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Call Agenda
Welcome

Sean Courtney, CDC Division of Laboratory Systems

SARS-CoV-2 Variants Update

Natalie Thornburg, CDC Coronavirus and Other Respiratory Viruses Division

Update on Dengue Globally and in the U.S.

Joshua Wong, CDC Division of Vector-Borne Diseases

Emerging Pathogen Preparedness and Response

Laura Knoll, Texas Health Resources

Call Transcript
Sean Courtney: All right. Well, good afternoon, everybody, and thank you for joining us today. My name is Sean Courtney and I'm a Health Scientist in CDC's Division of Laboratory Systems. On the screen is the agenda for today's call, but before we get started, I want to cover a few announcements and some general housekeeping items. So as you've probably heard on previous calls, DLS is the CDC division that works closely with clinical and public health laboratories across the country to support laboratory emergency preparedness and response activities. And we've been hosting these calls since March of 2020. DLS supports this work across four goal areas: quality, workforce and training, preparedness and response, and informatics.

And to start the call off with some announcements, the Spring Clinical Laboratory Improvement Advisory Committee or CLIAC virtual meeting will be held on April 10, 2024, from 10:00 AM to 6:00 PM. This meeting will be virtual. The agenda will include agency updates from CDC, CMS, and FDA. Presentations and CLIAC discussions will focus on the applicability of CLIAC personnel requirements to preanalytic testing, the role of artificial intelligence and machine learning in the clinical laboratory, and the use of clinical standards to improve laboratory quality. Information about the meeting is available on CDC's CLIAC website.

You can also register for the next OneLab event that's going to be held on March 27 to learn how to identify and assess for hazards, mitigate risk, and access resources to help you conduct risk assessments in clinical laboratories. One contact hour of P.A.C.E.® is available to participants, and registration information can be found using the QR code on the slide or through the link that's going to be in the chat.

We would also like to invite you to register for CDC's second annual OneLab Summit. It's a free three-day virtual event that connects laboratory professionals in real time to support a unified response to laboratory education and training needs. Attendance is open to anyone interested or involved in the laboratory profession. This year's theme is *Thrive: People. Planning. Preparedness*. The event is designed for

laboratory professionals to increase their knowledge of laboratory training development tools and practices, gain insights from the clinical and public health laboratory community's success and resilience, network and collaborate with peers, laboratory professional partners, and CDC experts in laboratory education and training, learn more about OneLab and its communities of practice, and earn P.A.C.E.® credit as well. And you can register now using the QR code on the slide or through the link that's going to be available in the chat.

And as always, we want to hear from you. Our Training and Workforce Development Branch is interested in hearing more about the education and training gaps that you're currently experiencing, and so we invite you to send your feedback to labtrainingneeds@cdc.gov.

And as I've mentioned previously, we'll be sharing the slides from today's call along with the audio and transcript, and we will post them online by the end of next week, hopefully, or within the next two weeks. You can find them on CDC's Laboratory Outreach Communication Systems page at the link shown here. If you have any questions for today's call, we ask that you please use the Q&A function in Zoom so that we can address it during the call and not use the chat function.

Please include your email so that we can follow it up if we're not able to answer it during the call. And if you're from the media, we ask that you please contact CDC media relations at media@cdc.gov, and if you're a patient, we ask that you please direct any questions to a health care provider.

With that, I'd like to remind everybody that the slide decks may contain presentation material from panelists who are not affiliated with CDC, and that presentation content from external panelists may not necessarily reflect CDC's official position on the topics covered.

And with that, I'd like to introduce our first speaker today. We have Natalie Thornburg from CDC's Coronavirus and Other Respiratory Viruses Division, and she's going to provide us with an update about SARS-CoV-2 variants. And Natalie, I'm going to stop sharing so that you can share your screen, your slides.

Natalie Thornburg: Great. Thank you, Sean. All right. Let me get this out of the way. All right. You guys should be able to see my browser screen. So this is the current status of SARS-CoV-2 circulation. This is a screen share from the COVID Data Tracker. The blue bars are new hospitalizations. It's the left y-axis, and on the right y-axis is weekly percent test positivity.

Where we are right now is we've had decreasing test positivity since it peaked right after the new year. January 6 peaked at about 13% positive tests, and we're sitting right now at around 5% test positivity. This is similar to patterns we've observed in the prior two years, with a late summer, early fall wave, and then a second wave that peaked right around the new year.

