virus like Delta, we're going to see a greater proportion of cases that are vaccine failures, or what we're calling breakthrough cases.

Now, it's not a perfect analogy because there's at least some degree of protection against severe disease and hospitalization. But there are a group of people who, for whatever reason, did not respond as predicted to vaccination. And as we get more circulating, they're going to be a greater proportion of those people who are infected.

Next one, please.

So, just to illustrate this with data from Los Angeles County from CDC last week, if you look at hospitalizations in the solid blue line in the left-hand panel, the proportion of people -- I'm sorry. These are cases. There's 4.9 times more likely to have a reported case in people who are unvaccinated than people who are vaccinated, and it was 29.4 times more likely to be hospitalized among people who are unvaccinated compared to people who are fully vaccinated.

The next one, please.

Now, I was also asked to take out my crystal ball and predict the future. There's a fascinating article in the New York Times today, if people are interested, talking about two-month periodicity of this disease. It's kind of an interesting theory.

These are data from the Institute for Health Metrics and Evaluation at the University of Washington, which I rely on for predictions. And this is what they're doing for their yearcast predictions to the end of the year. And the

projections are here in the middle.

The current projection is the middle one, which would suggest that we're having a gradual decline in this current spike and that we'll be not back to normal, but we'll have established a new baseline somewhere around the end of the year.

The worst-case scenario is in the red, the higher line, which has to do with behavioral things, like everybody has been vaccinated, not wearing masks with increased mobility, irrespective of vaccine coverage, and variants are spreading at a more rapid pace than they currently are. And then the lower bound is if everybody adopts a 95 percent -- 95 percent of people adopt wearing masks in public spaces.

So these are what the projections look like. You can see that all of them are kind of coming down by the end of the year, and none of them -- none of these three scenarios predicts a surge, which is something we've been concerned about at schools is mainly surges. But there are

a lot of kids who have been vaccinated, and that may blunt some of the high school/middle school surge.

The next one, please.

This is a very similar thing, which looks at bed usage in hospitals, with the top line -- these are national data, by the way -- with the top line being all bed usage and the green line at the bottom being ICU usage, with some dropping off -- peaking kind of roughly now in the next couple of weeks nationally and then dropping down.

And then the next one, please.

And so, finally, what are we going to do about variants? So there's actually a new -- I've already done one interview today about a C.1.2 variant from south Africa, which WHO has said is not a variant of interest yet. But we have these variants of interest out here from WHO that they're following.

One of the more worrisome ones is the Lambda variant, which is in Eastern Peru/Western

Brazil, kind of around the Iquitos region, which does not seem to have grown particularly over time and I think is probably being out-competed by the Delta.

But as a -- I told Dr. del Rio this yesterday. As a classics major, I can tell you there are 24 letters in the Greek alphabet, and we're -- with Lambda we're at 11, or at Mu we're at 12. So we only have 12 more to go in the WHO nomenclature system. So I hope that holds out a little bit of hope for everyone.

And with that, I'll stop, and thank you very much. Happy to answer questions. Thanks again for inviting me.

MS. KROFAH: Thank you so much, Dr. Rutherford.

And so I'd like to turn it over to Dr. Wong to help us make sense of the current environment for children. As you know, a lot of children have returned back to school. We're seeing the spread of the Delta variant. What are the implications for those who are unvaccinated,

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particularly young kids?

DR. WONG: Thank you so much.

Next slide.

I'm really pleased to have the opportunity to share some of the latest information on children and COVID-19. And, as has already been alluded to, this is a tough time for kids in the COVID-19 pandemic.

The chart you see on your screen is the number of pediatric cases added per week in the U.S. We saw that peak back in the winter in those darker blue bars. And as we move through data through last week, you see those lighter blue bars to the right showing that we are right back up there, so over 4.79 million kids who have tested positive for COVID-19 in this pandemic. That's over 203,000 pediatric cases added in the last week, which matches that winter surge.

And children, because a lot of them aren't yet able to get vaccinated -- though it's great to see -- we are seeing more adolescents vaccinated -- are representing a greater

proportion of cases in the U.S., 22.4 percent for last week. And this tracks with increased hospitalizations among kids, again, reaching a new peak, unfortunately seeing 330 kids on average per day as well as, tragically, 500 kids in the U.S. who have died from COVID-19.

Next slide.

So, with this pretty grim and worrisome picture, it's got a lot of people thinking, I'm a parent. I'm a pediatrician. I'm a public health professional -- thinking, what can we do to protect our kids from COVID-19, particularly those who aren't yet old enough to be vaccinated?

And the resounding and number-one thing we can do is to not wait to get vaccinated, because COVID-19 vaccines are the first and best defense against COVID-19. Along with those rising case rates and hospitalizations, fortunately we are also seeing increased rates of COVID-10 vaccination, including among our children, our adolescents who are already

eligible. And the way we protect our kids is to get as many people around kids vaccinated as possible.

While we're doing great with some of our older adults -- and you can see in that little black box up on the right, above 70, 80, 90 percent in some of our older adults -- we are seeing vaccinations lagging among younger adults, for example, our 18- to 24-year-olds, only 58.4 percent, with data from last week from the CDC, who are vaccinated. And these are representative of people who are around kids. These are parents. These are caregivers. These are staff who are working in our childcare centers and in our schools.

We also know that parental vaccination status is a marker for adolescent vaccination. And so vaccine hesitancy among parents can in and of itself lead to more missed opportunities to vaccinate teens. I have had so many teenagers that I care for myself who actually -- they themselves want to get vaccinated, but their

parents are really against it. And those are tough conversations to be had.

And then, of course, when we think about who's around kids, we want to make sure all of those teens who are already eligible get vaccinated because kids hang around with other kids.

Next slide, please. The next click.

And this is not a comprehensive list of strategies, but just a few to raise here. The first is we want to make getting vaccinated easy. People who are really eager to get vaccinated, they got vaccinated a long time ago.

And when we think about children and the people who are around children, we want to think about places where we can give on-site vaccine events so that it's easy for them. And so one place, of course, to think about is our schools. And we know that schools can be really effective -- if we can go back one more slide, please -- in encouraging vaccinations and being places where kids already are. Parents are often

already bringing their kids to places that are trusted in our communities.

