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 #14: CONTROLLING COVID-19: DISEASE SURVEILLANCE, TESTING, AND CONTACT TRACING

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WEDNESDAY, SEPTEMBER 16, 2020

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The webinar convened at 5:00pm Eastern Time, Karen DeSalvo, Moderator, presiding.

PRESENT

KAREN DESALVO, Chief Health Officer, Google

MARTIN BURKE, May and Ving Lee Professor for Chemical Innovation, University of Illinois

LAQUANDRA NESBITT, Director, District of Columbia Department of Health

MICHAEL OSTERHOLM, Director, Center for Infectious Disease Research and Policy, University of Minnesota

GEORGES BENJAMIN, Executive Director, American Public Health Association

**NOTE: LANGUAGE HAS BEEN EDITED SLIGHTLY FOR READABILITY. NO CONTENT HAS BEEN ALTERED.

GEORGES BENJAMIN

Hello. I am Georges Benjamin, the Executive Director at the American Public Health Association and I want to welcome you to the fourteenth webinar of the COVID-19 conversation series, brought to you by the American Public Health Association and the National Academy of Medicine. Today's webinar is entitled Controlling COVID-19: Disease Surveillance, Testing and Contact Tracing.

Today's webinar has been approved for one and a half continuing education credits for CPH, CME, CNE, or CHES. None of the speakers today have any relevant financial relationships to disclose and please know that if you want continuing education credits you should have registered with your first and last name.

Everyone who wants credit must have their own registration and watch today's event in its entirety. Next slide.

All the participants today will receive an email within a few days from cpd@confex.com with information on claiming credits. All online evaluations must be submitted by October 5th to receive continuing education credit.

If you have any questions or topics you'd like us to address today on future webinars, please email us at apha@apha.org.

If you experience any technical difficulties during the webinar, please email us at covid19@nas.edu and someone will be in contact with you shortly. The webinar will be recorded, and the recording and transcript will be available on covid19conversations.org. More information on the series recordings, or past webinars is also available at that link. Next slide.

So now I'd like to introduce our moderator for today. Karen DeSalvo is the Chief Health Officer of Google Health. She is a physician leader working at the intersection of medicine, public health and information technology, whose career has focused on improving health and eliminating disparities. She leads a team of health professionals at Google that provides clinical guidance for the development of research products and services.

Prior to joining Google, Dr. DeSalvo was the National Coordinator for Health Information Technology and the Acting Assistant Secretary for Health at the US Department of Health and Human Services in the Obama administration. During her time at HHS, Dr. DeSalvo focused on creating a more consumer-oriented transplant and value-based health system.

Prior to that, she served as the New Orleans health commissioner following Hurricane Katrina.

Prior to that, she was Vice Dean for Community Affairs and Health Policy at Tulane School of Medicine, where she was a practicing physician, educator, researcher and leader. She serves on the council of the National Academy of Medicine.

Dr. DeSalvo, over to you.

KAREN DESALVO

Great. Thank you, Dr. Benjamin and welcome everybody to our webinar today. We're going to be discussing updated information about the current process and capacity of surveillance, of testing, and also of contact tracing. The focus will be on what we have learned during the course of the COVID-19 pandemic and where there have been breakthroughs and what obstacles we still have to overcome.

I just want to first make a few comments before I turn it over to our esteemed panelists.

You know, public health is what we do together to create the conditions in which everyone can be healthy. There are many of us partnering together towards that goal in promoting and protecting the public's health. Certainly, I have had the opportunity to partner with public health, but I have also been in their seat as a local health commissioner.

I have learned on this journey that, really, governmental public health authorities are statutorily obligated to do this work of protecting the public's health every day. It's not a special effort. It's not a choice. It's what they have to do to protect those who live, learn, work, and play in their communities and they do this through the essential public health services. Next slide.

These are shown on this slide and were actually just recently updated by the public health community last week to reflect 21st century approaches and health challenges that we all face. They broadly fall into three big categories: assessment, assurance,

and policy, making all of this work grounded and with an eye on equity.

On an average day this work is no small task, but in a pandemic, it takes a Herculean strength. Plus, a lot of stamina and resilience and passion. So, I just want to take a moment to thank all the governmental public health leaders on the front lines and all the staff who are working in health departments across this country to keep us safe, and we thank you for doing that every day with a lot of passion. Because of COVID now a lot of people understand how important public health is and appreciate the complex work that stems from a communicable disease outbreak. Whether that's about flattening the curve or keeping it flat.

Of course, we know that these are critical to not only saving lives, but to giving medicine more time to stand up capacity to build better care models and science more opportunities to develop countermeasures. Whether those are therapeutics or vaccines, public health has a lot of tools in their toolbox to do that work and we're going to hear about three of those tools today that fall into the public health essential functions area of assessment. Essentially to assess and monitor the population’s health and investigate and diagnose health hazards and address root causes.

We’ll need all these tools, not only up until a vaccine arrives, but also after a vaccine arrives, because this is important work that public health will have to do to minimize transmission, not only of COVID, but other communicable diseases into the future.

So I want to take a moment now to formally introduce today's presenters, who are a wonderful group to share their frontline experiences and their expertise.

First, Dr. Mike Osterholm is going to talk about surveillance, then Dr. Martin Burke will talk about their experience and testing, and Dr. LaQuandra Nesbitt will talk about contact tracing. They're each going to bring this real world experience of what it's been like in this pandemic. Let me give you a more formal introduction of each, and then I'll turn it over to them.

Dr. Mike Osterholm is Regents Professor, McKnight Presidential Endowed Chair in public health, and the director of CIDRAP, or the Center for Infectious Disease Research and Policy. He's also Distinguished Teaching Professor in the Division of Environmental Health Sciences, School of Public Health, and a professor in the Technological Leadership Institute, College of Science and Engineering, and an adjunct professor in the medical school, all at the University of Minnesota. From June 2018 through May 2019, he served as a Science Envoy for Health Security on behalf of the US Department of State, and he's on the Board of Regents at Luther College in Decorah, Iowa. He's also a member of the National Academy of Medicine and the Council of Foreign Relations.

Professor Martin Burke is the May and Ving Lee professor for chemical innovation at the University of Illinois and leads the SHIELD Initiative on campus that has strategically deployed rapid and scalable COVID-19 testing to detect the virus for thousands of students and faculty and staff on campus twice weekly. He completed his undergraduate studies at Johns Hopkins University and his PhD at Harvard University. After completing

an MD at Harvard Medical School, he joined the faculty in the Department of Chemistry at the University of Illinois in June of 2005.

And our last panelist is Dr. LaQuandra Nesbitt, a board-certified family physician with over a decade of experience leading population health initiatives and governmental public health agencies. Dr. Nesbitt currently serves as the Director of the District of Columbia Department of Health in Washington, DC, a position she has held since January of 2015 when appointed by Mayor Muriel Bowser. As a physician leader, Dr. Nesbitt mobilizes organizations and communities to implement innovative solutions that promote health and wellness and achieve health equity. Throughout her career, she's led multi-sector collaboration to address innovation in healthcare delivery and its impact on high-cost, high-need, and other special populations; the integration of public health and healthcare and the impact of medical marijuana and decriminalization of medical marijuana on the public's health in DC. Dr. Nesbitt served as the Director of the Louisville Metro Department of Public Health and Wellness, where she led initiatives on the Affordable Care Act implementation and violence prevention. She earned her Bachelor of Science degree in biochemistry from the University of Michigan, her medical degree from Wayne State University School of Medicine and a Master of Public Health in healthcare management and policy from the Harvard School of Public Health.

We will hear from each in turn and then have time for questions from you all in the audience. So just a quick reminder, if you do have questions please send them to apha@apha.org. That's apha@apha.org and now. Dr. Osterholm I'll give it to you to kick things off for us.

MICHAEL OSTERHOLM

Thank you, Dr. DeSalvo. It's my honor to be here. If I could have the next slide, please? Next slide. Thank you.

Today I will address for you, the issue of COVID-19 surveillance and all the ramifications of what it means to our everyday public health practice. Next slide.