This is now three years in a row that we've seen that pattern with, of course, the peaks differing in percent positivity and steepness, but have definitely observed that peak, that double peak, the past couple of

years. As far as the genomic landscape goes, so JN.1 was a sublineage of BA.2-- oh, my. Sorry. My internet decided to-- there we go. BA.2.86 sublineage. BA.2.86 emerged in the late summer and didn't take off.

It kind of stayed at very low percent positivity through the late summer, early fall internationally, and it really took on only one substitution change in the spike protein and increased internationally. It is the most prevalent lineage circulating internationally as well as domestically. It's reached saturation, and you can see from weighted estimates. And as a reminder, the weighted estimates on the left side are actual sequences.

So it's the percent lineages of actual sequences, and then we use that data to estimate growth rates. And so the data on the right is modeled data using that calculated growth rates. It reached saturation by about February, JN.1 lineage. And then since about mid-February, early mid-February, JN.1 has started to diversify a bit. And when that happens, we'll start disaggregating the sublineages that are increasing in proportion on the COVID data tracker.

So recently we have aggregated two JN.1 sublineages on the data tracker, JN.1.13 and JN.1.18. They are very, very similar to JN.1. They only have two substitutions in the spike protein in comparison to JN.1 and they actually have the same substitutions that evolved independently. And so we expect JN.1 parental lineage to now start decreasing in proportion since it's already reached saturation, and continue to diversify. As more JN.1 sublineages are identified, we expect to see more and more diversification within the JN.1 sublineage. And that is all for genomics.

Sean Courtney: All right. Thank you for that update, Natalie. I do not see-- Oh, there is one that just came in. It says, how many sequences are included in the weekly updates now?

Natalie Thornburg: Well, it depends on week to week. It depends. We see anywhere between about-- so the data bins are no longer weekly, they're biweekly. So we have two weeks in a data bin, and we just do that to get more robust statistics. The number of sequences that we get is absolutely dependent upon the number of cases. So we had a lot more sequences in December, January, than we did, say-- we kind of hit a low last year right around June, July when there just weren't that many COVID cases.

I think in December we were hitting at about 7,000-ish sequences per biweek. So every two weeks we were hitting between 7,000 to 8,000 sequences. And then what we collect for the most recent biweeks isn't the permanent number. As we update, as we get more and more sequences-- because sequences take time to generate and get deposited and make it to us, so it's sort of a moving number.

Sean Courtney: All right. Great. Thank you. The next question that came in was, is there any indication that the emerging sublineages might have altered characteristics?

Natalie Thornburg: No. There is no indication that JN.1 has really any different characteristic than its predecessor, XBB.1.5. I think clinically they behaved very similarly, similar severity similar hospitalization rates, and there's no indication. We don't have any data so far about the JN.1 sublineages.

Sean Courtney: OK, great. Thank you. Another one just came in. Let's see. Do you have any information on how diagnostic net assays that target the S-gene are performing with the JN.1 or sublineages?

Natalie Thornburg: So the JN.1 and XBB.1.5, it did have some differing-- they were sort of opposite in their S-gene target failure performance. So if you remember some previous lineages, there was at least one molecular test which targeted a site in the spike protein where there was a deletion but there were multiple analytes in that particular test, and so you could use that presence or absence of that one surrogate as a surrogate for which lineage it was.

This has been used several times as is the spike gene drops it, picks it back up, drops it, picks it back up. And so a similar thing happened with XBB.1.5 to JN.1. FDA is really the primary-- they track test performance characteristics with the manufacturer of the tests, and so they're really-- they have all of the information about test performance characteristics on their website and questions about specific tests should really be directed towards them.

Sean Courtney: Yep. Absolutely. Not sure if you can address this one, but are there any concerns with the current boosters for these new sublineages?

Natalie Thornburg: So I can say there's been some initial vaccine efficacy data that's been published that was-- I think there were two or three MWRs that were released in February. At least one of them had vaccine efficacy data for XBB lineage viruses and JN.1 lineage viruses. The JN.1 lineage virus vaccine efficacy was just a tad low XBB, but it had pretty wide confidence intervals overlapping confidence intervals so they weren't significantly different vaccine efficacy. For anything that's evolving now, of course, we don't have that data yet.

Sean Courtney: Great. Thank you. All right. Well, I don't see any other questions at this time so I just want to say thank you for joining our call today. As always, Natalie, it's always a pleasure to have you on and answer these questions around this circulating variant, so thank you for joining. All right. And for our next presentation, we have Joshua Wong from CDC's Division of Vector-Borne Diseases, and his presentation is going to be about the ongoing dengue outbreak. Joshua? Oh, you're muted. I cannot hear you currently.