We need to continue to educate and earn the trust of our communities, adapting key messages that are out there, using the tool kits to fit the needs of the community, and that we're responsive concerns and particularly misinformation at this point and thinking about our trusted messengers and how they themselves can be hosting information sessions.

And then let's not forget about the role of employers, particularly for kids and adults, thinking about flexible and paid sick leave. Studies have shown that a quarter of parents whose kids remain unvaccinated have said, if I had paid sick leave to go bring them and flexible leave to bring them to get vaccinated, I would get them vaccinated. We are also seeing the impact of vaccine mandates from employers to increase vaccination.

Next slide.

In addition to vaccinations, as Dr.

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Rutherford was just saying, we want to layer on additional protections. But, again, emphasizing the importance of vaccinations is our number-one tool here.

In addition to vaccinations, proper masking is the most effective mitigation strategy when COVID-19 is circulating as it is now and vaccination is unavailable or where there's insufficient uptake.

When thinking about kids and masking, let's focus on comfort and fit. For older kids, there's a lot of videos on YouTube and infographics to help figure out how to get that best fit. There are a lot of masks now where you can insert a filter, for example.

For our younger kids, and particularly our children who find it difficult to wear a mask, let's focus on comfort and whatever it is they're willing to wear. We would rather have a child wearing a mask that's, say, a single layer for a longer period of time than a really great mask they take off after five minutes.

Just a reminder that our kids under two still should not be wearing masks for several reasons, including choking and suffocation hazards.

And then, as a pediatrician, lots of questions -- how is this going to affect my child's development? We'll still be studying that for many years to come, but it is reassuring to see evidence that is showing that kids can still recognize social and emotional cues from unmasked parts of the face.

In addition to the masking, we want to think about physical distancing over six feet, choosing outdoors. We want to think about that handwashing and respiratory etiquette, teaching our kids to sneeze or cough into their elbows, not to their hands, and then making sure to get tested early if you or your child have symptoms.

We have monoclonal antibodies that can help prevent severe disease under EUA, emergency use authorization, for people with high-risk conditions 12 and over -- for example, obesity.

There are insufficient data in children, but an important multidisciplinary panel is revisiting their recommendation that was originally against routine administration in children because there was not much data. But that's being revisited for highest risk children, particularly because of what we're seeing happen with Delta.

Next click, please.

And then, importantly, don't forget to keep up with kids' usual care. We are offering well-child visits. Routine vaccinations are really critical for health. That will be particularly true this year with flu. We've got RSV that's been circulating at very high rates early -- getting those Synagis doses in.

Reminder that you can co-administer COVID-19 with childhood vaccines, and don't delay their care. If you think your child is sick, please call your doctor for advice and additional instructions. We don't want to wait till our kids are really sick and having to go to our very full emergency rooms in hospitals.

Next slide.

Lots of interest in schools, of course. My kids just started school over the last couple of weeks. The top line here is that schools are a safe environment for children and staff if mitigation strategies are followed.

Again, in addition to getting as many people in schools and around schools and around children vaccinated as possible, masks are a really critical tool to use in schools. We now have a lot of data from the last several surges. Dr. Rutherford mentioned that spread in schools is low when you're in a masked environment. And I've included on the slides here links to some studies in North Carolina, Utah, Wisconsin that really demonstrate that that masking in schools is effective to control the spread.

We also have evidence that you see higher rates in unmasked settings, including where students are involved -- for example, a wrestling tournament in Florida, some early data that came out of Israel, and a more recent study

looking at elementary schools in Georgia that both looked at masked and unmasked staff as well as increased ventilation as an important and effective strategy.

Again, similar to what Dr. Rutherford said, hopefully we're going to get much higher vaccination rates, much lower rates of community transmission, which will allow us to safely transition away from universal masking of students and staff in K-12 schools.

In addition to masking, again, we want to think about physical distancing in schools. We know that it is so important for our students, particularly some of our most vulnerable students, to be in school and learning in school. And so the inability to physically distance should not limit in-person instruction when you can use other strategies like masking, getting as many people vaccinated as possible.

And then I'm in North Carolina, and we have some data to suggest that districts permitting one, two, or three students per bus

seat actually didn't see any difference in secondary transmission, which is important because I think our district and many others in the country are struggling with having enough staff and buses to be able to provide transportation to school.

Next click.

In addition, thinking about our modified quarantine policies in schools so that as long as kids are appropriately masked, we can really reduce or remove quarantine requirements, and that has shown to be safe and, again, promotes that very important in-person education.

And then surveillance and symptomatic testing, which is more widely available, particularly the surveillance testing, in this academic year. Because of where we are seeing outbreaks both before and already in this school year, considering more frequent testing for unvaccinated adolescents as well as staff and particularly those that are engaged in higher risk extracurricular activities, like we're

seeing a lot of outbreaks, for example, in our sports teams in high schools, for example.

Next slide.

So, again, we've been really talking about how vaccines are our way out of this. Let's talk about adolescents and the Pfizer vaccine that they're eligible for. These are data from as of July 31 that looks specifically at coverage of COVID-19 vaccines in adolescents.

What we saw at that time is that -- you know, starting to see increased uptake, really wide variation by state, you can see on that map there, ranging from 20 percent in Mississippi up to 70 percent in Vermont. And, not surprisingly, we see increasing coverage with age within that adolescent age group. And the good thing is the vast majority of those teens who've gotten their first dose also got a second dose.

Like so much of the COVID-19 pandemic, we also see inequities, with white children having higher COVID-19 vaccine rates than black

children in the seven states at the time who were reporting race/ethnicity for adolescent vaccine data. And pretty stark in some places, so four times higher, you can see there, in Washington, D.C., and about two, two and a half times higher in Connecticut.

Next click.

And so parents have been surveyed about what are their intentions to get their unvaccinated teens vaccinated. The good news -- and this is a little bit older data -- is that about half of parents said they would get their teens vaccinated. Again, some differences looking at, for example, parents who are female, Hispanic, living in the Midwest or South having lower intentions.

And factors they said would increase their vaccine intentions were receiving more information about the vaccine safety and efficacy, hopefully some of that here, as well as COVID vaccine requirements in schools.

Next slide.