I will be relying in large part on a document that our center put together with a number of experts from around the country on surveillance. If you look, it's part five. The bottom one. SARS-CoV-2 infection, COVID-19 surveillance and a national framework - published on July 9 of this past year. This is available on our website. You can see the address below there by going to www.cidrap.mn.edu if you'd like to obtain this document. Next slide please.

In the document we summarize the fundamentals of surveillance for SARS-CoV-2. In their various categories, disease surveillance is a very obvious one - we want to know what is happening, when it's happening in terms of infections, and in most instances, just clinical cases.

So, the first activity is to monitor disease activity to local, state, and national levels and the timeliness of that obviously is critical. To conduct disease control interventions only through knowing what's happening in our communities, can we target the issues? For example, in our state today, a major challenge for us has been outbreaks as such with bars and restaurants. Only through disease surveillance we’re able to really understand that and then to define the epidemiology and

burden of COVID-19 is something that remains a challenge given the large number of asymptomatic individuals that are part of this pandemic.

And also in terms of enhanced surveillance during pandemic response. How do you monitor and predict the impact on the health care system? A mark that is frequently being used in terms of trying to understand when certain restrictive actions may need to be used in order to be certain that the healthcare system is not overrun with patients is to monitor changes and antibody prevalence over time.

How do we know what's really happening with the outbreak? This data will inform modeling activities, where those are used and appropriate, and will monitor viral changes over time by understanding what is actually happening with the virus itself. Next slide.

In terms of pressing issues today for COVID-19 surveillance, one is limited COVID-19 testing, especially early on. We are well aware of the challenges that we had, flying blind in the earliest days of the pandemic here in this country. We also have had continued challenges; I wrote an op-ed piece in New York Times back in April about what would likely be the scenario unfolding through the summer months of inadequate testing. Particularly when we saw the increased number of cases that came to fruition. This is one of the things we need to be doing right now in terms of surveillance; anticipating this very testing issue and you'll hear more about that from Marty Burke in a moment.

The issue of what has been called quarantine, relative to what they should do and shouldn't do in terms of transmitting in our communities - we have problems with inconsistent data collection and reporting. A great deal of that often has to do with systems that have been overwhelmed by the sheer number of cases. When we say in areas “a house on fire” that is often a true situation in terms of trying to do surveillance with a very nonspecific case definition, other than testing itself. We still don't have a clinical case definition that we're able to use in the absence of testing.

The issue of clustering of cases detected and outbreaks. How do we handle that? From the standpoint of actually determining that to be the case, when we may have individuals who will not participate in contact tracing or follow up and how we understand the extent of those clusters occurring, it’s difficult to assess exposures. Many people will report little to no information about where they think they might have picked this up, or what their activities were one to two weeks before. The lack of regularity of reporting has surely been an issue that's been in the media. Where we see states sometimes reporting cases literally weeks later because of a backup in the reporting system, including testing reports being sent to state and local health departments and then just a lack of an integrated reporting infrastructure.

We often find ourselves in local areas still using fax machines. We find ourselves, on a national level, not yet having the kind of infrastructure we need for rapid and comprehensive reporting that also does validation checks to make sure that the data in fact are as they are supposed to be. Next slide please.

We've realized what the cost can be of not having adequate surveillance, in this case testing being a key piece. This is an article that was just published this past week on our CIDRAP news site, but it details a study that was reported by the University of Washington and what happened in the early days of the virus transmission in the United States and the fact that we were flying blind. We were led to conclusions that were in fact not correct, also did not allow us to fully understand the breadth and depth of what was happening. Surveillance is absolutely critical; it is the intelligence that public health must have. Next slide.

In terms of the issue of incomplete data, we continue to see a challenge with certain categories of data. One is the incomplete racial data on COVID-19 cases. Again, another current recent article that looks at the issue of the level of racial data collection, finding that in some areas, large segments, more than half of all the reports, lack such data.

This has been a very important issue, as it relates to the fact that we do see such disparities and the impact by race and ethnicity, and so this is a critical function that surveillance must be able to collect and provide in a timely way. Next slide.

One of the other areas I just want to comment on, while Marty is going to talk about testing, I don't want to skip this. There's another document that we produced on what we call smart testing and I only want to talk about it, not from the testing perspective as such, but what the results tell us. In this document, another one of the COVID-19 CIDRAP viewpoints, we defined smart testing as having the right infrastructure for

testing the right population. That's what I really wanted to hit on, who should we be testing, when, and where.

We have to understand for surveillance purposes, there will be differences, in whether it's the clinical case that we absolutely need and want tested today. Whether it's contacts or whether it's samples in the community to try to understand more fully the epidemiology of the disease. So, how we pick the population for testing becomes very, very important.

That then gets us down past the right test, which, depending on what our purposes are for surveillance, such as the use of antibodies for surveillance. Some things have only very limited use from a clinical perspective, but may have tremendous use from a surveillance perspective, in terms of monitoring the ongoing level of infection in a community, even with challenges around the false positive rate of antibody testing.

Today, we can determine with serial sampling, meaning, in time we can basically find that the errors, in terms of false positives, isn't in a sense baked into each one of those. So, if a sample at time A is 8%, then at time B is 10% and at time C it's 15%, that gives us a relative perspective of the changing incidence and prevalence of the infection and then of course we want to use this to take the right action, and this is where we want to enhance surveillance, enhance the ability to detect more cases quickly to also attempt to limit transmission. Next slide please.

So what are the challenges to COVID-19 surveillance? One is just adequate resources, testing the population, since this is still such a highly dependent part of determining if someone has been

infected - it matters to have testing. We clearly need that kind of access and we're going to be hearing more about that, but this is critical. Willingness to test - I have real concerns about what we've seen over the course of the past several months in terms of going from not enough testing being available to now having more testing, but because people don't want to be tested.

We've seen that with people, for example, who challenged the very validity of this pandemic, many of them refusing, even with clinical symptoms to get tested when they first become ill.

We've seen that with certain events, the cyclists who went to Sturgis, South Dakota, we found that even when they came back, when they developed clinical symptoms, they did not want to be tested.

We're seeing that now in college campuses. We have some college campuses reporting over 50% of the students refused to be tested and/or refuse to give any names of contacts that then might be followed up on. We're going to have to follow this carefully because it's not only about trying to understand the relative tip of the iceberg.

Knowing where we've been with acute clinical cases and testing will never ever truly define what's under the water level at that iceberg, but the top of it has been a relative number we've been able to use. So the challenge we have is if people are refusing to get tested today, even when mildly clinically ill, what does that mean? Wnd then, of course, the use of technology, we need to see a major improvement in that fax machine based surveillance.

Oftentimes we're kind of more or less trying to put things together with twine and barbed wire at state and local health department levels.

The connection with healthcare facilities also challenging. We've already heard about that in terms of data reporting from hospitals, etc. If there's anything we need to take away from this pandemic is the fact that we need desperately to upgrade our technology and then finally, trust in the public health system. We have had real challenges, as you know, over the course of the past months with the government agencies like CDC and FDA.

There has been more than enough public discussion of challenges about the validity of the information coming from those areas that then often will translate into the public's trust of even state and local health departments and the compliance with contact tracing. As I made a point earlier, is very challenging in many areas today where we're seeing people who do not want to participate in any kind of follow-up with regard to the surveillance because of their distrust of government and the public health system. This is a very, very major point. Next slide.

So as we move forward. I think we're going to actually go from a problem of not enough to too much, if you can say that too much means it's not all being used. I think that we can see as we're slowing down testing, in this article in the Washington Post from May, but we're actually now seeing it happen again. Where in fact we're seeing testing actually dropped off in areas where at one point we had hoped that we would continue to see participants who are ill come forward for testing. Next slide.

One of the areas we also have to understand is our connection, not just between local health departments and state health departments, as well as the CDC, but how do we connect to the hospitalization surveillance network, the data there. We've already had challenges, trying to connect with healthcare facilities and healthcare systems to obtain information in a timely way and this has to be seen as a priority.

Trying to fix systems in the middle of a pandemic is not something we should be doing, and yet we have found ourselves doing that very thing because of the antiquated, incomplete systems we had before. Again, another lesson to be learned. Next slide.