Joshua Wong: There we go. Can you hear me now?

Sean Courtney: Perfect. Gotcha.

Joshua Wong: Great. And give me one second to share my screen here. OK. Can you confirm that you can see it?

Sean Courtney: Yes. Looks good here.

Joshua Wong: Excellent. Great. Well, thanks so much for inviting us here and for chatting with this group. You've probably noticed that there's been a surge in dengue coverage in the news, and even just a quick search will find a number of headlines that show all the recent outbreaks around the world. And because dengue outbreaks result in large case counts within a short period of time, there are always these heart-rending photos attached to these articles.

And I put two photographs here taken by colleagues showing overwhelmed hospitals and patients in makeshift wards just waiting to be seen. So these images can be distressing for us knowing that our global colleagues are struggling, but also for our U.S. populations who might be traveling to dengue endemic areas or who have concerns about local transmission. And diagnostic testing for dengue is critical in assisting clinicians in local health departments, so I'm grateful and my role as a physician to talk to this group today.

So today I'm going to give you an update on the situation of dengue globally followed by an update of what's happening in the U.S. and how travel influences local transmission. And finally, I want to discuss a little bit about how the current state of dengue testing in the U.S. and the work of our branch. So let's start with a quick review of some key facts about dengue. So dengue is the disease caused by any of four distinct but closely related dengue viruses numbered one through four.

An infection with one virus gives lifelong immunity to that specific virus but only short-term cross-protective immunity to the other three serotypes, meaning that individuals can be infected up to four times in their life. Most infections are asymptomatic, about three in four. But among those symptomatic cases, the illness manifests after an incubation period of five to seven days. The early clinical findings are nonspecific, so it can be difficult in the absence of testing to really distinguish them from other infections. These viruses are transmitted through the bites of infected *Aedes* species mosquitoes, such as [*Ae.*] *aegypti* or [*Ae.*] *albopictus*. However, other less common routes of transmission shown on this slide have been documented. Globally, we know that dengue is the most common arboviral infection in the world, but it's really been getting worse in recent years.

And from the 2023 data preliminarily, we know that there have been more than 5 million cases reported worldwide, a fraction of the true number of illnesses, that these cases have been reported from 92 countries and territories located across all six WHO regions, and alarmingly, outbreaks have been reported in at least 23 countries. Now, this map shows the countries where locally acquired dengue cases have been reported in the last year. First, you can see that all-- countries in all regions have reported locally acquired cases, including Europe.

And second, you might notice that central and South America are almost all the darker brown color, indicating the highest level of case notification rates. So looking at cases reported to PAHO for the Americas region specifically, we've seen a sharp increase in dengue cases and incidents since 1980. And

as you can see on the right, 2023 has had the highest number of dengue cases on record, with more than 4.4 million cases reported. So what's the effect of increased global dengue activity on its epidemiology in the U.S.?

Well, we should first acknowledge that if we're talking about all U.S. health jurisdictions, including the territories and freely associated states, we have six with endemic dengue transmission, and they are American Samoa, the Federated States of Micronesia, the Marshall Islands and Palau in the Pacific, and Puerto Rico and the U.S. Virgin Islands in the Caribbean. This figure shows dengue case data from Puerto Rico, American Samoa, and USVI from 2010 to 2020, with the solid lines showing case counts and the dotted lines showing rates by population.

Puerto Rico, shown in the pink here, had large outbreaks in 2010, 2012, and 2013, and lower-level transmission in the following years, but increasingly concerning case counts and serotype shifts in the last couple of months. USVI shown in the green highlight also experienced outbreaks in 2012 and 2013, and American Samoa, shown in the blue highlight, had an outbreak in 2017 and 2018, with highest incidence in the population shown by the blue dotted line.

So looking at U.S. states only, however, where dengue is not considered endemic, we can appreciate that most cases, over 94%, are associated with travel to endemic areas. So this slide shows the number of travel associated dengue cases reported by year to the CDC, with more than 10,000 cases reported from 2010 to present. And what I want to highlight here is that while 2019 was previously the largest year, we can see that even the preliminary 2023 data has already broken this record with greater than 1,500 cases, and that only three months into 2024, we already have 181 reported cases.

