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JOSH Welcome to this special broadcast from Johns Hopkins University. Thank you for joining us.

SHARFSTEIN: I'm Joshua Sharfstein, a faculty member at the Johns Hopkins Bloomberg School of Public Health and former Secretary of Maryland's Department of Health. We're here to talk about COVID-19, which is now a global pandemic.

As we know, the coronavirus is dramatically affecting life around the world. There have been more than 185,000 cases and 7,300 deaths because of this disease. In many places, events and gatherings are being canceled. In 37 US states, schools are closed. And that may increase. Millions of people in the United States, in Europe, in Africa, and other parts of the world are heeding recommendations and guidelines to practice social distancing.

And health care systems are working to manage incoming patients. To understand the very latest on the virus and what we can all do together to help stop its spread and impact, we will hear first from a virologist who is an expert in infectious diseases and who has been studying the virus in the lab. Then we'll talk about social distancing with an expert from the Johns Hopkins Center for Health Security, what it is, why it works, and whether governments and organizations are making the right decisions today. Our goal is to bring their knowledge directly to you. We'll also answer questions from our audience submitted both before and during the broadcast.

You can listen to more interviews with experts on a new podcast called *Public Health on Call* which is available wherever you get your podcasts. With that, let me introduce our first expert, Dr. Andy Pekosz. Dr. Pekosz is a professor here at the Johns Hopkins Bloomberg School of Public Health. He's an expert on the basic biology of influenza and other emerging viral infections as well as a leader in the field of infectious disease research. He is co-director of the Johns Hopkins Center of Excellence for Influenza Research and Surveillance. Dr. Pekosz, thanks so much for being here today.

ANDY PEKOSZ: Thanks for having me.

JOSH So I just want to start with this one question. I understand there is a vaccine trial that started
SHARFSTEIN: this week. Can you tell us what's going on with that trial?

ANDY PEKOSZ: Yeah, so one of the, I think, amazing things that has happened scientifically with this outbreak is the speed in which vaccines have been designed and brought into at least the first phase of testing, which is the safety phase. So one of those vaccines started trials this week. And a second one is scheduled to start clinical trials.

Again, these are for safety. So these are just the very early stages of vaccine development. But it's only been two months that we've known what this virus was. And we already have a vaccine. I think it's a tremendous statement to the science behind this.

JOSH SHARFSTEIN: And what is the science behind vaccines for this new virus? What are they trying to do with this vaccine?

ANDY PEKOSZ: Well, with coronaviruses, we have pretty good evidence from the SARS and the MERS outbreaks, which are related to coronaviruses, to the virus that causes COVID-19, that if we generate a good antibody response that recognizes the virus, then we can be relatively sure that we can protect people from infection. So the goal of these vaccine studies is to generate those kind of vaccines, things that look like the virus that can generate antibodies that can then recognize the virus and stop it from infecting cells.

JOSH SHARFSTEIN: How long do you think it will take to know whether these initial vaccines being tested are able to generate that antibody response that's necessary for an effective vaccine?

ANDY PEKOSZ: Yeah, a very difficult thing to predict. After phase one, they have to go into trials that actually measure how well the vaccine is working. Best estimates are that 12 months to 18 months is probably a time frame in which a vaccine would come into use, providing everything goes well.

JOSH SHARFSTEIN: Got it. So bottom line-- it's good that studies are starting, but we still have a lot to learn to see whether they'll work.

ANDY PEKOSZ: Yeah, the vaccine won't be a short-term solution.

JOSH SHARFSTEIN: OK, well, let's back up a little. And since you're a virologist and expert in viruses, what do you think people need to know about this virus?

ANDY PEKOSZ: Well, you know, it came into the human population with an ability to spread quite efficiently, much more efficiently than SARS or MERS, again, the related viruses that we've seen in the human population beforehand. And I think the second thing is this virus does cause mild

disease at a rate that's much higher than SARS or MERS did. And so all that has contributed to some of the issues in terms of being able to control the virus. Because it's no longer people that are so sick that they're looking for medical care that are being reported as being sick. There's a large number of people that are showing mild symptoms that maybe don't feel the need to go seek medical care that are driving the transmission chains with this virus.

JOSH SHARFSTEIN: Right, so it makes for a very interesting and challenging response which we'll be talking about a lot with Dr. Rivers soon. As a virologist, what do you want to know about the virus that is not yet known?