And when it comes to efficacy, I am not going to go through all of these numbers, but just to say the vaccines work really, really, really well to protect children as well as the broader population from COVID-19. We know that they work really well to prevent those COVID-19-associated hospitalizations. We also know that they induce a really strong immune response in our 12- to 15-year-olds, and I put some of the data and references there.

And then, importantly, in addition to these data we see in the clinical trials, we now have multiple studies showing that the vaccines are working really well in the real world, in many parts of the U.S., and in many parts of the world where that evidence is really adding up to say that we should feel very confident in how well the vaccines are working.

Next slide.

And then, of course, we want to make sure that the vaccines are safe, too. And the top line here is that the benefits of the COVID

vaccine far outweigh the risks for adolescents. This is, again, some recent data that's come out summarizing looking at safety of the COVID-19 vaccines in teens in two really important systems, the VAERS system, which is a passive system where people can make reports in, and then a smartphone-based system called V-safe.

And the top line here is that in those VAERS reports, the vast majority were non-serious adverse events, some of them bolded there. And then, of the serious events, almost all of them were really consistent with a myocarditis diagnosis, which I'll talk about in a second.

And then in V-safe, again, what we're seeing in this profile of these side effects in teens is really matching to what we saw in the clinical trials.

Next click.

For myocarditis, we know that it is associated with vaccination. It's great to see our safety systems being able to pick these up. We know that it is very rare after vaccination,

about 12.6 cases out of every million second-dose administrations. We see it more often in our younger males. We also know that myocarditis is more common after infection with some of the statistics there.

Next slide.

And, finally, one of the most common questions we get of course is, well, what about for our younger children? I happen to have children who are under the age where they're eligible to get vaccinated yet.

So, for Pfizer -- if you could click one more time, please. For Pfizer, received full approval on August 23rd for our 16- and 17-year-olds. Their EUA was approved for 12- to 15-year-olds on May 10th, and they're going to need some additional time to accrue before getting that final approval in that age group.

For the 5- to 11-year-olds, those trials started in March, and we expect an EUA submission likely this month. And then they have, also, ongoing trials in the even younger

children down to age six months. These are looking at different doses, at safety, tolerability, and immunogenicity across those different age groups. Expected enrollment, around 4,500 children.

For Moderna, I hyperlinked to the TeenCOVE study, which is the data used in the EUA requested on June 10th for 12- through 17-year-olds. The Moderna is also currently being studied in KidsCOVE, which is the trial in our younger children that was also started in March with expected EUA submission in the 5- to 11-year-olds this fall. Larger expected enrollment there.

And then just two last things to say, which is that we do anticipate a smaller dose in our kids who are under 12, not just because they are much smaller than full-grown adults but also because of the immune response that our children are able to mount. And we'll also say that the AAP has urged the FDA to think about authorizing these vaccines for children under 12 as soon as

possible because of some of those trends I mentioned.

And then final click.

I also want to mention that the FDA and the AAP both strongly discourage off-label use of the Pfizer vaccine in kids who are under 12. Providers who think about doing that risk violating their provider agreement, will be at liability for any potential adverse events, as well as potentially forfeit payment.

Thank you.

MS. KROFAH: Thank you so much, Dr. Wong, for a very clear presentation on the implications for our children. Of course, there are a number of questions that are coming up, and we'll come to that in just a moment.

I would like to turn it over to Dr. Hotez to paint the picture for the rest of the population. Quite a bit of interest around boosters, breakthrough cases -- and so can you share with the audience how the rest of the population should expect the Delta variant to

manifest?

DR. HOTEZ: Yes, happy to. And thank you to my two colleagues for those comprehensive presentations.

So I'll use my time to kind of fill some of the gaps and give some discussions about where I think we're headed as a country, and also, I want to talk briefly about where I think we're headed globally.

So, back in March and April, I think many of us were pretty optimistic. We were doing a good job vaccinating the country. We were getting up to a million immunizations on a daily basis. And there was this brief period where we were holding our breath and thinking we could vaccinate our way out of this epidemic in the United States because of the reproductive number of the virus -- said that if we get to 60 to 70 percent, maybe we could really start to slow transmission.

And that continued to happen in the Northeast, especially in the New England states,

some of the Mid-Atlantic states, and that continues to be why they're doing so well. If you look at the various vaccination trackers, including the New York Times, it's looking like almost all of the adults and adolescents are getting towards full vaccinations, states like Vermont, New Hampshire, and Massachusetts.

But what happened down here where I am in the South -- I'm based in Houston, Texas -- is that it ground to a pretty screeching halt as we went into June and July. And now we've got quite a frightening situation here in the Southern United States.

So, if you look at vaccination rates by age, what you see is those over the age of 65 -- there's not too much difference between the Southern states and the Northern states. So, in the Northern states, you're getting over 95 percent of those over the age of 65 vaccinated; in the Southern states, over 80 percent. It's a difference, but it's not a huge difference.

Where the bottom really falls out is

vaccination rates of younger people, so young adults and the teenagers. And there we're doing terribly. So, unfortunately, in the South you've got vaccination rates, for instance, among teenagers, 12- to 17-year-olds, in the 25 percent range, where it's three times higher in some of the New England states.

And so this left a huge vulnerability, and you combine that with the Delta variant, which is so highly transmissible because of that mutation in the 681 position, which created more susceptibility to furin cleavage. What happened is this Delta is just accelerating through our unvaccinated young people in the South.

And now what we're seeing are ICU after ICU get overwhelmed with a younger age cohort. People in their 30s and 40s are the median age, for instance, in our Texas Medical Center, and a fair number of pediatric hospitalizations as well. And for the first time, even pediatric intensive care units get overwhelmed.

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So that's a very scary scenario, and of course, now we're up to 1,300 deaths per day, and we're getting 100,000 hospitalizations. Dr. Rutherford appropriately pointed out that in the last few days, maybe there's a glimmer of hope because there is some leveling off in that acceleration.

But I'm still pessimistic because we are seeing a second node develop after the Sturgis Rally in Western South Dakota and then into Wyoming. And if we remember last fall, that's when we saw that same type of acceleration. So I'm a bit worried. I'm worried that we're going to resemble what's happening in the United Kingdom with their Delta variant, which is about a month or so ahead of us.

And what's happened in the UK is it was around 5,000 new cases a day. It went up to 40,000 new cases a day, and then it cut in half from 20,000 new cases a day, and then everybody was very excited. They thought, you know, in the UK they're finally going to get out of this.