So in these next couple of slides, I want to reflect on the link between increased travel associated cases and the risk for local transmission. So to assess this risk, the first question you have to ask is, are there competent vectors? And these heat maps of the continental U.S. are the probability of vector presence, with darker red indicating a higher likelihood of vector presence. And you can see that *Aedes aegypti* is on the left, primarily in the southern states, and that *Aedes albopictus* is on the right, covering large portions of the south, east, and west coasts.

So historically, locally acquired dengue cases have been reported from Florida, Hawaii, and Texas, with transmission occurring as sporadic single cases or in limited outbreaks. However, the past two years have been quite concerning with two new states, Arizona and California, showing evidence of local transmission. So now let's take a closer look at Florida, which is an illustrative example of what happens when you have a place with competent vectors and frequent travel-associated dengue introductions.
So this figure displays dengue three cases in Florida categorized by travel associated in blue and the locally acquired cases in red. And you can see that in 2022, a large dengue three outbreak occurred in Cuba, and it manifested as a spike in travel-related cases in Florida due to frequent travel between these two locations. Consequently, we can appreciate the increase in locally acquired cases highlighted in the yellow circle there due to the frequent importations.

And the moral of the story here is that in areas with competent vectors, we need to be prepared to ascertain cases, both in travelers, and if local transmission is possible, in non-travelers. So when a clinician has got that patient in front of them and they think that they might have an illness that's compatible with dengue, they'll often turn to the labs or the health department and ask, OK, what tests should I use? And the answer is that it depends on when the sample is collected because of dengue's virology.

During the first seven days of dengue illness, dengue virus RNA and the NS1 viral protein are high. IgM levels are not detectable initially at onset but will continue to rise and might be detectable several days after onset. After seven days, sensitivity goes down for detecting viral RNA or NS1 and IgM titers will continue to increase. And this is why CDC recommends testing with molecular or NS1 antigen testing and serology within the first seven days, and then only testing with serology or samples collected after seven days of symptom onset.

And I also want to highlight here that the combination of positive tests influences a certainty of the diagnosis and case classification. So positive NS1 and PCR test are considered confirmatory for dengue, however, a positive IgM is considered a presumptive diagnosis due to the possibility of cross-reactivity with other flaviviruses. In these cases, further discussion with your health department or with the Dengue Branch to evaluate if further testing is warranted to confirm the dengue diagnosis or rule out other flaviviruses as warranted.

So with that in mind, how prepared are we to test for dengue in the U.S.? Well, first off, I'm sure that many on this call are well aware, but there are four FDA-approved tests to diagnose dengue. And they are two RT-PCR based tests, including the CDC dengue virus one through four test and the CDC Trioplex, and then two tests from InBios, the ELISA and NS1 ELISA. And while these are approved, there are some limitations in who's actually doing this testing.

And the first factor that distinguishes who can use them is whether they are commercially available. So the CDC PCR tests are not commercially available, while the InBios tests are commercially available. So for the CDC PCR testing, they're widely used in public health labs. However, they're not available in private labs. And while the InBios tests are commercially available and the IgM test is widely used in public health labs, we're still looking into what their availability is in private labs.

We're anecdotal anecdotally aware that clinicians are sending samples for dengue testing to private clinical labs, but we're actively working to understand whether they're using laboratory developed tests or LDTs developed in-house or whether they're using these FDA approved tests that you see on the slide. So if you have more information on this, please feel free to contact our branch. And also, given that many of you on this call are working in private labs or work closely with them, I want to emphasize here that because these tests are commercially available, you can purchase them and comply with the CDC recommended testing guidelines.

So it's these differences in access that really frame a lot of the current gaps and needs in dengue diagnostics. And many thanks to Jorge Muñoz, our Lab Lead, for helping to supply these slides. So starting with Puerto Rico where the largest population of persons at risk for locally acquired dengue live, we know that private labs do not offer comprehensive dengue testing. And while the public health lab has strong testing practices, their capacity can be quickly overwhelmed during epidemics, as we know from experience.

And in the U.S., we know that private labs rarely offer confirmatory PCR NS1 antigen testing for dengue, and as a result, their testing algorithms for appropriately diagnosing dengue are often incomplete according to our testing guidance, and are therefore likely imprecise. And finally, I saved this for last because it is a huge gap in dengue diagnostics, is that there are no FDA approved commercially available RDTs in the U.S. that could really help clinicians diagnose dengue.

And I personally think that RDTs are critical because we know that dengue can have up to a 13% mortality if left untreated, but that with timely recognition and appropriate management, protocolized IV fluid resuscitation, mortality can be taken down to less than 0.05%. And so our guidance for clinicians is really to start treatment based on an empirical clinical diagnosis, and we always tell them not to wait for test results. However, as an internal medicine physician, I know how helpful getting that test result can be in your workup and management.