ANDY PEKOSZ: Well, some of the really important questions are understanding the immune response to infection. So we just talked about vaccines, wanting to boost an immune response. What we really want to know is now that we've got people that have survived the infection that have generated antibody responses, we want to understand what the virus is doing in terms of inducing antibody responses. Because we want the vaccine to mimic that. We also want to know if people who have gotten infected can be re-infected, so understanding how strong their responses are to that infection is going to help us understand the chance of being re-infected.

JOSH SHARFSTEIN: So you ran a basic science lab here at the school. What are you going to do or people who are also studying the virus going to do in the lab to understand more about this virus in a way that will help with the ultimate response?

ANDY PEKOSZ: Well, one of the really important questions that we have is why is this virus causing this mild disease when its related virus SARS caused a very severe disease. And there's good data suggesting that both of these viruses COVID-19 and SARS can enter cells and get into the same cells. So it's probably not something that the virus does to the cells after getting in that is different between the two. And understanding what that is will be important. Because, you know, we still get severe diseases with COVID-19. But if we can understand how the virus drives the mild disease, we may be able to come up with better treatments for those infected that are showing severe disease.

JOSH SHARFSTEIN: Do you think you and others will be studying like the receptors that the virus attaches to and how it moves inside the cells, those sorts of things?

ANDY PEKOSZ: Absolutely. And my lab uses a cell culture system that mimics the upper respiratory tract of humans. And so we're really going to be studying how the virus replicates in that environment, that cooler environment of the upper respiratory tract that may give us hints as to why this

virus is spreading so efficiently.

JOSH SHARFSTEIN: And then in the process, is it possible you'll understand, like, key places to design treatments or possibly inform the development of vaccines?

ANDY PEKOSZ: That's our hope, yes. By understanding some of the processes that the virus uses to infect cells in the upper respiratory tract, that may give us some hints as to weak points in the life cycle that could be the targets for interventions.

JOSH SHARFSTEIN: Great, I'm going to take some questions from the people who have been listening.

ANDY PEKOSZ: Absolutely.

JOSH SHARFSTEIN: And the first one is, how long can the coronavirus live on a surface and what kind of surfaces can it live on, how to think about that kind of question?

ANDY PEKOSZ: Yeah, so there's a lot of ongoing data on that. Certainly, it's clear that it can live on surfaces such as tables and stainless steel for anywhere from a few hours up to about 24 hours. The other important thing to understand is that this virus is very sensitive to a lot of normal disinfectants, alcohol, bleach solutions. Almost anything that says microbicidal will probably kill this virus relatively quickly. So it is important to practice good wiping down of common surfaces and disinfecting areas. Because if the virus does get deposited there, nothing better than wiping the surface to kill the virus.

JOSH SHARFSTEIN: Those are the kinds of guidelines, for example, the CDC has been putting out for like how businesses can clean areas, for example, and probably are also guiding health care facilities and hospitals in how they're assuring that surfaces are safe.

ANDY PEKOSZ: Absolutely, and that people should be looking at and using at home as well.

JOSH SHARFSTEIN: Got it. Another question is, could you talk a little bit about how this virus is transmitted from person to person? And, you know, there are all kinds of articles out there about, is it contact transmission? Is it airborne transmission? You know, and you've studied not just this coronavirus, but other coronaviruses. So tell us a little bit about how you think as a virologist this is happening.

ANDY PEKOSZ: Yeah, well, you know, there's a whole field that studies droplets and how they behave in air

and in rooms. But I think the simple message is, you know, droplets are things that you cough or sneeze that are rather large and can deposit on surfaces relatively quickly. When people say airborne or aerosol, technically that means droplets that are so small that they can actually float around in the air a little bit. A good example is if you use a pump liquid that sprays air freshener in the room. You'll see those small droplets. And they'll actually float around in the air a little bit because they're so small that they don't deposit right away.

JOSH I see.

SHARFSTEIN:

ANDY PEKOSZ: Everything we know right now says that the virus is most efficiently transmitted through those droplets, the ones that are large that are deposited within three to six feet of people and that can stay on surfaces.

JOSH OK, and going back to how to clean those surfaces. What if you go to the store and you can't
SHARFSTEIN: find any cleaning supplies? Is there something around the house that people can use to wipe things down? You mentioned a dilute bleach solution. I don't know if that's one of those things. But what else would you recommend?

ANDY PEKOSZ: Yeah, so very dilute bleach solution does wonders in terms of eliminating these viruses. Any alcohol-based solution that's roughly 60% to 70% alcohol will work as well.