Then it went right back up again, and now it's around 30,000 new cases a day.

So I'm a little worried that this slight slowing that we're seeing the last few days is a temporary pause, and now we're going to see this accelerate across the country. And so it's always dangerous to predict, as we've learned with COVID-19, but I think what we might see happen -- which is with the exception of the Northeast, some of the Northern states like Minnesota, Michigan, and some of the West Coast states -- I think we're going to see Delta continue to surge over the next few weeks at some level.

And, unfortunately, those Institute for Health Metrics Evaluation projections -- you know, I think we're going to be looking more at the worst-case scenario rather than a good-case scenario, which is going up to 2,400 deaths per day. And the final toll by the end of the year could be between 700,000 and 800,000 Americans, the total number for the full epidemic, who've

lost their lives.

And I think that's going to be very destabilizing for the country both because of health systems overwhelmed and staff -- hospital staff, nursing staff, doctors -- already exhausted and somewhat demoralized. I think that's a vulnerability, and we're going to have to figure out a way to accelerate some workforce training. DR. HOTEZ: And -- and we're still going to have people holding out against getting vaccinated.

So, I think we are seeing some autocorrection. In other words, some people are, you know, now people who have been vaccine resisting are seeing enough of their friends and relative and colleagues get very sick and to the hospital, that there's been an autocorrection and they are starting to get vaccinated.

But, I think this is not going to be adequate. And so, I think what you're going to see is a group that's deeply dug in, even -- even to the point where they'll refuse to get

vaccinated despite employer mandates and federal mandates.

And remember, with mandates the -- so much of it is set at the state level. And that's going to be problematic.

So, I do see the next few weeks in this country, going into the fall, as a fairly unstable time in the country. And it's -- so it's going to still get rough before it gets better.

And we've learned so much about this anti-vaccine and vaccine resistant groups. We've seen this very strong partisan divide in the country.

And this has been an evolving story that not many people know about since 2015 when the anti-vaccine movement, a number of us, including a number of us on this panel, worked very hard to debunk the fake links between vaccinations and autism.

And we were successful. But, then to re-energize the anti-vaccine movement took on a

political dimension around 2015 under this banner of health freedom, medical freedom.

And this then became a sign of allegiance to the far right, saying that you're not going to get vaccinated. And unfortunately, that's with us today.

And we still see this very sharp partisan divide. If you look at some of the data from Charles Gaba and others, it's very much along those lines.

And I think they're going to be very tough to reach, because the disinformation empire is so robust.

If you look at the conservative news outlets, the conservative news anchors at night, some of the statement coming out of far right members of the United States Congress, House of Representatives and Senators, and some of the executive leaders of the states, the Governors, it's -- it's -- there's -- really there's not much effort to try to really encourage people to get vaccinated.

And so I think this is going to be a continued problem for the country. And then the question becomes, what can we do about this?

And clearly now with this Delta variant, which is so highly transmissible with the reproductive number some say as high as eight, that makes the percentage of the country that requires full vaccination, even higher than that 60 to 70 percent.

I've said 85 percent. I think Dr. Fauci said 90 percent. You know getting upwards of measles levels required for vaccination.

And that's going to be a very high bar for the country. Particularly not so much in the northeast, but on a regional basis in the south. It's hard to imagine how we're going to get there.

And compounding the problem is we are seeing some waning evidence of waning immunity for the two MRNA vaccines. Perhaps more so with the Pfizer-BioNTech vaccine with two doses.

Now studies from Israel and some

studies from the Mayo Clinic and elsewhere in the U.S., are showing that protection against infection is going down from over 90 percent to the 40 to 50 percent range.

Now, before people start to panic about that, it's important to remember that the vast majority of those infections are either asymptomatic or low-grade mild infections.

But, that's the -- that's still a concern. And what we heard from the White House two weeks ago, was they're worried about the decline in vaccine effectiveness from over 90 to 40 to 50 percent for infection was -- was the tip of the spear.

And that we would start to see significant breakthrough hospitalizations. And that was the reason why they made the recommendation to move forward and charging the FDA and CDC to look into third immunizations.

And this set up a pretty vigorous discussion in the scientific community. With some saying, look, if you're not seeing

significant breakthrough hospitalizations, let's -- what's the point of vaccinating?

Whereas others are not necessarily in agreement. And I tend to come out in favor -- favor of a third immunization, because even if the hospitalizations are not going up a lot, I do very much worry about the emerging body of evidence around long COVID and its consequences.

And unfortunately now we have two smaller studies showing that with breakthrough vac -- breakthrough cases among vaccinated individuals, we're seeing about 20 percent with long-lasting symptoms.

And the more we learn about long COVID in adults, the more concerned I get. And most recently was an unpublished study, it's in a preprint form in medRxiv out of the Oxford University neurology group, showing significant levels of gray matter, brain degeneration in individuals with long COVID.

And it's written by the Alzheimer's Research Group. And they make the very

concerning statements that to them, this gray matter brain degeneration very much looks like what they see with the cognitive decline they see with aging or with Alzheimer's disease.

And so I think, you know, we tend to frame the seriousness of this epidemic almost overwhelmingly in terms of deaths and hospitalizations.

And of course, that's important. But, I think the burden of disease from long COVID has really been underestimated in adults, even young adults.

And I think this something we're going to have to come to terms with. And this may be the basis also for recommending that third immunization.

And then this gets to the whole equity question. And then I'll stop, because there's a lot of concern of the fact that the African continent is for all practical purposes unvaccinated.

And we're not doing that much better

in Latin America. And we're not doing that much better in Southeast Asia.

And I think, I have a -- and so therefore, there's been a lot of emphasis on holding off third immunizations in favor of donating those doses globally.

And in a piece in the LA Times this weekend, last weekend, I kind of framed it a little differently. And it goes something along the following lines.

If you look at the numbers where you have 1.1 billion people in Sub-Saharan Africa, 650 million people in Latin America, another half a billion in the smaller low income countries of Southeast Asia, that's two and a half billion people. We're going to need five to six billion doses of vaccines.

And the problem is, for the new technology vaccines, the mRNA and adeno virus vector vectored vaccines, unfortunately there was never a plan to make five to six billion doses of those vaccines.