And let me just close here with a set of recommendations that we came forward with regard to our COVID viewpoint. I might add that if you look at the document, you'll see that a number of the authors are former CDC employees, people who have spent a great deal of their life working on this very kind of issue and hopefully that wisdom is reflected here.

Number one, state-by-state assessment of COVID-19 surveillance practices needs to be conducted to identify inconsistencies in timely case detection and reporting and to determine resource needs. Since the Council of State and Territorial Epidemiologists (CSTE) establishes and implements the use of national case definitions, it should conduct the review and collaboration with the CDC. So CSTE has to take a lead role here.

Number two, information from this assessment can then be used to develop a national standardized approach to COVID-19 surveillance by the states. The approach needs to adapt to the changing epidemiology of the pandemic and as new data on the nature of the disease are published.

Number three, automated electronic reporting should be incorporated into surveillance, whenever possible, and the federal government needs to provide the additional resources needed to develop such systems.

Number four, states should publish on their own COVID-19 dashboards standardized and detailed data for demographic subgroups defined by a combination of age, gender, race, ethnicity, and location. These should be publicly available if data privacy can be maintained for different periods of the temporal trends can be analyzed. Next slide.

And finally, number five, there should be a coordinated campaign at the Federal, State and Territorial level with consistent guidance from the CDC regarding key messages as needed to inform and educate applicable facilities, commercial and clinical laboratories, health care providers and facilities on what information is required and why it is important.

Number six, state and local health departments need to have the data systems, informatics expertise, and trained epidemiologists necessary to conduct effective COVID-19 surveillance. This includes upgrading data surveillance infrastructure and ensuring federal support to provide resources needed to accomplish this goal.

Number seven, the CDC should implement the agency's serosurveillance program as quickly as possible.

Number eight, the CDC should continue to promote consistency for COVID-19 surveillance across the country and to ensure that a coherent, so national surveillance system emerges by the end of 2020.

And finally, with the fall influenza season approaching, federal, state, and local tribal and Territorial Health Officials need to begin now to determine strategies for coordinating surveillance from both COVID-19 and influenza.

So with that, I will conclude, and thank you very much again for having me and I look forward to our discussion and to further elaborate on these issues. Thank you.

KAREN DESALVO

Great, Mike. Thank you so much, very thoughtful, as always. I want to just thank all of you who are sending in questions and remind you if you've joined us later that you can submit your questions to apha@apha.org and we'll have an opportunity to get into them during the Q&A session that will follow our next two presentations.

Now we're going to turn to Dr. Burke. Marty is going to tell us about his experiences around testing at the University of Illinois and help us understand what that looks like for nationwide testing as well. Marty, over to you.

MARTIN BURKE

Thank you Dr. DeSalvo, I really appreciate the opportunity. I'm really excited to have the chance to share with you our story from the University of Illinois, go to the next slide, please.

So back in April, our administration reached out and asked me to stand up and strategically deploy a scalable testing program as part of our university's effort to open and stay open as safely as possible this fall.

So, the first thing we realized is that this was all about safety. So, we dubbed this program SHIELD to emphasize that emphasis on safety, to empower our community to engage in our critical mission of teaching our students, performing research, and engaging with our community partners.

The next thing we realized is that testing was going to be really important. But testing is not a silver bullet and we really tried to run through thinking about what it was going to take to pull this off. We realized it was going to have to be done in concert with really smart decisions about who to test, when to test, how often you repeat it. As well as how to communicate these results in a way that was maximally actionable and highly impactful.

We call this our target, test, and tell. These programs are meant to represent the comprehensive nature to it, in concert with other mitigation strategies that we also knew were going to be important.

The last thing, a key message I want to make sure to send is that we recognized very early that the protocols and tests and strategies that were available were probably not going to be sufficient. So, there's just been a tremendous amount of innovation amongst the team. In Illinois, we love to innovate, and this has been a big part of the story, thus far, and I'm excited to have the chance to share. Next slide.

So, as mentioned, we really thought of this as kind of a three-part comprehensive program. So, we like to think of this, not as a testing program, but as a program that involves testing as an important phase.

So, target is meant to be our kind of epidemiological and data modeling - from kind of a de novo perspective. We tried to anticipate who needs to be tested and how often in order to give ourselves the maximum chance of mitigating spread. I hope to highlight just a few of those key aspects in a moment.

The second piece is our test - and I'll describe it in a little bit more detail. We realized early on that the nasal swab was not going to be sufficient. So we're going to have to find a way to make a test that's much more cost effective, much more scalable and much easier to perform on a regular basis. And so I'll tell you the story of how we developed a new saliva-based test that goes directly from saliva to PCR and has key features that make it very fast and very scalable.

The last piece on slide is tell. We realized in order for this program to be effective, the information that we generate during the test has to be rapidly communicated to individuals in a way that allows them to make smart choices - to stop them from

spreading it to others. So, we've done this through a very strong partnership with our local Champaign, Urbana public health district and manual contact tracing.

We've also created a new app called Safer in Illinois, which allows the results to be directly communicated to the user's phone in a fully HIPAA-compliant and privacy-first manner. We are also now engaged with, in direct contact with individuals within our own community through a new component that we added on when we realized this last part could be improved.

The last piece I'll emphasize is that we've been constantly updating and adapting and optimizing the protocols as we go. So, I think that flexibility and adaptability has been a key overall component. Okay. Next slide.

So very briefly, on the target side, we have an outstanding team of data scientists and mathematicians and epidemiologists who helped us try to scope out what this would look like if we did nothing. And then, what types of mitigation bundles would give us the best chance of success.

So, in summary, if we did nothing, modeling predicted, out of our entire community, pretty much everybody would get infected with COVID-19, and it would happen quite quickly. We're actually about 30,000 to 50,000 people in our campus.

So, this is, actually, I think, a pretty good cross section of a large community population. And unfortunately, this looks like this would be normal in most of those situations if we did nothing.

In contrast, the modeling told us that if we were able to test everybody, so all 50,000 people, twice per week. As well as high levels of compliance with masks and social distancing. And, for example, classes greater than 50 online, as well as manual contact tracing. That if we put these things together, we would have a very high chance of being successful, leading to a nicely controllable number of total infections that would be manageable by our public health department and would not overload our hospitals.

They also told us that there would be a bump when our students first came back. We expected that. You know, 35,000 undergraduates coming from all over the country, all over the world. We will get several hundred new cases brought into our community, but that would quickly be crushed by fast, frequent testing. We would reach a nice, slow, steady state and be able to stay open safely for the semester, our community could thrive, our businesses could stay open. It was a very optimistic prediction. I'm very excited to tell you, and I'll show you by the end that largely this has come true.

We did end up with a challenge. Some of our students made bad choices about socialization behavior which caused an extra bump that we did not expect. I'll tell you all the details of that.

But even with that challenge, the fast testing, combined with the other mitigation measures, we've actually now managed to get those numbers way back down to where we started and we feel very hopeful now that this is going to be an example of how a community can stay open safely. Next slide.

I will also emphasize a point again - that testing is not a silver bullet. It has to be done in combination with other mitigation measures and our modeling actually shows this. So, if you just do the testing alone, yeah, nice reduction in predicted cases but if you add masks, social distancing, and contact tracing, you get a very dramatic and synergistic effect of these combinations. So it really has to be a holistic approach with lots of community engagement in order to make this process successful. Next slide.

So, when we thought about how to achieve twice per week testing of 50,000 people, the first thing that became clear was that the nasal swab was not going to work, as I mentioned, and we started to look for alternatives. So we became very excited about saliva as an alternative, and there were good logistical and scientific reasons for doing this.

From a logistical side, people don't like the nasal swab. It's uncomfortable. It is difficult to imagine people being willing to repeat that twice a week for an entire semester. In contrast, the saliva sample, you can imagine, that’s very easy to collect. It’s something that's noninvasive and you can imagine a system where this becomes just a regular routine as part of your day.

It avoids the swab. It also avoids a lot of supply chain bottlenecks. You don't need, or you need less healthcare workers to be involved. It's much easier on the patient and there were some really nice reports that came out, showing that it was compatible with fast, frequent testing in theory and if you could do this, even if the test had less sensitivity, you’re testing fast and frequently, it actually could be very effective in terms of mitigating spread.