Because if dengue isn't highest on the differential and you're treating with intense antibiotics for sepsis, which also has different fluid replacement strategies, getting that positive test result early can seriously change your management and possibly save that patient unnecessary antibiotics or overloading them with IV fluids, which can cause complications later on. So in short, I would sincerely appreciate a good RDT. So after all that I've presented here, I want to finish by telling you what we at CDC doing to improve all this testing capacity.

So first, we're ramping up production of CDC's RT-PCR test kits to meet demand from the public health labs in the U.S. and in the Americas. And thanks to our branch leadership, CDC has provided these tests to more than 2 million cases in the Americas since 2013, so we know it's a really powerful tool for dengue both in the U.S. and globally. We're also supporting and collaborating with the Puerto Rico Department of Health to improve laboratory capacity and timely detection of cases here in the territory where the cases are highest.

And next, we know that Thermo Fisher has been sunsetting some of their devices that run the PCR tests from CDC, so we're adapting our tests to work with current equipment. Also to advance the diagnostics field, we're conducting a landscape analysis of research use only tests, including RDTs, and facilitating further clinical evaluations needed for regulatory filing. And lastly, we're assessing private laboratory practices and providing recommendations on best practices for diagnosing dengue.

So in summary, we know that dengue cases are increasing globally and that they're also increasing in the U.S. In the U.S., we know that in areas with competent vectors and frequent travel associated

introductions, there is a possibility of local transmission events. And so in the field of diagnostics, we review that there are four FDA approved dengue tests and that appropriate testing for dengue depends on when the sample is collected and that a major gap is that while PCR is the preferred test for confirming dengue in the first seven days, it's not commercially available.

However, NS1 and IgM testing are recommended, and they are FDA-approved tests, and these can be used to provide comprehensive dengue testing. And these are commercially available, even if we don't know whether private labs are using them right now or not. We know that dengue testing is available in public health and private labs, but as we said, with some of the limitations that we described earlier. And finally, we know that CDC Dengue Branch is doing a lot of work to improve dengue testing capacity. So, many thanks to everyone on this call, and now we've got our Branch Chief and our Laboratory Lead at Dengue Branch here who can answer any questions and many thanks for inviting us and for letting us share this information with you all.

Sean Courtney: All right. Thank you for that presentation today, Joshua. It was really great. We did have a few questions that came up while you were presenting, and so I'll just read some to you and see if you guys can answer them on the call or if we need to follow them up later. So the first question was around the exclusion on your slide. You forgot to mention the BioFire global fever panel test for FDA-approved tests. Is that one that's available for use or can you expand on that test?

Joshua Wong: I'll defer to Jorge Muñoz on that, our Laboratory Lead, or Gilberto Santiago as well.

Sean Courtney: I don't think we were able to get Jorge elevated to the panelist. We'll try again.

Gabriela Paz-Bailey: Yeah. And in the meantime, this is Gabriela Paz-Bailey. Hello, and thanks for the opportunity to talk about our work. So the BioFire, I understood from-- oh, Gilberto is on the line. Gilberto, can you speak?

Gilberto Santiago: Yeah, certainly. Jorge, go ahead.

Gabriela Paz-Bailey: Yeah.

Jorge Muñoz: Yeah. Thanks for adding me to the panelists. Yes, we have been-- and of course, Gilberto can add to this. We have been looking into this panel. The issue with this panel is fundamentally that it is a panel of several illnesses, including leptospirosis and plasmodium detection.

So it is a test that, as far as we can tell, is certainly approved. But it contains cartridges that provide testing capabilities for six pathogens at a time. It is a possibility, particularly if it's going to be added to some sort of federal surveillance system. And it's not currently, as far as we know, widely available for public health laboratories or commercial in the United States. Gilberto and I are looking into it. Do you want to add anything, Gilberto?

Gilberto Santiago: Yeah. So this is the BioFire instrument was originally designed for armed forces deployment and, like Jorge mentioned, it covers a couple of different pathogens that produce acute febrile illness. Dengue is included. It will detect dengue, however, it's not going to detect the serotype. It can run six samples at a time, but not a lot-- it's not very frequently found in public health laboratories.

Sean Courtney: All right. Great. Thank you. Next question that came up was around the production of the Trioplex kits. Is that something that public health labs are able to get their hands on?