Certainly not through Operation Warp Speed in the U.S. government. There was really no plan for how we're going to have that much vaccine made available.

And when you go so heavy on the innovation, meaning mRNA and adeno virus vector vector vaccines, you almost guarantee that there's going to be a problem. Because with any new technology, there's a learning curve of how you scale it and how you can produce it at the billions of dose range.

And I think there was a science policy failure and not really considering the urgency of having sufficient amounts of vaccine that you know you can scale.

And that's what we're trying to do in our Texas Children's Center for Vaccine Development. We've been developing global health vaccines for two decades.

And we've been having a Corona virus vaccine program for over ten years for SARS and MERS. We flipped it around for COVID-19, and we

have now developed a recombinant and protein vaccine that is looking really exciting in terms of levels of virus neutralizing antibodies that are getting up there with the mRNA vaccines.

And what's nice about that technology is there's no limit to the amount you can scale. It's the same technology used to make the recombinant hepatitis B vaccine through yeast fermentation technology used globally.

And we've been doing this even for kids for three or four decades. And so now this is the -- the big Indian producer, Biological E, is now scaling up to produce the 100 million doses a month of that vaccine, with the hope that in a few weeks it will be released for emergency use.

And now we are working out with Indonesia with Neopharma to make the halal version of the vaccine for the world's Muslim majority countries. And another group known as ImmunityBio, which wants to do this for South Africa.

So, let's let -- maybe we can have a little bit of discussion about this. I know global heath was not our major focus.

But, what's really interesting is our group, our Texas Children's Center for Vaccine Development, which is co-headed by myself and Maria Elena Bottazzi, we've worked together for 20 years, has been now doing Zoom calls several times a week with countries all over the world desperate for vaccine.

And we're doing what we can to affect the technology transfer of our recombinant protein vaccine. And the worrisome part is, we're not getting a lot of help.

Certainly there has not been much engagement with the U.S. government. And so, we're doing what we can on our own.

And, but I think what we've got to really push hard on, is recognizing that there's just aren't enough mRNA and adeno virus vector doses to share.

And probably won't be for the

foreseeable future. And that was the policy failure, the science policy planning failure from the get go.

But, in the meantime, we think that we can move forward on our vaccine, and potentially get a good chunk of the world vaccinated in the coming months, if we can continue to get that help. And right now we're working with these vaccine developers.

So, -- so, a sobering picture of where I see we're headed in the United States. Where I think we will benefit from a third immunization.

Why the U.S. government should make the commitment that with every dose we vaccinate, we at least share a dose with the world.

But recognize, that's still not nearly enough. We've got five to six billion doses to make, and hopefully ours will make a contribution.

So, I'll stop there. And hopefully we'll have lots of time for questions. So, thank you.

MS. KROFAH: Well thank you so much, Dr. Hotez. And you certainly did paint a sobering picture.

In particular, that worst case scenario, in that we may not necessarily be at the top of that curve. With the Delta transmission, of course, you have a number of questions coming in about the boosters.

But, I would want to turn to Dr. Katz as we're rounding out this conversation. And then leave some time for Q and A.

Dr. Katz, you know, we talk about the end to the pandemic is through the vaccines. And Dr. Hotez and others have talked about the efficacy of these vaccines.

But, it will be helpful for you just to help us understand, are we using the right metrics?

Is it about the end of the pandemic, or going into a different phase? How should the public really anticipate the next several months?

DR. KATZ: Well, thanks -- thanks so

much. And I have to say, I've learned so much just from listening to Drs. Rutherford, Wong and Hotez.

And I think it's a great session. And I'm sure the people who are listening feel the same way about their great presentations.

I also think there's a certain appropriateness with having a New York speaker, because New York was so hard hit in March. We really were the epicenter of the epicenter.

I know in my own health and hospital systems, I had to triple the number of ICU beds in order to accommodate the number of people I had on respirators, as one example of just how bad it was.

And in New York City, which is the largest city in the whole U.S., essentially turned into a ghost town with no cars, no people on the street, no activity except in the makeshift ICUs in all of our hospitals.

Also, an opportunity to say how much we have progressed in terms of the science. At

that time we didn't even have the ability to test people readily for COVID in March.

We were still sending our tests to the CDC on a very limited basis. We were still focused only on symptomatic people.

We did not yet have the advances that in medical therapy like steroid use or monoclonal antibodies, and we certainly didn't have vaccines.

So, I recognize the very realistic point that Dr. Hotez meant about how generalizable the technology is to the rest of the world.

But, it's still quite notable that we have three effective vaccines. And I certainly hope that leads to us being able to have a normal world in the near future.

New York City has high vaccination rates. We're not like the areas of the country that are under 50 percent.

But, we are still quite hard hit, even in this phase, by the Delta virus. And I think

what that shows is how effective the Delta variant is in finding the unvaccinated.

This is still overwhelmingly an epidemic of the unvaccinated. And many of us would hope that having rates of vaccination of 70 percent would in fact yield a kind of herd immunity.

Clearly that has not happened in New York. And clearly those people who are saying that it must be much higher, are correct.

I want the audience to think for a minute about, as a country, the hard choices that that's going to require. And use my own hospital staff as an example.

Health and Hospitals, we have about 35 thousand employees. And we are now up to about 75 percent of my employees are vaccinated.

And on one hand that's great. That is way more than many parts of the country. But, think about the 25 percent who still feel that it's not in their interest to be vaccinated.

And I want to be very respectful of

those people. As a primary care doctor, the last thing I've ever wanted to do is compel someone to take a medical intervention that they don't feel comfortable with.

But, as a public health official, I have to ask myself, how will we ever get to the end of this pandemic if we're not able to fully vaccinate everyone?

And 75 percent is not sufficient. And it's important to think about, Dr. Wong was talking about the importance of making the vaccines easy and available for school children. I love that.

We in New York City, as we open our schools, we're going to have vax clinics in all of our schools for the kids who are old enough to get vaccination.

But when we're thinking of my staff, we're talking about a highly educated group of people who are mission driven. Who are interested in health issues and are committed to working on health issues.

And who have had access to the vaccines since they were available in January. All of my facilities have vaccines available without appointments, onsite.

All of my staff can receive four hours of time off in order to go and get that vaccine. So, I view it as an ideal situation. And the best case scenario.