Now on the scientific side, there's also really promising reasons to think about saliva. The first, and we think really most important, is that saliva is how we spread COVID-19. We spread it through our droplets and aerosols that our saliva create and so, we're in a sense directly and in fact quantitatively asking what the amount of viral load is in the saliva.

So, as a way to understand infectiousness, it actually becomes a much better medium to look at. There was also a very encouraging report out of the group at Yale back in April, which really further encouraged our looking at saliva and they showed you could detect COVID to even more sensitivity with saliva than the nasal pharyngeal swab and this has actually been consistent with our experience as well. So, next slide.

So, what I'm thinking about was, the standard method at the time when we were starting the program was the nasal pharyngeal swab-based approach. Not only is it uncomfortable, but the swab itself is an important supply chain bottleneck and then you have the same challenges all along this four-step process.

So, then it goes into a viral transport medium. Which is also a supply chain bottleneck and it causes another delay. And then there’s purification, which requires a special kit and usually another machine, and then finally the PCR reaction, which is where you get the information about the viral load.

If you click, there has been a report that came out showing saliva could work. But this original version, actually involved a very expensive specialized collection device. It still

involved the RNA purification and overall actually ended up being a very expensive and not more efficient way to do it.

So if you click again, my colleague, Paul Bergeron had a really, I think, brilliant idea to go directly from saliva to PCR. Cut out all the supply chain bottlenecks, dramatically streamline the process, and make it much cheaper. And this is the ultimately the result I'm excited to tell you about. Next slide.

So, the process actually turns out to be remarkably simple. The team discovered that if you simply heat saliva at 95 degrees for 30 minutes you can de-activate the virus, which is critical and allows you to process it in a much safer way at a large testing lab. But also, we think it breaks the virus open and thereby exposes the RNA, allowing it, upon transfer to a buffer, to be directly applied to a PCR reaction. So you take saliva, heat it, buffer, and run the PCR. It really is that simple.

And this actually had a dramatic impact on the scalability. As you can see, our level of detection in fact rivals and is more sensitive than most nasal pharyngeal swabs. In fact, we've now shown, it's even more sensitive than other saliva-based tests. Next slide.

We also had to form a lab to do this. So it's actually a really cool part of the story. Our Veterinary diagnostic lab is fantastic, at the University of Illinois. You may have heard back in February, there's a tiger at the Bronx Zoo that had been diagnosed with COVID-19. The animal coronavirus specialist that developed that test was Leyi Wang, and here are my colleagues all working out there with him.

We all teamed up to transform our Veterinary Diagnostic lab into a human COVID-19 testing facility. We bought a bunch of PCR machines and robots, and were able to actually reach capacity, up to 20,000 tests per day, in our veterinary diagnostic lab. Next slide.

Just a bit of the logistics that allowed us to achieve that. So we were able to pop up about 20 different tents all over campus. Each tent had two lines so students or faculty and staff can simply walk through. You swipe your card, it generates an order, it goes on your card with an RF code.

You submit your saliva sample and you put it into a rack and then we've got golf carts running those racks down to the veterinary lab every hour and this allows the whole process to be very efficient and easily collect up to 20,000 samples per day. We've been doing this since July. We've now run more than 300,000 tests on our campus.

A really key point is that the results come back within hours, rather than days. And when we look at the effectiveness of mitigation of the disease spread, the time window between when you start to collect the sample and when you finally get someone safely isolated - that time window is the absolute critical factor in terms of advocacy and so a fast test is a really key part of the story. Next slide.

The other piece, as I mentioned, is how to communicate those results to achieve that very effective isolation and quarantine. We've been working very hard on this and we think we've learned a lot along the way. One of the key things we did is we created an app that actually allows the results of the test to be

directly sent to the user's phone in a HIPAA compliant and privacy first manner.

This allows the rapid communication in a way that young people are used to dealing with, and it also has a really nice feature in which there's an opt-in exposure notification that's proximity-based as opposed to GPS. So, people feel very comfortable using this. It's actually very a private and secure way to understand if you've been exposed. We've actually had a lot of uptake. People actually are using this app and we think it's making a big difference. If you click the next slide.

The other key piece of the app is that there's a cover page - if you are up to date on your testing, and you are not positive, you actually get a checkmark on the cover page and you need to show that to get into any building on campus.

So coupling your compliance with the testing program with activities that you want to do has been a very powerful mechanism to actually get people to participate in a way that I think has made a big difference. If you're not up to date, or if you've tested positive, you get an X mark, and this means you actually have to get that rectified before you're able to gain access back into any building.

The other really interesting thing that's happened is our community has now started using this. So to get into bars and restaurants around campus, you have to show your app and that's a way to ensure safe engagement in those community activities and our businesses and it's actually turned out to be a really good boost for the economy and the community as well. Next slide.

Okay. So this is the most important slide that I'm really excited to share with you. These are our latest results that have been updated even up to yesterday.

So, as I've told you, we've performed now more than 300,000 tests. The upper right-hand corner is our seven-day rolling case positivity rate. So, I'm very happy to tell you that right now we're at 0.44% for our positivity rate. The plots below the orange line is our case positivity rate per day. And I'll talk about, in just a moment, some of the trends and we have to observe.

The blue bars are new cases per day and the green bars on the bottom are the number of tests that we perform per day. So, a couple of things to highlight. The Y axis on the bottom plot - that is up to 20,000 tests per day. So, you can see this has been a massive testing operation throughout.

Moving to the top plot, you can see during the month of July and early August, we ran kind of a pilot. This was with our faculty, staff, and students who were still around campus and you can see we got some really encouraging hints that this could work. We were up around one and a half percent in mid July, and then we watch this drop below 0.2%. We almost eradicated COVID-19 from our faculty, staff, and students. Then we brought our undergraduates back and we knew from our modeling that there was going to be a bump. We expected it, there will be a rise. In fact, consistent with our modeling we saw several hundred cases come in. That was during that first, let's say, the third week in August.

And then our modeling predicted, we would drive this right back down. Now we had been very cognizant of the fact, these are young people and they're probably not going to be perfectly compliant. We had modeled that thousands of students would probably go to parties three times a week. They wouldn't wear masks. And yet the modeling still predicted, we would crush the pandemic.

Once they came in, if you give me one click, we didn’t model for, unfortunately, students made some really bad choices that we didn't expect. Specifically, students who were known to be positive, having confirmed it by our testing, they still went to parties or hosted parties and this caused some events that really led the numbers to spike. And so, you can see there, we actually almost reached 3% positivity rate and we were able to directly connect this to those activities because we saw exactly where these spikes happened, and they had correlated exactly with where we got reports of these parties.

Now, two things I really want to emphasize because we were testing everybody twice a week, we saw this immediately. So the fast frequent testing gave us a very early warning signal that something was wrong and that allowed us to very quickly make pivots and make changes and adjust so that we could address it. So, if you click one more time.

We made three key changes very quickly that I think ultimately had a really strong impact in the positive direction. The first is we looked at all of our data and realized that greater than 95% of all of our cases were with our undergraduates. So, this allowed us to put a specific “essential activity only” order in for just the undergraduates.

We are very proud of this. We never closed down classes, we never stopped research. We allowed the undergrads to continue to go to work, but we forced them to not engage in any types of parties or any other socialization in large groups which had a big impact on mitigating spread in that group.

We also changed our testing strategy, instead of continuing to test everybody twice a week and fishing in the whole ocean. We said all the fish are in this little pond. Let's go fish in that pond more often. So, we tested some of the undergrads now three times a week, particularly in cases where they had high incidence in their houses. We had everybody else and undergrads twice a week and then everybody else just once a week.

And so that allowed us to increase the turnaround time of our testing, which also had a good positive impact. The last thing is we realized we could get much better at helping people isolate safely and quickly.

We were working with Champaign, Urbana public health district. They were doing their very best, but it took sometimes up to a day to actually get that information to people and get them isolated. So we're missing out on this very large window of time.

So we launched our own internal team. We called it SHIELD team 30. The goal is within 30 minutes, we ourselves contact the students and help them get safely isolated. I'm happy to tell you this worked really well, usually within a few minutes this team has contacted folks and gotten them isolated and we think that's really made a big difference. All of this together.