Jorge Muñoz: Yeah. Well, public health labs have access to these kits readily from us. There is an email. They're all very aware of how to order the kits. Both the Trioplex and the dengue Multiplex kits to an email address that is provided to all public health laboratories in the United States.

Sean Courtney: Great. Thank you. The next question that came in was actually around, what are the best sample types for dengue PCR tests?

Jorge Muñoz: Sorry. Serum samples are the preferred sample for the dengue Multiplex and the Trioplex. The Trioplex is approved for whole blood as well and for urine samples, because it was approved for Zika as an emergency-- for emergency use authorization for Zika to be able to provide that testing in those samples as well. But the preferred sample for dengue is always serum.

Sean Courtney: OK. Great. Thank you. The next question was, does the IgM InBios dengue FDA-cleared assay have cross-reactivity with any other group B arbovirus or flavivirus antibody responses?

Jorge Muñoz: Yes, it does have some level of cross-reactivity. So whenever you detect dengue antibodies using this test, public health laboratory needs to disclose the fact that it may be cross-reactive with other flaviviruses, particularly Zika in areas of endemicity. Confirmatory testing in the United States for travelers includes the possibility of using plaque reduction neutralization test, a test that is only performed by some of the public health laboratories and by our sister branch, Arbovirus Diseases Branch in Fort Collins, Colorado.

Sean Courtney: All right. Thank you.

Jorge Muñoz: The CDC Test Directory contains this information that public health laboratories can access easily and determine exactly what is it that they want to do with samples from travelers.

Sean Courtney: All right. Perfect. Thank you, Jorge. All right. The last question I'm seeing is if you can explain how important clinically is it to identify which dengue virus is affecting a patient, especially if this is a second time he or she has come infected by dengue virus.

Joshua Wong: You know, I—

Gilberto Santiago: Go ahead.

Joshua Wong: At least at the clinical level, each one of the dengue viruses are going to present very similarly. So I think the most important thing is making sure that you are treating dengue. However, you know, and I'm sure that Jorge or Gilberto will expand on this, but getting that serotype information is really important for trying to understand the serotypes that are circulating in the world and the ones where this person might have picked up that dengue virus from, if they're a traveler, or if we believe that it's a locally acquired case for trying to trace it back through sequencing to ensure that we can know where that came from. And Jorge or Gilberto or Gabriela, I don't know if you want to add to that.

Jorge Muñoz: I think, Gilberto, if you want to add anything about the genomic surveillance capabilities that we have and our recent interaction with APHL.

Gilberto Santiago: Yeah, certainly. So we have been promoting these general surveillance conducted by the Dengue Branch and our sequencing capacity. For many years now, we have provided sequencing service for U.S. public health laboratories who we have collaborated and have sent the samples for sequencing. Our interest is to actually get a look at what's circulating, what is the interest rate in the region. We have collaborated with laboratories like Florida, Arizona, New Mexico, Texas, and recently California, and we have been finding very interesting results of the different strains that are circulating. So every laboratory that is interested in participating in this genomic surveillance project can contact us.

Sean Courtney: All right. Thank you for that response, and thank you guys for all of your help today and joining our call. I appreciate it. So if any additional questions pop up during the rest of our call in the Q&A function, you're welcome to get in there and just answer them live right there by responding to those questions. But we'll move to our last speaker today, who is Laura Knoll from Texas Health Resources. And her presentation is on emerging pathogen preparedness and response. And if I can have Joshua, if you can stop sharing your slides, I will go back to our slide deck and we will continue. All right. Laura, I think you're ready to go. Thank you.

Laura Knoll: Yeah. Thank you, and thank you for having me. It was an honor to be asked by your team to present this. And if you want to go to the next slide, I do just want to start off by explaining that what I have in this presentation covers what we have implemented at one institution for how we handle emerging infectious diseases, and in particular, for viral hemorrhagic fever.

We really strongly encourage everyone, especially because there's another call coming up on the 27th about risk assessments, and we really strongly encourage everyone to perform their own risk assessment prior to implementing anything. So not everything that I have to share in here may be applicable. There are examples, and we do feel strongly that sharing is the best way to communicate and to promote the fact that you can do something at your facility for these patients. It's scary, but you can do it with planning, and it is not a small undertaking. You can go to the next slide.

So I'm going to start off with it kind of almost makes sense that I would wrap up with, oh, we train on this every year. But I'm actually kind of starting off with the fact that we annually train on all of our processes.