And still, I'm only at about 75 percent. And that's the reason why the city and the states have promulgated vax mandates.

The state has promulgated one that will include all of my facilities starting September 27. Everyone will have to be vaccinated unless they have a medical reason that prevents their vaccination.

The city is increasingly limiting where people who are unvaccinated can go for, you know, fun optional activities, like concerts, and movies, and gyms. The schools are going to require all of our teachers to be vaccinated.

And we do these things not lightly.

But, because we don't see how else we return life too normal, how else we guarantee our children can go to school, our economies can flourish, people can have jobs.

As public health people we know that socioeconomic status is one of the most important determinants of health.

And that COVID has had a destructive impact on our economy, on people's ability to educate themselves, on jobs, on the ability to maintain housing. And we have to move away from that.

As public health people, we also recognize that there has been a misinformation campaign that has system -- systematically given people the wrong message.

There are profound ethnic disparities that are involved with people's prior experiences of healthcare and the way that the medical profession has not consistently treated the black and brown communities well. And so people have, you know, justifiable reasons to be skeptical.

But, we have to be more effective, because to return to the question posed, what is the most important metric?

I think that it's vaccination. The breakthrough cases that we're seeing are overwhelmingly asymptomatic or mildly symptomatic.

So that in a world where everyone is vaccinated, then we will continue to have COVID. There's no reason to believe this virus is going away anymore than the 1918 virus went away.

But, in order to learn to live with it, we're going to have to be vaccinated. I see no other way out of this pandemic.

That vaccination rate is going to have to be very high. Which means that there is going to need to be vaccine mandates.

Historically that's been what's required to eliminate vaccine preventable disease, is mandates. We haven't done as good a job with vaccinations when those vaccines are voluntarily decided.

So, I think the metric that I'm looking for is vaccinations. I will follow very closely, hospitalization rates and rates of death.

But, what I want to see if full vaccination. I think to complement what Dr. Hotez had raised as well about both unvaccinated in our country and the large number of people who are unvaccinated in the world, what is most likely to lead to other variants is uncontrolled reproduction of the virus in humans.

And so we are running the risk the longer we go with unvaccinated people both domestically and abroad. The greater the risk we have that there will be emergence of a variant that may not be sensitive to the vaccines that we currently have available.

And so there is tremendous urgency for full vaccination in our country and availability vaccination throughout the world.

I'm really looking forward to hearing what people's questions and the discussion.

Thank you so much.

MS. KROFAH: Thank you so much, Dr. Katz. Particularly for those metrics in terms of how we should be thinking about the next several months.

Thank you to all of our speakers for such great clear presentations. And we have a number of questions that have come in. Far too many for us to answer all of them.

But, I will try to highlight some of the key questions. And if I could invite all of you to turn your cameras back on.

We'll start with Dr. Hotez. You've had a number of questions around boosters. In particular, what the data indicates around a booster being needed, and the potential for mixing and matching.

If you received an mRNA vaccine, does it matter whether you boost with that same mRNA vaccine or not?

And/or if you had a J and J vaccine, should you boost with an mRNA? So, we can touch

a bit about boosters, the data.

And really is it at that six-month time line? Eight month time line? And the mixing and matching?

DR. HOTEZ: Right. So, we clearly are seeing, oh it says -- it's giving me instructions here, sorry.

We are, you know, there is now evidence for what appears to be waning immunity. And we are seeing this decline in effectiveness from over 95 percent and it's cut in half against infection.

There -- one of the problems with evaluating this is there's two things going on at the same time.

We're seeing probably a decline in infection. And there maybe some diminished efficacy against the Delta variant, which kind of muddies the water a little bit.

And the way I look at it is, if you remember when those vaccines were released in December and January, December of last year and

then January, we were in a horrible crisis. Right?

We were -- we needed to get the healthcare providers immunized. We needed to get the nursing home residents immunized. And the vulnerable populations immunized as fast as we could.

And that was the basis for recommending a three to four-week interval between those first two doses for the mRNA vaccines. Three weeks for Pfizer-BioNTech, four weeks for Moderna.

And that was done to get the American people fully immunized as fast as possible. And I think it was a good decision.

I agree with that decision. And it saved a lot of lives. The only problem with it is, if you were designing a vaccine purely from the standpoint of durability or length of protection, that's probably not the schedule you'd want to use.

I mean, if you look at most of our,

certainly our childhood vaccines, whether it's diphtheria, tetanus, pertussis, or Haemophiles influenza type B, or injectable polio vaccines, we give pretty rapid fire immunizations as infants.

And then we pause and then give a six to -- six month to 12 month boost after that. And we know that's what gives you that big increase in durable protection.

And so for instance, when we were designing the malaria vaccine, the Mosquirix malaria vaccine for Africa, same kind of thing. You know, you give several primary immunizations. And then you give a boost significantly later on.

And so in some ways, and the way I think of it, is by going through that three to four-week interval, we almost kind of guaranteed that it was going to be a three-dose vaccine at some point.

I think where I get some push back when I say that, is from colleagues. And they maybe right. I may be wrong.

That they say well, again, we're not seeing significant breakthrough hospitalizations. Part of the problem is we're not looking either.

We don't have -- I mean, there's no website out there that lists the -- all the major medical centers, and breaks it down by hospitalization, by vaccinated and unvaccinated.

So, the numbers are a bit all over the map. Some say they've got 20 percent that are even in low vaccination states, getting to Dr. Rutherford's nice slide about how the percentage of vaccinated goes up in high vaccination coverage states.

But, even among low vaccination coverage, we are getting hospitals of 20 percent vaccinated in the hospital. But, these are all antidotes.

There's not really a well-coordinated presentation of data out there nationally that we really need to see.

In Israel now, what's interesting, is they are seeing that. And they're also seeing

the benefit of giving a third immunization where it seems to restore that protection against infection again.

Again, it's a small study. And so the problem is we've got, you know, the data is not pub -- most -- the vast majority of data is unpublished.

And a lot of it is not even on preprint servers like bioRxiv or medRxiv. It's on, you know, the Ministry of Health of Israel website. Or we're seeing it from shareholders' presentation, PowerPoint presentations from Pfizer and Moderna.

Or we're, you know, getting it bits and pieces like that. Or we're getting it through press releases.