You can see the result. We watched those numbers drop right back down and we think this is a really exciting example of how fast we can test. Combined with other mitigation strategies, it can work, and it can, in this case, show that a university community can stay open.

Two other things to highlight. We worked very closely with Champaign, Urbana public health and look at this. We saw no crossover into our community and we saw no crossover into our faculty and staff. Because we acted quickly and went on offense. Instead of playing defense with our testing, we were able to stop the spread to other groups. No one ended up in the hospital. We've had no serious illnesses, next slide.

So just to summarize, we think we've learned that fast and widespread testing can help mitigate the spread of COVID-19. Specifically, in our case, in a large university community, but we think the lessons we've learned can be broadly applicable to many others. To highlight again - testing is not a silver bullet. It has to be integrated into holistic approach. That includes the epidemiological modeling, contact tracing, masks, social distancing, and really importantly, community engagement, We have to be all in this together.

Another important aspect is the test we've developed. It's a direct saliva PCR that enables fast frequent testing on scale. That heating step, as the first step, allows it to be run safely on large scale while protecting the workers.

Prioritization of testing can really help maximize the impact. Mechanisms to help people who test positive get safely isolated

very quickly and then supporting them. And in fact, enforcing that isolation and quarantine are really important.

Okay, I'll stop there. Of course, will be happy to answer questions. Thanks so much, again, for the chance to tell our story.

KAREN DESALVO

Great. Dr. Burke, thank you so much for that inspiring story about leaning in and scaling at the university and appreciate those insights. Our last speaker is Dr. LaQuandra Nesbitt, who is going to talk with us about this additional tool in the public health toolbox of contact investigations and tracing. So I'll turn it over to you.

LAQUANDRA NESBITT

Thank you so much, Karen and thanks so much to APHA and NAM for inviting me here to talk a little bit this evening about the role of contact tracing and to share what we've been doing in the District of Columbia, and our lessons learned about some best practices. But also some things that we have learned could be done better in our jurisdiction and some things colleagues and governmental public health professionals and communities are doing on our behalf and what governmental public health can do better. Next slide.

Just to kind of level set. There's been lots of talk about contact tracing since the COVID-19 pandemic has begun, but contract tracing or disease investigation is actually a core function of public health. We do it routinely to be able to

respond to tuberculosis cases and other infectious diseases, as you've noticed on this slide.

There's a huge connection between the surveillance work that was covered earlier by Dr. Osterholm, and Dr. Burke just talked a lot about the role of testing and how critical both of those functions are to our ability to respond to this pandemic.

And so we're going to spend a little bit more time talking about the process of disease investigation and contact tracing and how that can play a tremendous role.

Again, they've given some insight into how important it is and all the three of these things are so intimately linked, which is why we've been spending time talking about it.

What we've done in the District of Columbia, and how we differ from some communities is we have kept the role of disease investigation and contact tracing linked in our agency.

And so when we have a case, our case interviewers do the full gamut of work from being able to assess the individual in terms of their clinical history, whether or not they've had any signs or symptoms, being able to explain to them what they need to do in terms of isolation, and also getting information about their contacts.

They also contact those contacts and provide them information about what they need to do in terms of quarantining and providing them information in terms of what they should be looking for in terms of symptoms and advising them of the need to be tested and what our recommendations are for testing in our

jurisdiction. There's an assessment of any social support that you may need for this to happen, in terms of being able to isolate and quarantine successfully.

So all of those things are done in a comprehensive approach. Some jurisdictions have separated the disease investigation and contact tracing functions and have had myriad success or different types of levels of success because of the bifurcation of those responsibilities. And that may be something that we will learn more lessons from - in terms of the level of success that you have when you keep those kind of functions combined versus when those functions are separated.

The other thing that I want to make sure I highlight early on is that, in public health, when we're responding to a pandemic, there are periods of time where the number of cases - we call it the acceleration phase, increases so substantially that the ability to responsibly conduct contact tracing for every positive case is markedly compromised versus when you may be in a deceleration phase or you have fewer cases.

We may quantify acceleration cases per 100,000, so you may have to either suspend the contact tracing or prioritize the types of contact, the types of cases that you're going to conduct contract tracing for – and they may be for populations who are the most at risk. This can be determined by how we see particular communities in your jurisdiction are experiencing a disproportionate burden disease. Next slide.

So what I'll talk about here are some things that we've recognized can assist us - so I recognize these again. I mentioned testing is a key part of our strategy, on how quickly

we isolate and quarantine individuals after they have been tested or identified as a contact through the tracing process. We recognize this to be one of the core measures to stop the spread.

If you'll advance for me, we'll also be able to talk about what we've recognized to be the enablers of these other things.

Tracing, isolation, and quarantine – these things have made our efforts more successful and I want to talk a little bit more about all of those things: testing, tracing, isolation, and quarantine.

But more importantly, what we've had to do in terms of building public trust, how we use technology as an enabler, and how policies helped enable our work. But also how sometimes we have to be flexible, especially in the area of policy to make our efforts more successful on the next slide.

I'll talk about testing. We started very early on with the approach that many jurisdictions did - trying to ramp up the availability of testing in our jurisdiction. I won't go into the details in terms of talking about types of tests. But we focused on putting mass testing initially in our jurisdiction in the communities where we knew healthcare access was most likely to be the most limited and where our surveillance data was telling us that we were going to be experiencing the most disparities in COVID-19 outcomes.

So that's where we focused initially. Then we began to expand our testing, you'll see these little fire engine graphics, because we started to use something that's spread equitably

throughout DC, in most jurisdictions - and that's access to fire houses or fire stations. So we put more resources for testing in and at our local fire houses. This is a place that people trust and it kind of links to that public trust domain, and if you advance one more for me.

This helped us, along with expanding and getting our providers to do more testing. This happened after we addressed issues of concern for keeping their healthcare workers safe in the ambulatory environment, by better segmenting out healthy patients who were coming in for preventive health services, for patients who had colds.

This helped us to rapidly increase the number of tests per million that we were doing in our community – meeting two goals that we had set for ourselves. On the next slide, I won't spend a lot of time on the all of the different things that are set here.

These are broad goals that we have for our agency and some more specific goals that we have for the contact tracing, for us. As I mentioned before, disease investigation is a core function of public health, as Dr. DeSalvo shared the 10 essential services for public health at the beginning of our session this evening.

But I would be remiss if I didn't highlight that, at the beginning of our response, prior to COVID-19, we were an agency that had about 26 full time employees who were dedicated to disease investigation. These are epidemiologists within our agency, and contact tracing was part of their function. And now we are a workforce that has over 560 full time employees, if we are counting our reserve corps that scales up this work and has

been expanded through a combination of new hires, staff that have been detailed from other functions across the government to respond to this work, and all the other work at various levels.

This includes those who are doing the direct work of the interviews, as well as the investigators and the supervisors. So really, a huge expansion to be able to respond to the demand of this work, based on the amount of cases that a jurisdiction of our size is experiencing.

On the next slide, I want to make sure that we highlight here what it really looks like if you're doing case investigation and contact tracing, this combination, and this will be a great transition into the importance of having these enablers. You think about having hundreds of people doing this work and also making sure that they are social distancing, and in our operations as well. So much of this work is done remotely now and you want to have fidelity to the process because the data that you collect and your contact tracing is a part of your surveillance data. This helps you to manage the pandemic in your jurisdiction.

The testing data is surveillance data, but content tracing information gives you insight into the pandemic, the qualitative and quantitative aspects of its impact on your community. And so if you could imagine that having people do this work in a pen and paper, pencil and paper type of way, that would make it very difficult to do analysis of what the pandemic looks like or how to manage logs of information, logs of contacts, and then communicate with those contacts.

And so, technology has been a tremendous enabler of this work, and helping us be able to call interviewers and conduct interviews with positive cases, maintain logs of close contacts, and be able to understand to what extent close contacts become positive cases. And what the relationship is between cases and contacts, as well as locations throughout the city and in our neighboring jurisdictions, which becomes extremely important when you have bi-state and tri-state relationships. Next slide.