JOSH Like Scotch, will that work?

SHARFSTEIN:

ANDY PEKOSZ: Scotch won't work.

JOSH OK.

SHARFSTEIN:

ANDY PEKOSZ: So this is one of those myths out there that your Tito's vodka turns out to be a little bit below 60% alcohol.

JOSH OK, all right. I just figured I would ask.

SHARFSTEIN:

ANDY PEKOSZ: So it should not be used, yeah.

JOSH OK. All right.

SHARFSTEIN:

ANDY PEKOSZ: But many people have rubbing alcohol in their medicine cabinets. That's something that you just have to look at it to see if it's the 90% or the 70%.

JOSH I see.

SHARFSTEIN:

ANDY PEKOSZ: And if it's 70%, you use it straight. If it's 90%, you can dilute it a little bit to let it go a little farther.

JOSH Great, and in terms of diluting bleach, is that like 1 to 10? Or what would you recommend
SHARFSTEIN: there?

ANDY PEKOSZ: At least 1 to 10, you can go a little bit more than that to wipe off surfaces.

JOSH So it can be pretty dilute.

SHARFSTEIN:

ANDY PEKOSZ: Yeah.

JOSH OK, great. There are a number of questions people have about the temperature and whether
SHARFSTEIN: we'll get a respite from what's going on when the temperature warms up. Is there any clues from coronavirus viruses generally or from your perspective as a researcher into whether that might happen?

ANDY PEKOSZ: You know, the short answer is we don't know with COVID-19 virus how it's going to behave in the warmer weather. Many respiratory viruses spread less efficiently when it gets warmer and the humidity goes up. But we don't know if that's going to apply to COVID-19. And I think the other thing that's important to know is that most of us are susceptible to infection because we have no pre-existing immunity.

And that makes it easy for the virus to spread. So if we look back to the 2009 H1N1 pandemic, there was some spread of that virus in the summer simply because there were so many susceptible people around then even though conditions weren't optimal for spread, it was easy enough for the virus to find people. And I think the same thing is what we're assuming is gonna happen with this virus.

JOSH So really we have to prepare that there is not going to be a big benefit in warmer weather. And

SHARFSTEIN: maybe we'll be pleasantly surprised, but right now that shouldn't guide anybody's actions.

ANDY PEKOSZ: Yes, prepare for having to deal with this during the summer months and there will be no respite. And hopefully there will be, but prepare that we won't.

JOSH SHARFSTEIN: Great, I have one other question, which has been out there, which is some people are wondering whether antibodies from people who have recovered from infection might be used for either prevention or treatment. Is that something that is worth studying? And could you tell a little bit about why that might be?

ANDY PEKOSZ: Yes, and it absolutely is worth studying. My department chair here at the Bloomberg School of Public Health, Arturo Casadevall, is leading an effort to try to use antibodies from people who have survived infection and give those as a treatment to individuals who are either suffering from disease or perhaps to prevent people from getting infected if they're in high risk situations. There's a long history of using antibodies from people who have survived infection as a treatment. There are some studies coming from China that suggest that there is some utility to this treatment. So there are a number of institutions in the US that are gearing up to try to see if they can get this in place.

JOSH SHARFSTEIN: Got it. Well, I really appreciate your walking us through that. I mean, it's been a string of kind of very tough news for people as schools have been closed, gatherings have been canceled, sports are off TV, all these different things that have happened. But I appreciate the work that you're doing and the message that you've had that there is a lot to be learned and a lot to be done to really fight back against the coronavirus. Thank you so much for joining me.

ANDY PEKOSZ: You're very welcome.

JOSH SHARFSTEIN: Thanks very much Dr. Pekosz. We're now going to take a short three-minute break before moving into our conversation with Dr. Caitlin Rivers from the Johns Hopkins Center for Health Security. We'll be right back.

ELLEN MACKENZIE: There's one and only one Johns Hopkins Bloomberg School of Public Health. We were the first, and we're number one. We work around the clock and around the globe on the world's biggest health problems. And we're restless, always looking for new ways to secure a healthier future for everyone. With five strategic priorities and the support and hard work of a diverse global community, we're pushing forward. We're reimagining our educational programs to help our students become the chief health strategists of the future.

We are training students to be interdisciplinary thinkers who are skilled in team science and creative problem solving and always committed to the fundamentals of good scientific practice. We are also extending our reach by creating new opportunities to pursue coursework online, in the field, and in the workplace. We're transforming our research ecosystem to accelerate lifesaving discoveries. And we've dedicated \$4 million to our new SCIBAR initiative which builds on our excellence in both basic and applied sciences to solve the most challenging public health problems.