And where I am is a hub laboratory, meaning that we provide services for other smaller facilities within our hospital system. We have two hub labs. We are very similar. We have some similarities to our plans. But again, we have our own risk assessments so our plans look slightly different.

But we strive to have the same capabilities, as close as we can. So with that in mind, we do system training every year where we call it train the trainer. And ours is coming up in about two weeks for our smaller entity laboratories, where we will, again, show them donning and doffing of high-level PPE. We review any concerns that they have. We typically have a presentation, things that are going on, things that they need to be aware of public health-wise, how to transport samples to their hub laboratory. Our smaller entities are not really set up to do the wide variety of testing that we may do, but they might be able to do something. So again, they have to do their own risk assessments. Our system team of trainers has gone into some of the smaller facilities, done evaluations, and helped them out to identify some of those things. But the majority of testing, especially for some of our rule out patients for potential viral hemorrhagic fever, comes to the hub laboratory.

So we talk about transport of those samples, how to properly package them, reminding them that they have to have certified shippers that have to go through a certified course, and also talking about a chain of custody form, which becomes very helpful throughout the process when we do-- if and when we do have a real patient that we're working with to ensure who's touched what sample and for us to keep track of what samples have actually come to us for the patient so that we can properly make sure that we're disposing of those properly and documenting those.

In addition, on-site training at our hub laboratory at our particular site, we do high level PPE donning and doffing twice a year. This is with our entire microbiology team and several members of our core laboratory team as well. And the reason that we have everybody at least learn how to do the high-level PPE is because you never know when they're going to have to jump into something. If they even have to come into the room where we're working, we want them to be prepared and to feel safe and protected with what they're wearing and know how to do that. But we do have a smaller response team.

And the reason that we have a smaller response team is because this takes a lot of work to make sure that we are, knowing what we're doing all the time and to practice and practice and practice. So we keep that team a little bit smaller, but at least to where we have enough people where if I'm on vacation, at least I know somebody covered. We have testers and buddies, and we are getting ready to bring on some new team members. So not only do we practice a minimum of twice a year, but when we add a new team member, that team member has to learn how to be a tester, how to be a buddy, and then we will practice with that team member as well.

So it's practice in addition to any time throughout the year when we're called in to do some of these things. When we are practicing our processes for testing, we recreate the scenario of our workspace, which we are lucky enough to be in a very full-service microbiology laboratory with some really great spaces. So I know that that is where we are very lucky, and with our-- we actually turn our AFB space into a contamination or a containment room.

So we turn the room into exactly what it would be like if we had a real patient so that we can experience that. We will doff our PPE as well throughout that process so that we can experience how hot you get in there and how uncomfortable it is. And so we really go through the whole thing. But we also review scripting for changes.

And as we look through this, we'll talk about scripting, and you'll see a couple little examples and why we think it's really important. The other thing that we do is we'll engage some outside observers, such as our medical director, or maybe someone from our core lab who also is familiar with some of their emerging disease processes to review motions of our process just to identify any safety concerns that we may have missed. So we'll go to the next slide.

OK. So here's an example of some scripting, and we have a lot of different scripts. We have scripts that you can see on the left, which are for initial calls. We actually have two different types of phone scripts. This one is what we would use internally with our emergency department. And it's so that if somebody gets a call from the ED and says, we are in high level PPE. I have a possible Marburg patient that walked in and we don't know what to do. So our techs, they can go and grab the script.

And basically as long as they follow this, they'll have all the information that we need to get started. And so we believe that, number one, we want scripting so they really don't have to think that hard in that situation because there's a little pressure and a little stress, and we want to make sure that everything we have is covered. So this is just an example.

Remain calm. Put them on hold. Find out if infection prevention has been informed. Has the county been informed? It's really important to make sure that we're engaging our public health partners, and if we have not, then we have to do so before we can proceed. We help them with some specimen collection, we get the information. Remind them, do not tube anything to the lab. The laboratory actually has a very specific process on how we pick up the samples, and again, with a buddy system as well.

And then we also believe it's very important for the caller to have one specific point of contact in the lab. What we have found is that when callers call and they get a different person every time, there's a lot of confusion that occurs. And so we make sure that there is one point of contact on both sides, ED and in the lab, and that if those points of contact need to change, that is communicated as well. Once they're done with that call script, we have a to do list.

And that's an internal to do list so that nothing is forgotten by the caller, because whoever takes the call is the one that gets to own it. And so there's several different people to contact and then information on how to get the room ready. So there's initial calls with scripts. We also have scripting for donning and doffing PPE, which I hope by now that everybody at least has that portion and that you know how to put your PPE on properly, how to take it off, and make sure you have a really good script and process in place that you have practiced.