I just want to be able to highlight again, getting into these key successes and the enablers that we have and being able to leverage technology. Again, there's a number of entities that are out there that are supporting this work with a particular technology partnership.

And what this is where flexibility becomes extremely important. As our response has matured, we have needed to have the ability to make updates to our system. We recognized this in our engaged workforce. Some people were much better at it, with experience in terms of having done disease investigation before, because of some of our recruitment efforts, we were very flexible in terms of just naming a type of skill set.

Customer service was very important. Those skills were very important to us and we recognized the need to build in different hard fields into our system, we wanted to be able to limit the amount of manual data extraction that our team was doing. And so we do updates to our customer relationship relations management solution every two weeks to improve how that tool works for us.

We've also recently signed on with a Google, Apple partnership for exposure notification to make that tool available for us, adding on to supplement some of our other solutions.

I'll talk about that for challenges where we don't have as much information for contacts as we can. But this can help augment how people are notified if they've had an exposure. This enhances the work that we are doing with our contact tracing force.

And the last thing that I'll mention here is that contacting people is a cold call. So you have to make sure that the number that is showing up when you're making those contacts, whether it's the SMS message or a phone call, shows up on caller IDs. That doesn't happen all the time in the in the age of cell phones. So we worked really hard to have our DC COVID-19 teams show up on the caller ID for mobile technology.

Building trust, on the next slide, was also extremely important for us. So we hired from the community - almost 100% of all of our contact tracing employees are the residents in the District of Columbia. We've worked to have credible messengers.
We have partnerships with our faith based institutions, those community leaders, as well as our local health and social service providers.

We issued a number of grants to help our healthcare organizations, as well as social service organizations. Many of those organizations, either as a requirement of their grant or independently, have taken training modules on contact tracing so that they would be familiar enough with the process to be able to explain it to individuals who either test positive or are

contacts, and that helps them to be primed for the process. Working with the government helps them to understand what we will ask, which helps to build trust around the process, and helps them to understand that we're not going to pass their information on to law enforcement or anything that will compromise your ability to feel safe in your community.

On the next slide we recognize that a lot of the key to success is being able to have individuals isolate and quarantine successfully. That's a picture of what some of our housing looks like in the District of Columbia, and we found that some of the other neighborhoods that were having high rates of infection were very densely populated. These are just traditional row homes in the District, but some of our other areas that have a lot of apartment buildings, where the number of individuals per household was much higher than the city wide average - despite us having isolation and quarantine housing available in hotels, people weren't taking advantage of it. And this was information we were gleaning from our surveillance data.

We decided that we needed to go to another tried and true public health approach that we've used in our maternal and infant health programs, and in some of our TB initiatives, as well as some of our other chronic disease management programs, and launch a home visit pilot to see if we could decrease the lack of follow up and increase the number of individuals who completed interviews and provided close contact information.

On the next slide, it's just showing the eligibility criteria for that initiative where we focused on those who have missing or incorrect phone numbers. Surprisingly, in the District that, percentage is very low.

That's around 3% for individuals who we had reached by phone, but for some reason didn't finish the interview or weren't able to do our public health monitoring - or these were individuals who when their case was reported to us by their health care provider or through a community based organization, identified them as having complex needs that may make it difficult for them to isolate or quarantine.

On the next slide. I'll share with you some of the preliminary findings that we've had. Prior to the visit or the visit attempt, that outcome we couldn't reach was about 60% of individuals, which is very concerning when these are individuals who should be quarantining or isolating.

Even more interesting is that 13% of individuals for who we had a successful attempt at reaching them, someone in the home reported to us that they were not there, and that perhaps they were at work at the time. And these are individuals who have tested COVID-19 positive.

And then lastly, for those who we weren't able to reach successfully initially, we were able to complete about 40% of the interviews and 60% of them are still incomplete. The average time to completion for an interview when they were successful was about one to two days.

So these are some of the things that are still very concerning – as Dr. Burke mentioned, the ability to have community really engaged with a contact tracing process and some of the other community mitigation factors that we know could be very successful.

This is not something unique to the District of Columbia. When we talk to our peers and other cities who have launched home visit pilots, they have seen similar results and this is something that we're going to be focusing our efforts to try to address earnestly. So just in closing, I do really want to highlight that we have found some things that work, that are successful. If you have the core components of a program. If you're leveraging technology. If you are adequately staffed, you really can have a successful contact tracing program.

But we really have to address the challenges of having adequate community engagement in order for contact tracing to be successful in any jurisdiction. I look forward to an engaging Q&A discussion. Thank you.

KAREN DESALVO

Well, that's fantastic. Thank you, Dr. Nesbitt and I know you and your team have been going full out for months. So thank you for making time for these learnings today. We could move to the next slide.

We're going to move into our Q & A session. We've had quite a lot of questions come in to apha@apha.org and in case you still have any you want to send in, please do.

I may just go ahead and move straight into some of those because they are aligned with some of the things that I would like to hear more about from these from these panelists. So, thank you for bringing forward some questions.

I'm going to start by directing a question maybe to one of you, but some of these seem very appropriate to have multiple responses. So please feel free to chime in and share your perspectives, even if I don't ask you to lead off in the question.

Um, I want to start off with a tough question for Dr. Osterholm. I think this is less about you, but just more about the state of our surveillance system in the US. The question is, why we were caught flat footed when the CDC reports were sent out in January that a new pneumonia was detected in the Wuhan province.

MICHAEL OSTERHOLM

Well, I think part of the challenge was, in fact, that we really lack the creative imagination to expect that this could be a pandemic, This is not a partisan issue. This is not an issue that, I think, divided public health versus others. I put out a statement on January 20 saying that this was going to be a global pandemic and we needed to prepare and get ready.

It still was another seven weeks before the WHO declared a pandemic. During that time I received a fair amount of comments from people across the spectrum, including public health, that basically were critical for us putting statements out like that - saying that we were scaring people needlessly.

A major medical journal published a cartoon, comparing flu with at that time, COVID-19, suggesting that we were really blowing up the COVID-19 issue far beyond what was an appropriate level and that influenza was still killing many more people.

I don't think any of this was, you know, any way other than just that people couldn't perceive what was about to come. We had planned for influenza pandemics, and so since this wasn't influenza, and since we'd had SARS and MERS and had been able to control it as a coronavirus, people just assumed that was going to be the case.

We took a lot of heat from a number of people for what they thought was overhyping of the 2000 H1N1 pandemic. Which, ironically, if you actually have years potential life lost, exceeded that of 1966 and 1967 and 1957.

If you look at the Ebola situation, where one estimate from the CDC as a model, even though the threshold, the upper range said up to a million cases would occur, people were really afraid and thinking, oh my god. Here we go again. We're going to scare people and it's not going to be for real.

And so I think that was a reason why there was reluctance by a lot of public health officials, as well as across the political spectrum to realize and acknowledge that this was coming, and that we were really ill prepared for it.

KAREN DESALVO

Thank you, Mike.

A related question that we got was about sources of data. And we have a couple in this vein, and one of the things, certainly, that always frustrated me as a as a local public health leader was how stale the data was that I typically got in some cases, especially for chronic disease surveillance. That data could be

a couple of years old by the time it was packaged and presented to us to respond to, or take action on it.

I wonder if, LaQuandra, you have any thoughts about the state of data insights or signals that you get as a local health officer on a daily basis and what's missing here or how you think that could be improved. Not only today but certainly going forward into the future - and anybody else chime in if you have some thoughts about that.

LAQUANDRA NESBITT

As I've mentioned before, the pandemic response continues to mature and we've had a lot of discussion about surveillance and how surveillance is going to change over time. But for the response to the pandemic, and when we look at how we do surveillance for influenza, we don't monitor every single case of influenza that happens in the country.

What we have is certain sites in our community that report on the influenza cases that they're seeing and the number of tests that they're doing. And that's how we monitor trends and influenza in our community. We consider them in terms of those sites that are recording, so it'll be a set number of hospitals, a set number of urgent care sites, a certain number of primary care provider sites, and as the flu season matures, we see changes and we compare it to what happened the year before, and we look at the types of influenza that are circulating in our community. It is a little of A to B.