We amplify our impact by nurturing new partnerships with communities and organizations outside the traditional boundaries of public health. We're working across sectors such as housing, criminal justice, and transportation. In the US, the Bloomberg American Health Initiative is working with more than 150 organizations to tackle five urgent health challenges facing the country. And globally, our collaborations reach from Baltimore to Uganda and India. To fuel creativity and excellence, we're investing in a diverse body of students, faculty, and staff.

Our new dean for diversity, equity, and inclusion is helping to foster an environment where people of all backgrounds can succeed and thrive. We're finding new ways to communicate across more channels. We aim to make sure our knowledge is shared, understood, and applied in policy and in everyday practice. New leaders in advocacy and communications are infusing all of our efforts with new energy and direction. Our strategic priorities inform everything we do as we seek a healthier future for everyone. Thank you for being part of this amazing community.

JOSH SHARFSTEIN: Welcome back. And thanks again for joining us for this webcast. Moving into our second conversation, I'm going to be speaking with Dr. Caitlin Rivers, a senior scholar at the Johns Hopkins Center for Health Security here at the Johns Hopkins Bloomberg School of Public Health. Dr. Rivers, thank you so much for coming.

CAITLIN RIVERS: Thanks for having me.

JOSH SHARFSTEIN: So where are we right now in the epidemic, globally and in the United States?

CAITLIN RIVERS: I think we're getting to a point where we're starting to understand the situation here in the US. As testing capacity has expanded and as public awareness has increased, WE are seeing

quite a few cases in the US. And I expect that to continue for a while longer. I don't think people should be surprised or alarmed more than they might be otherwise if we continue to see cases increase. And the reason for that is because any change that we make now is not going to show up in the data for probably seven to 10 days. So I expect we'll continue on that course.

JOSH SHARFSTEIN: And why is that? Why does it take a while for us to see changes in what we're doing impact the number of cases of COVID-19?

CAITLIN RIVERS: The incubation period or the time from when someone gets infected until when they start showing symptoms is around five days. And then it will take a few more days for people to go to their doctor, to get a diagnosis, and for that to really show up in our numbers.

JOSH SHARFSTEIN: I see, so we need to do things and not expect to see results tomorrow.

CAITLIN RIVERS: It does take a while, but we need to maintain vigilance. Because these actions that I'm sure we'll discuss today really do help.

JOSH SHARFSTEIN: OK, so people have heard by now probably about this concept of flattening the curve. Can you explain what flattening the curve is?

CAITLIN RIVERS: Flattening the curve is this idea that if we slow transmission, we can extend or change the shape of the curve. And the curve that we're talking about here is the number of new cases that we see every day. So it may or may not be possible to prevent infections. That is always our number one goal in public health.

But even if we are not able to do that, just supposing, it would be better to extend those number of new cases over a longer period of time so that our health care system can accommodate everybody who's sick. So just as a toy example, if 100 people are going to get sick from this disease, we would rather have that occur over 10 weeks than one week. Because then our hospitals will be able to manage that more easily.

JOSH SHARFSTEIN: So as we're thinking about flattening the curve, where are we on the curve right now, do you think? Are we at the top part? Are we halfway up? Where do you think we are?

CAITLIN RIVERS: I do think, in some respects, that we are just getting started in the United States. But that doesn't mean that we need to keep going. And so we, only in the last couple of weeks, have

begun to recognize community transmission in the United States. And so I don't think that we have turned the corner yet. But there is widespread awareness and widespread action that we need to take measures to protect our communities. And so I think we can turn things around.

JOSH Let's talk about those measures. What does it take to flatten the curve?

SHARFSTEIN:

CAITLIN RIVERS: On a personal level, it's all about what we call social distancing. And that is a suite of measures that prevent infection. So you and I are sitting quite far apart. And that is so that we do not have an opportunity to transmit to one another. And of course, we are not sick. If we were, we would stay home. But keeping six feet apart--

JOSH That's another social distancing measure--

SHARFSTEIN:

CAITLIN RIVERS: Absolutely.

JOSH --staying home when you're sick.

SHARFSTEIN:

CAITLIN RIVERS: Stay home if you are sick.

JOSH Right.