And this, of course, this is not a way to do science. So, I think what's going to be really important is that we give the FDA and the ACIP, the Advisory Committee on Immunization Practices, adequate time to really do a deep dive into the data.

And to give us, so we can really see everything that we have in hand. Because all of us right now, are just getting these bits and pieces.

So, I think we will go to a third immunization. I think there's, you know, part of it is for breakthrough hospitalizations.

But again, I am a -- I'm very concerned about the long haul COVID question, and high rates of breakthrough cases leading to long haul COVID up to 20 percent in that recent New England Journal paper.

I think for the J and J vaccine, we may have even less data. There -- you know, when that data -- when the Phase 1, Phase 2 data came out with the J and J vaccine, I always thought it would be a two-dose vaccine, because the levels of virus neutralizing antibodies were really high

And it brought everybody up to the same level. But, they -- they went for an indication for single immunization.

We'll have that Phase -- we'll have

Phase 3 data on two doses pretty soon. So, I think it's a good possibility we'll move to a two-dose vaccine.

With regards to mix and match, we -- again, there's not a lot of information out there. There's a study from the UK that looks at Pfizer and AstraZeneca mix and match, and it seems to do well.

You know, if you want to extrapolate and say J and J is also an Adenovirus vaccine like the AstraZeneca, that's a reasonable thing to do.

You know, it's one of the most common questions I'm asked. And unfor -- you know, it is frustrating that we just don't have a lot of J and J data.

The other question I'm asked a lot, is people making a big deal of the -- Moderna released some information that the antibody levels were two times higher than Pfizer. I actually don't make that much of it.

You know, two -- there's not that

linear correlation between levels of virus neutralizing antibody and protection. There are other factors, of course, that go into this.

And the Moderna vaccine was given an extra week apart. That maybe a difference. The amount of RNA antigen in the Moderna vaccine is much higher than the Pfizer.

And then, you know, when Tony Fauci presented some data a week or so again, he showed a 30 to 40 fold rise in virus neutralizing antibodies from the third dose.

So, I think again, this is what happens when we do science by press release. It sends people running off in different directions that are probably not helpful.

But, I -- you know, if that data holds up with the third immunization, I think that should put that to rest.

I got that Pfizer-BioNTech vaccine. I'm very happy with it. And -- and so don't feel all of a sudden that there's some inferior aspects of that.

And I think that's another part of the problem with the whole U.S. vaccine program. Is the mRNA vaccines were sort of held out there as some sort of magic.

And they're not. They're good vaccines, no question about it. But, there are also other ways to achieve it through recombinant protein vaccines and others.

MS. KROFAH: Thank you so much. And of course, I don't think as a public we've ever been in a circumstance where we've known exactly the manufacturer of each vaccine we've taken over our lifetime.

So, it is --

DR. HOTEZ: Yeah. We have -- we have to improve our dinner -- we have to improve our dinner time conversation.

MS. KROFAH: It's a unique circumstance. Dr. Wong, I want to come to you, because there are a lot of questions coming in about whether or not, you know, with the number of cases we're beginning to see in children, is

the Delta variant more -- causing more severe disease for children versus the wild type we saw with the original virus out of Wuhan?

Could you just comment on that? How concerned should the public be about more severe disease for children in particular, who are not vaccinated, given Delta?

DR. WONG: I think we should be concerned. We know that it is more transmissible.

And it is transmissible more among people who are unvaccinated, which include our children who are not yet eligible to be vaccinated, or who have remained unvaccinated, for our eligible teens.

As I think Dr. Hotez referenced, and others, we are seeing our cases and hospitalizations as well as ICUs rise. So, there is a concern that it is more severe.

Not that it is a -- I welcome the other panelists to comment here. There are, I think, three pediatricians on this panel today.

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Not that this is particularly worse in children compared to adults, but just in general, it is more transmissible. We are seeing evidence of faster, more severe disease with the Delta variant.

But again, welcome other comments from the other panelists.

MS. KROFAH: And then just to be clear, as well, on the question, you know, of course there's the misinformation that children do not get as sick as adults with either the wild type, or Delta, or et cetera.

And of course now, we're seeing kids, more and more cases. Can you just address that misinformation for a bit, in the sense that kids don't get sick as much from COVID-19?

DR. WONG: We are seeing the spectrum of illness in children as we are in adults. Ranging from kids who remain asymptomatic and have COVID-19, to being severely ill.

And as I mentioned, 500 deaths of U.S. children so far in the pandemic. So, we are

seeing that full spectrum.

And then I'll just mention the long COVID that we're seeing in kids. And I have taken care of some patients myself with long COVID.

It is -- it is really troublesome to see as a provider. For parents it is so distressing.

And so really thinking about doing all those things that we've talked about today to protect our kids as much as possible, getting vaccinated, doing those layered protection strategies.

MS. KROFAH: Agreed.

DR. HOTEZ: Yeah. And I'll just chime in and say I absolutely agree. I think, you know, there is this narrative coming out of groups with people, you know, who have an agenda, that try to make the case that COVID-19 is exclusively a serious illness for those over the age of 65.

And we know that's just not the case.

Especially with this Delta variant. So many young people are getting sick.

I think one thing that would be really helpful is if we had better numbers on, and standardization of long COVID in young people.

There's a nice paper in JAMA showing 26 percent of long COVID in young adults. But -- and that was pretty high.

But, in terms of younger age groups, adolescents and kids, again the numbers I'm seeing are -- vary everywhere from 2 percent to 50 percent.

And I think a lot of it has to do with there's not -- no standardization of metrics and how we are evaluating long COVID. Especially the cognitive effects, neuropsychiatric effects.

So, standardizing that, I think, would be really helpful to better get our arms around it. And then of course, we just don't know also about the -- the structural changes to the brain and the young developing brain.

So, we really -- there's a real

urgency, I think, to get that information out. Especially as we're keeping our kids in school this fall.

MS. KROFAH: Well, thank you both. I want to come to Dr. Rutherford. We've had some questions here really around this premise that usually genetic evolution of viruses, they lead to new strains that take advantage of evolutionary potential for more transmission, but not necessarily leading to more severe disease.

Can you talk about that as we think about the other variants of interest?

We're seeing of course, Delta being more transmissible than Alpha. What are your thoughts as we see the lineages?