What we have gotten into with COVID-19 and SARS-CoV-2 is that we are tracking and documenting every single case. Initially,

looking at it with a real time PCR tests and now we have more of these antigen point of care tests that are out, which are better than going into doctor’s offices, and the antigen tests are becoming more along the lines of the rapid flu test. It’s going to be interesting to see how we capture data. We continue to capture data on every single test on every single case.

And Dr. Osterholm mentioned this - what's the level of data quality we are getting every single test? We don't have a uniform clinical definition that we're using. And every state isn't reporting their positives using a clinical definition. So I don't know what we have when we talk about how accurate the data is.

Are we, by the beginning of the year, going to be doing surveillance for SARS-CoV-2 to in the same way that we do surveillance for influenza? I don't think the country is really prepared for that type of shift.

In terms of how the District is doing, we've got really great inputs. All of our laboratories are reporting electronically so we aren't in the fax-land, which has been remarkable for us and it helps us do our job very well and do it very timely. Many of my neighbors, who come and work in my city, they don’t have all of their data coming in electronically, so there's not a lot of equity in terms of access to data, which means there isn't a lot of equity in terms of the rapidity of the response.

MICHAEL OSTERHOLM
I was going to add one context to that too. I think that was a very, very helpful and thoughtful, but I think we also need to understand that there's a big distinction between, yet a real

complementary role for both surveillance and intelligence. And they play off of each other.

For example, I mean, I'll just say I'm not using intelligence from the quote unquote spy side. But, you know, we were able to glean substantial information from social media and actually with people on the ground. That's why we were able to say, on January 20, that we believe that this situation was going to become a global pandemic. I've heard people argue about how much you know, classified data is available or not, and you know, we did it on simple, just, what's available.

The same thing is true, right now, today. We're doing intelligence gathering constantly. How many college parties are occurring. Where are they occurring. How are the bars operating. Where are they at?

I can go down a laundry list of different behaviors that really give us insight into where we might expect the next cases and where we should be looking more carefully to find cases. You can do surveillance by using intelligence. And I think you have to link up intelligence and surveillance to have your best chance for a disease like this where many will not be diagnosed with a specific test result.

KAREN DESALVO
Most definitely. These novel signals that public health is getting better at using and that are all around us and are quite useful.

You know, related to that, is the public health infrastructure required. LaQuandra says there's some variability based upon capabilities and we've all seen the pictures of fax machines.

For example, in Houston we related to the fact that there were a lot of new laboratories doing testing that were not part of the data use agreements that were already in place between public health and the health department. And so it was people like you, Marty standing up new laboratories. You were gathering additional information and needing to feed that into the public health infrastructure. I think it's wonderful what you all are doing, but I wonder if you could give us a glimpse of how you all have partnered with public health so that the surveillance data that you have can inform the work that they're doing at the local level.

MARTIN BURKE
So we went ahead and went through the process of getting a CLIA certification for our laboratory. And so as a CLIA certified lab, we are actually required to share all of our data with the Illinois Department of Public Health on a daily basis, which we do, but we also recognize the challenges of the current system. Which is the lab sends to Illinois Department public health, and then the department of public health sends it to the local public health and then the local public health starts the process of contacting folks.

And we were worried about that time lag associated with that. So one of the things we did early was we also formed a direct line of communication to our local public health department. We have a fantastic public health team we've had partnership with

university for now, you know, decades and decades through lots of different challenges.

And we were able to leverage that relationship. And I think one of the things we've learned is that yes, this is a national and international problem. But hyper local solution-making can be very powerful and so finding ways to empower communities is important.

We all care about keeping each other healthy and getting our economies going, educating our kids, you know, getting things back on track. And I think the more that we can empower local solutions to some of these challenges is actually a really big plus. So that's why, even with our local health provider. We weren't feeling like this isolation was fast enough.

So as a university, we can actually under FERPA regulation actually have faculty members and other people on staff directly contact our students and help them get isolated and we got it down to within a few minutes of the positive test. So I think that was a really key pivot.

Last thing I'll just say, I think is people think testing is trying to understand the problem. That's really important. But we are also able to turn testing around and go on offense and actually use it to help fix the problem. And I think that's really a challenge, but we've shown it can be done. And we've also shown speed is the key. So I think that's also an important lesson.

KAREN DESALVO
Let me transition. We have a lot of questions on testing, and apologies to the audience, some of them are pretty technical so I'm trying to stay a little bit more high level.

But as always, there's a lot of interest in the area. Just as you are thinking about population level testing that can have a rapid turnaround time, are you all looking at any additional technologies like testing wastewater or some of the more advanced work, the next gen kind of work? What are you guys doing currently?

MARTIN BURKE
So we looked at wastewater as an option. To understand where you are is probably very helpful. You can probably get a lot of nice information from the wastewater. We just couldn't convince ourselves that we would be able to complement what we were doing already. Since we're going to be testing everybody twice a week, that level of granularity and speed within hours, we didn't think the wastewater was actually going to help us.

I think that we recognize it's not about just our tests. It's really about the whole program. And so, learning how to take wastewater energy tests or other types of testing and trying to turn it into going on offense and actually mitigating spread.

There's lots of lessons learned from our experience and many others that we think can be leveraged to start doing this and many other situations and in some cases wastewater probably could be.

KAREN DESALVO
Mike, I've heard you give a really good synopsis of the utility of different types of testing. PCR testing or antigen testing or antibody testing and we had a few questions in that category. So I wonder if you could just share that synopsis of what's useful when and how the country should be thinking about applying these testing technologies.

MICHAEL OSTERHOM
First of all, Marty very competently covered all this, so feel free to speak up.

In terms of diagnosing a clinically ill patient, PCR still remains the gold standard. There will be, I think, challenges coming down the pike to understanding based on cycle thresholds and cycle time and knowing what a positive really is in terms of infectiousness. That already has been raised as an issue, and I think it's a legitimate one that needs to be looked at.

But PCR is the, I think the standard that we need to use. I have concerns about the lateral flow antigen test that we're seeing out there. Having spent many years in the area, I can tell you that many of these antigen tests, while they promote a sensitivity of 95 to 97%, in fact, they’re much less sensitive. For example, the binary tests that Abbott has out, that they use for influenza, we routinely get 50 to 70% sensitivity, even though the package says it's in the 90s.

The same thing happened, I think, with this most recent approval of the test for COVID-19, you know, they got 3435 samples. Right. That's the sum total of data positives that went in for

approval. It would have been hard not to get those right like that, given what they could do.

I would worry that the antigen test, which has been approved for clinical use, which should never be used for clinical use, should be used for screening. If in fact you're trying to look at experiences where you're at a place where you just want to test people who are well enough to see how to use that antibody test – clearly we don't understand what that test really means.

In low prevalence areas, even with some of the technology, we still have, today, half of the positives being false positives. Second of all, if you do have a positive, it's not clear, necessarily, that you have protection.

Where I think serology can be used in a helpful way is in the issue of, number one, identifying potential plasma donors who have recovered and who would want to participate in plasma donation.

The second area that we are seeing it being helpful is among the long haulers – the people who, early on, were infected and did not have access to testing and did not have a positive at the time, but they have ongoing chronic fatigue-like symptoms and other challenges. We are finding that a number of these people are positive by serology, which helps the clinician realize that this is a long-hauler condition.

So, again, just to summarize: PCR for diagnostic purposes. The lateral flows for the idea of screening and antibody for surveillance and I think that, to me, is the appropriate use for each of those.

KAREN DESALVO
Next time we have a webinar, we'll talk about CRISPR and other technologies that are coming.

I think you're going to see some point of care tests, you're going to see a number of those coming, but for what we have right now, that's the primary use.

It's an extraordinary time where science is being matched with traditional public health tools.

LaQuandra, I'm going to have you to start this next round. We have probably enough time for two more rounds of a couple more questions, but I want to start talking about something that weighs on a lot of us, which is the potential for there to be mismatch in capacity and in need.

We often talk about that as capacity and demand, though, I think as you get it to the local public health, environment, sometimes you have a need and you're working in a jail environment or some workplace environments or certain populations that may not have all the resources that University Illinois would have. So I hope that all three of you will kind of weigh in on how the country should be thinking about our responsibilities about making sure that we're matching supply and demand in a way that is most equitable and ethical.