SHARFSTEIN:

CAITLIN RIVERS: Right. Keep physical distance between people. Wash your hands. Good times to do that are when you come in from outside, like when you arrive at home or at work, before you eat and before you spend time with people who are very old or very young. And you also want to make sure to wash your hands or avoid contact with high touch surfaces. So when I go to the grocery store, I'm always grabbing those little wipes and wiping down my cart.

JOSH Got it. Are we doing enough right now in the United States? Some places have said no bars or restaurants can stay open. In San Francisco at the moment, they said, you know, shelter in place basically. Where do you think we are in terms of whether this country is taking this threat seriously enough and responding appropriately?

CAITLIN RIVERS: I am encouraged by measures by communities to close down public spaces where people gather. In general, I do not recommend movement restrictions. So I think that's a step beyond

where I would recommend. But things like closing schools, gyms, mass gatherings, I think those are the right moves. But I think we all should continue to understand the spirit of those interventions. They are really to encourage and enable people to stay home. And so that's what I want people to focus on, staying home and washing your hands and conducting good hand hygiene.

JOSH SHARFSTEIN: Could you help us understand the different experience that different countries have had with this disease? Because we've heard that there's some places where it hasn't been so bad. But then we see and hear about, for example, Italy or France where there's so many different patients who are coming in very sick to the hospitals. You know, what's the difference there and what are the lessons for the United States?

CAITLIN RIVERS: Some Asian countries have had a less severe experience than European countries. And to some degree, it's speculation, but I would say their experience with SARS in 2003 really helped to inform their response.

JOSH SHARFSTEIN: Because that infection really hit Asia very hard.

CAITLIN RIVERS: It hit Asia hard. And it was very scary, rightfully so. And so I think people there really understand what social distancing means. And when news of a new SARS-like coronavirus emerged out of China, I think they really were able to lean in to these kinds of measures that we are now taking in Europe and the US.

JOSH SHARFSTEIN: I see. So the lesson may be to really pay attention to this social distancing concept.

CAITLIN RIVERS: The lesson there I want to underscore is that social distancing really does work. So in those Asian countries, we're not just seeing less COVID-19, we're also seeing less diarrheal illness and conjunctivitis, which is like pinkeye. Those are diseases that are also spread person to person. And so if the things they were doing were specifically for COVID-19, we wouldn't really see a change in those diseases. But we do, so social distancing does seem to be a driver.

JOSH SHARFSTEIN: Got it. That helps. Let's take a couple of questions. Here's a question from someone who says that the young people that they know in their life aren't taking this very seriously. They say, well, it's very unlikely I'm gonna get very sick, so why do I have to worry about that. What would you say to a young person with that attitude?

CAITLIN RIVERS: It's true that young people are at lower risk of severe disease, which is good. But young people are also a bridge to older people and those who are most vulnerable. The disease can only spread if there are people to spread it to. And so young people play a really important role in breaking that chain of transmission.

JOSH So young people are-- and on the podcast, you describe them as a bridge.

SHARFSTEIN:

CAITLIN RIVERS: Right.

JOSH What do you mean by that?

SHARFSTEIN:

CAITLIN RIVERS: I mean, even if older adults and people who are vulnerable are able to stay home as much as possible, they are still going to need groceries and they're going to need to get their medicines and maybe have visits from loved ones. If young people are in the places where those are happening, they could come in contact with older adults. And that's a transmission opportunity.

JOSH So really it's certainly protect yourself because there can be severe disease in younger people. But really it's to protect other people in your life, too. It could be your parents, grandparents, neighbors, teachers, other people who you might wind up in contact with.

CAITLIN RIVERS: We all have an important role to play.

JOSH Great. Here's a question about recommendations for doctors, dentists, other professionals, acupuncturists. What do you recommend now about how they go about caring for patients?

CAITLIN RIVERS: Even if you're not in a practice where you expect to see COVID-19 patients, it's a good idea to really step up your infection control and prevention measures. There's great guidance on the CDC website about what that involves. But I would encourage all providers to think about how they can reduce transmission opportunities among their patients and their staff.

JOSH Like what kind of opportunities are there?

SHARFSTEIN:

CAITLIN RIVERS: I think providing alcohol-based hand sanitizer and masks in your waiting room are valuable opportunities. Masks are not recommended for healthy people out in the community, but they are recommended for people who are sick. And so you want to make sure if you're someone

who sees sick people, they have an opportunity to access a mask. You can also ask people, if you are in a practice that may see people who are symptomatic, to call ahead so that you know they're coming and you can maybe take them directly to a room instead of having them in the waiting room, things like that.