Should we expect more transmission but less severe illness?

DR. RUTHERFORD: Yeah. I mean, it's always -- it's always difficult to think like a virus. And I always like to start off my live TV interviews with the phase, teleologically speaking, comma, you know, just to stump them.

But, it's you know, in an evolutionary sense, what does a virus what to do? It wants to make lots of little viruses. And it doesn't want to kill its host.

So, yeah. I mean, you know, this is like Michael Crichton and The Andromeda Strain. But, that's the, you know, that's how these things work.

Now, whether it works over the -- you know, over this period of time we're talking about, or whether that's more of a 10 or 15 or 20 year window, is another -- is another issue.

So, I'm, you know, I think would likely be the way to go. The other thing is that there are probably a finite number of mutations that can really, you know, that really will increase transmissibility, and not be fatal mutations for the virus.

So, maybe we've seen then all. Probably really haven't. But, you know, we're kind of coming -- we have a fairly robust series of variants with -- that we've studied, with lots

of different viral mutations.

And then I think we might be able, you know, somebody at Los Alamos or somebody, you know, some place could be predicting where the next sort of the next stable variants and stable mutations might come from that would be associated with increased transmissibility.

But, it's you know, it's guessing, it's all guessing at this point.

MS. KROFAH: Um-hum. So, I think just saying that, I think, is quite helpful and important to put out what we know and what we don't yet know.

Dr. Katz, there's a question here, we talked about vaccine misinformation. And certainly the messages around masking have been quite challenging, I'm sure, for the public to track.

What are the strategies that we need to have in place to get those right messages to that population that continues to be hesitant? Even as we're seeing increased hospitalization

and death?

You know, some have said, where is the Elvis Presley of today, of COVID-19, really drumming up a lot of, you know, individuals in public to go and finally get their vaccine?

Are there any strategies that you think would work that we're not really emphasizing?

DR. KATZ: Well, we're public health people, so we know that what works is trusted messengers. And that the message is usually best given by someone who is very close to the person you're trying to give the message to.

So, we've had good luck with community groups. We've had good luck with clergy. We've had good luck with sports stars.

But, my own view from New York, again, where I feel like we've been in a best case scenario that even after we've done that, there is so much misinformation out there.

And so much fear. And, you know, a general disbelief in science that I don't think

our country has seen before, where people simply don't believe.

You explain the data in the correct words, developmentally appropriate, culturally appropriate, but people don't believe the science. And that creates a hole.

And I think it will be interesting, and people will have to watch, what effect the vax mandates have. In the end, do people, you know, quit their jobs? Or do they get vaccinated?

And sometimes, you know, even if ideally we don't like mandates, and I think again, public health, you know, we always try to appeal to people to do things voluntarily. Same in primary care.

But, sometimes people need a little extra push. And I'll be interested to see, and we'll have a lot more data come September when a lot of these mandates go into effect.

MS. KROFAH: Thank you so much. Dr. Hotez, one final quick question to you in just

the brief moments we have.

So, if you don't mind just keeping the answer brief and short. Looking into the crystal ball, when are we going to get past this pandemic?

What are the expectations for the fall into the spring? Should we -- are we going to live with this for a long period of time?

How should we be thinking about the next year to several years?

DR. HOTEZ: Well, you know, one of -- this has been a very humbling pandemic. And I've learned not to try to project too far.

I think, you know, with that third immunization, I think this will produce more durable, long-lasting protection. I don't know that for sure.

I come out on the side, I don't think we're going to need annual boosters after that. But, we'll see.

I know the Pfizer CEOs talked about coformulating flu and COVID vaccines in

anticipation of that possibility. I don't think we're going to need to go there.

I think once -- if once we get that third immunization, I think it's going to be pretty robust and durable, long-lasting protection.

I think how we do as a nation really depends on -- on those last 30 to 40 million people who may hold out. And that's going to be an ongoing problem for the country.

And so, trying to figure out how we can bridge that partisan gap, and really appeal to groups that are sort of deeply dug in.

And -- and one of the things that I worry about is, and I do agree, mandates are important, both federal mandates, and even school mandates.

But, what that's also going to do, is there's going to be a cohort of people who will leave the workforce for that reason. And they will be angry and deeply resentful.

And that in itself is going to create

some instability. So, that's an extra layer of concerns that I have.

I do feel confident that if we could get to really high rates of vaccination, we could halt this epidemic. But, it's also going to mean vaccinating the southern hemisphere.

And the United States as a country has not stepped up and made that commitment. We've never had an address from the President or the Secretary of State to just give us the simple back of the envelope calculation that I just gave.

Six bil -- we've got six billion people that need to get vaccinated. Here's what the Excel spreadsheet looks like.

This is what we -- here's the inventory that we have. I don't think we're going to get through with mRNA vaccines and adeno virus vector vaccines.

Even if all the G7 countries tomorrow shared all of the doses they had, it would get us a very tiny fraction of the way there.

And so we've got to figure out a way to step up and produce another few billion doses of vaccines. And we've got to stop this nonsense of saying, we'll do it by 2023 or 2024.

We've got to do it now. And we can do it. And we just haven't made that commitment as a country. And neither have the G7 countries.

So, I think those are -- those are the big, for me the big picture issues.

MS. KROFAH: Well, thank you so much. I think we'll leave it there.

Thank you to all of the panelists and your presentations, where were quite clear, quite comprehensive.

And it really helped us understand where we are on so many fronts with our children. With everyone else, and how we can get through this pandemic.

Certainly the take away for me is vaccination, vaccination, vaccination. But certainly we cannot invest without the rest of the world and getting access to those vaccines.

So, thanks again to everyone who participated and registered for today's webinar. You will receive an invitation to the next webinar.

As mentioned earlier, this webinar has been recorded. The recording, a transcript, and the slide presentations will be available on COVID-19 conversations.org.

Thanks again to our panelists and the National Academy of Medicine and the American Public Health Association for cosponsoring this webinar series.

If you have any ideas or suggestions for future webinar topics, please email APHA@APHA.org.

And thanks again to our listeners for joining us today and throughout the series. Best wishes to all of you for health and safety.

Take care and we'll speak to you next time.

(Whereupon, the above-entitled matter went off the record at 6:30 p.m.)

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