LAQUANDRA NESBITT
This is a wonderful question, and it was actually posed to us earlier today in a conversation with our legislators, because it's really, as you said, it's on a lot of people's mind.

We talk a lot about the epi curve, and what the epi curve looks like. And we're always conditioning people to, not only look at test positivity or have people say, well, that city has tested all of its residents and it's like, well, you have to look at it as it relates to the period of exposure and time since the pandemic began.

I raised that to say if we get ourselves, in this country, into a situation where we have supply chain issues and we end up with long test turnaround times, we have really tried to get people to understand what we have.

We may need to prioritize testing as it relates to who's at the greatest risk for mortality and who's at the greatest risk for severe illness. We have been able to explain it to people from the perspective of, you know, inpatient environments where there's a critical need to be able to think about it from the clinical management of the individual.

Now, that there are some potential therapeutic agents out there that could decrease mortality, or at least decrease morbidity, you want to know what the individual has. And so making sure that those folks have access to tests and tests that can be turned around very quickly is always critically important.

The next line of thinking that I like for people to be able to have is we have to make sure where the risk of transmission is highis because people are in close proximity to each other, can be addressed and that our resources for testing are allocated to those environments.

If we work in a situation where testing capacity was limited, then those kinds of settings have to be looked at from the perspective of case fatality ratios and we were making sure people could look at our data and say well, there's a difference between the case fatality ratio and the long term care facility and even in a correctional facility because of the underlying health conditions that those populations have.

Then when we start talking about some of these surveillance programs. As Dr. Burke mentioned, we're testing two or three times a day, a week in a on a college campus that has in person instruction or has residential students, you can really begin to see how those resources should be allocated based on risk.

Risk of exposure, risk of transmission and then you can begin to allocate resources differently. So again, as the pandemic matures and as we learn more, if we have an issue again in this country where testing resources began to become limited, we have a lot more data about who's most at risk, and we would have to allocate resources based on that.

I think the last thing I'll say about this is that the non-pharmaceutical interventions would then have to come back into play if testing resources became limited, to augment the testing.

KAREN DESALVO
Thanks. Marty I hope that you can weigh in, because I'd like to hear how you all are thinking about it at the university.

MARTIN BURKE
Yeah, so we are a land grant institution. Therefore, our charge is to serve the public good. And this is something we feel really passionate about.

We feel like we've learned that we have a model that can help and we understand that – again, testing is not a silver bullet.

We've learned that community engagement, the holistic approach, these are some of the most important things we've seen. So we've launched two different organizations. The goal of which is to help expand our capability to as many communities as possible.

One of them is called SHIELD, Illinois. We partner with our governor, with the public health department, with partners across the state to get our testing out to the entire state. We're building 13 different labs and a population density map-driven approach.

We've built mobile labs. These are CLIA labs on a truck that can each do 10,000 tests per day. We can go into communities that are particularly struggling, particularly those who are disproportionately affected by COVID-19 and really try to help make a difference and get in front of this.

The second organization is called SHIELD T Three, which is being targeted towards everywhere outside of Illinois. We've partnered with 35 different universities across the country and many different businesses and different communities. We've actually partnered with seven or eight different countries now to try to help get our platform out, to make as much possible impact as

possible. We are passionately committed to this, I think, again, we want to go global, by going hyper local.

I really think there's something about empowering local communities to be able to get in front of this and take control because people care about making this difference. And I think the more we can tap into that local spirit of Let's make it happen, the better. That's kind of our approach.

KAREN DESALVO
I love that and I love how much you've been collaborative, especially with your local public health.

Mike, do you have anything you want to share about the mismatch there, and capacity, demand, and need.

MICHAEL OSTERHOLM
Yeah, it really comes back to, in part, as I said earlier, the term creative imagination, and what are we going to need. What are going to be our long-term issues. I think that, you know, how are we going to respond to the ongoing pandemic well after the vaccine is here and we don't have potentially that many people who take the vaccine, along with the potential for reduced protection and then the potential for waning immunity. I think now's the time to plan for that.

Don't assume that just because when vaccine gets here we're going to suddenly go back to normal. There will never be normal again. It'll be a new normal and so I think that's where the mismatch can occur - if we're not anticipating that.

I don't see us ever leaving COVID-19. I see us only managing it differently as it appears differently in our communities.

KAREN DESALVO
Thank you. All right, we have, I'm going to do a lightning round. We have four minutes left.

We didn't get to contact tracing entirely but there's a question in here about the Apple Google exposure notification system and since I'm at Google, I must say a word, which is that we felt like we needed to lean in and augment, support, partner with public health, where we could to leverage technology to help with contact tracing.

It's part of a bigger system, though, and really where I want to go with this last question for you all. Is that is trust which has been mentioned a few times, not only trust and partnership, but how the community trusts public health and just hear your thoughts. Maybe Mike, since you're already on video, you can start, then Marty, then LaQuandra. How do you all see that we need to be working on trust with vulnerable populations. It's public health in general as we go forward to the end of this current stage of the pandemic.

MICHAEL OSTERHOLM
You know, I've been in this business 45 years and I've always understood that public health was in itself an exercise in trust. But I think for the first time in my career, I've been challenged to understand what that really means anymore. And I think that we have to go back to the drawing board and not assume.

That let's just do more of what we've been doing to get people to understand what public health is and isn't. It can have happened for years and years and years of building up trust, and then it can be lost, quickly. I think we've had that happen. When it happens at the federal level, it happens at the state level, it happens at the Local level. You know, we've seen the rush of public health leaders leave their jobs over really abusive conditions and so forth. I've never seen that happen like I have now. So, I think we have to go back to the drawing board and really rethink this because I agree. Trust is critical.

MARTIN BURKE
Yeah. So along those lines. I think the key thing we've learned is that we need an anchor in the community that can be that source of trust, as well as resources. So, for example here, our university has kind of been that anchor, but of course there could be many other businesses that plays a large percentage of the population. For example, a church. You know, some type of faith organization, or a firehouse, so think about places where people inherently have and find those anchors in the community, allow them to be kind of the bottom up partners and trying to help create an overall ecosystem for safer living. I think that's something we could really build on.

LAQUANDRA NESBITT
Yes, I would just, you know, Marty just referenced me. I was going to reference him. When you talk about hyper local I would say hyper local and it's really about finding those credible messengers who can really grasp the concepts and have those conversations in small groups that can be messengers for us and really get people to take on and understand how participating in

these processes are really going to help us have these whole of community responses and recognize that we're all in this together.

So, when we have the opportunity to explain something to someone who has a question and maybe on the fence and doesn't quite get it, we have that one to one interaction and all of the people walk away with a better understanding.

I have trust in the process we have created them as credible messengers, and they can go back and have that one-on-one conversation and be force multipliers and I think the more that we grab that as the way that we're going to make more progress.

As opposed to have believing that it's going to be that one person all the time who changes the multitude of people we'll be on to something. So really thinking about this is hyper local and finding really great embedded credible messengers is going to be key to our success.

KAREN DESALVO
That is a beautiful and classic public health philosophical approach the world. So thank you. I really agree with that.

Look, we learned a lot today about models of surveillance testing and contact tracing and ongoing challenges there for this pandemic but even into the future.

We learned that strong and trusted and supported public health infrastructure is really essential to the response, but it requires partnerships. We also heard it's not only about a vaccine. It's not about one solution at all. It's about a set of

strategies that come together to tackle outbreaks like COVID-19 and support the public's health every day and that everything is innovating in real time and then consequential ways whether that's partnerships, policies or science.

I want to thank APHA and National Academy for their leadership and bringing all this evolving knowledge to the forefront in such a public way and look forward to continued learning like these.

For everyone who registered for today's webinar, you'll receive an invitation to the next webinar, and this has been recorded and the recording and transcript and the slide presentations will be available at conversations.org.

Thanks again to our panelists, the APHA, the NAM, and to all of you for joining us today. Please stay safe and healthy. Wash your hands. Wear a mask. Keep safe distance. Take care.