JOSH SHARFSTEIN: What about if it's sort of a very elective kind of visit? Do you think some of those might be best canceled now? For example, for like a 75-year-old who might have something on their skin that is not going to become a problem, but maybe is just cosmetic.

CAITLIN RIVERS: I do think for elective procedures like that, it's a good idea to check with your doctor or your provider about canceling. It's going to depend based on what it is and the risk of the provider. And I know that providers are thinking a lot about what the right moves are right now. But if you are at high risk of COVID-19 severe illness, it would be a good idea to step back from those care environments.

JOSH SHARFSTEIN: Yeah, and so some physicians or dentists or others might be thinking about which patients really need to be seen and which don't. That would be a reasonable thing for them to be doing right now.

CAITLIN RIVERS: Exactly right. And another thing that hospitals are thinking about is how they can expand their capacity to care for people who are very ill. And elective procedures are one area that they might scale back in order to make that space.

JOSH SHARFSTEIN: Got it. There's a question about schools and maintenance, you know, how to clean surfaces. We heard from Dr. Pekosz about the various types of things that do and do not, you know, actually kill the virus or eventually sanitize areas. What kinds of recommendations are there for scaling that up to a whole building? Or how do you think about that?

CAITLIN RIVERS: I think it really underscores the importance of environmental services staff. Focusing on high touch areas is going to be important, so light switches, door handles, desks. We wiped down this desk before Dr. Pekosz and I switched. That's a great opportunity. There are, once again, disinfection guidelines on the CDC website that I would point people to, but really focusing on using alcohol-based microbicidal products on high-touch surfaces will be important.

JOSH SHARFSTEIN: Got it. And then there's a question about whether state parks and trails should be shut down. We often get questions like, can I go outside for a walk? You know, how do you think about that?

CAITLIN RIVERS: I think going outside is still a great opportunity. You want to make sure that you keep that six feet of space. Contact sports are probably out. But going on a hike, a jog, a bike ride, those are really important, not only for your physical health, but also for your mental health as we all face these challenging times.

JOSH SHARFSTEIN: So maybe one last question about mental health. You know, this is a stressful situation for a lot of people. Some people have, you know-- really, none of us have experienced something quite like this. This is a unique event. But even something that approaches this level of stress, some people have not experienced. How can we address that so that people are able to really change their lives, but maintain their equanimity, maintain their composure to be able to do the things that they need to do for themselves and their families?

CAITLIN RIVERS: Yeah, that's an important question, especially since so many of us are scaling back the activities that we do with our friends and family that don't live with us. I think this is a great time to turn to online resources like Skyping, Zooming, talking on the phone to stay connected with people, especially those who are older and have underlying health conditions who might really not be going out very much at all. I think we should all be supporting each other as best as we can.

JOSH SHARFSTEIN: So social distancing really just refers to social distancing in the physical space.

CAITLIN RIVERS: That's absolutely right.

JOSH SHARFSTEIN: But it's not psychological distancing.

CAITLIN RIVERS: That's right. And in my office, a lot of what we're doing is moving our normal around the water cooler office chat to online spaces. So you can still have those casual interactions. They just should be online or over the phone.

JOSH SHARFSTEIN: But yet they may be recorded forever, so you have to be a little bit more careful.

CAITLIN RIVERS: Also that.

JOSH SHARFSTEIN: OK, all right. Thank you very much, Dr. Rivers, for joining me. I really want to thank Dr. Pekosz and Dr. Rivers for a candid discussion on the very latest of the COVID-19 pandemic. This

webcast is just one of the many ways Johns Hopkins University experts are sharing their knowledge on this global public health issue. You can see a lot more about information from Johns Hopkins at coronavirus.jhu.edu.

And we also have a podcast called *Public Health on Call* where we have conversations with experts, including Dr. Pekosz and Dr. Rivers everyday. I think Dr. Rivers' podcast just posted today. Please subscribe wherever you get your podcasts. Also I should mention that at that resource center online, you can see the global tracker map which shows the spread of the coronavirus across the globe. And you can sign up for a daily situation report from the Center for Health Security.

You can follow Johns Hopkins and Johns Hopkins Bloomberg School of Public Health channels on Twitter and elsewhere to stay up to date with all of the latest information about the situation. And if you have questions to address in future programs, either webcast or podcasts, please email publichealthquestion@jhu.edu. We answer these questions on the Friday *Public Health on Call* podcast as well as on these webcasts. Thank you very much for joining us.

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