We also have scripts for our testing process, and our scripts are extremely detailed. And as you can see, on our scripts here we have little checkboxes so you can check off-- so that you don't lose your space. Our testing script is probably 15 to 16 pages long at this point, and we sometimes will have some laminated copies, but what we've decided is we just have the testing scripts that we'll print out at the time so that we have the most current version all the time.

The buddy will have it with a pencil, and the script and the pencil will get discarded at the end so we don't keep anything that we've used within that testing room. And it is extremely detailed, down to where the box-- where we might place a box inside of a hood, where the trash is going to be in the hood on your left side.

Every single motion is scripted, and we even kind of have some code words so that whoever is the tester listening to the buddy who's reading off of the script so that the tester knows that the buddy's done with their statement, because we can't start our next task as a tester until the buddy has stopped reading their individual statement. That way the buddy can watch us as we're doing whatever it is that we're doing, whether it's wiping the surfaces of a box, removing a cap from a tube. Every single piece of that motion is scripted out. Next slide.

Here's the donning and doffing script. Again, just an example just to show you on the board. You can see exactly how detailed that is as well. Go on. Next slide.

OK. We also have an initial test menu that I thought we would put up here in case anybody wanted to know what we're doing initially when we have a patient for viral hemorrhagic fever. What we do is it says collect the following specimens at the top. And that seems like a lot of specimens compared to the test menu that's at the bottom. And it is, because we want whoever is going to be collecting, that caregiver, we want them to be exposed to all of these things one time.

We don't want to have to go back and ask them to collect something else and something else. Collect it all at once, limit the exposure of that caregiver, and that way we'll have everything we need. If something needs to be added, we can do so. Based on everything that we have collected at the top-- and we have two lavender tops on there, just because in case we need to send one to public health to Dallas County, we have an extra sample that we can send on.

So we do for rule out testing of viral hemorrhagic fever-- you can kind of argue it both ways. We say this all the time. OK, just because you have blood parasites does not mean they don't have Ebola. We know that. And that is where that relationship and those conversations come in with the medical director, the patient's physician, infection, prevention, and county health. These are tests that we are doing up front so that we do not harm the patient by not providing patient care.

The patient could absolutely still have Ebola if they have something else going on. So those conversations are absolutely vital. But what we offer here is blood parasites. We do the rapid malaria

antigen by Binax. We do a thin smear only. We have a urinalysis, just a dipstick. A CBC that we will do on the PocH and a complete metabolic panel that we will do on our Piccolo. Next slide.

This sample here is just specimen packaging, and this is something that we provide when we go to pick up the samples that we can provide a copy of this to the nursing staff. This was developed by the lab in conjunction with the nursing staff so that they would know exactly how to package a sample, what to wipe, how to grab the sample, how to handle it, how to place it in a box. And this is something that we'll just print out, they can throw it away right in the room after so that they don't have to think about how to give the samples to us.

Every sample has to be completely wiped off. Every bag has to be wiped off, and this is triple-bagged. And then everything gets placed in a pressure bag just to take it from the ED to the laboratory. So we make sure that everything is sealed as much as possible, and a buddy will come with the tester to go pick this up in the ED. The tester-- quote, unquote "tester"-- is the person that that's basically holding the hard shell container. You can see that transport container on the right, which is like a red hard-shell container. That's the person, that person is not going to touch anything in the hospital. The buddy opens doors. The buddy might press the elevator button. The buddy is filling out the chain of custody. The person who's holding the box is literally there to hold the box, open it, close it, carry it. That's it. So we always do that with two. But this is just something so that nursing would have a visual so that they know what to expect. Next slide.

We also have, while this is going on-- so while nursing is collecting the samples that we want them to collect, while we have a team going to pick up, after this whole scripting has been done, we are preparing the containment room. And none of this takes-- all of this takes a long time. Nothing is very fast. I think probably anybody who's ever had to do any kind of rule out realizes that nothing goes necessarily exactly the way you want it and in the time frame that you want it.

It always also happens on a Friday afternoon or a Saturday evening when you're going out and then you get a call that you have to come in. So we have people that come in. If you're part of that response team, you know you're going to have to come in at any time. It could be on a holiday. It could be on a weekend. While we're on our way in, unless we're already here, someone's getting our containment room ready. So they're going to clear it out. They're going to get some waste bins, and I'll have a picture of that so you can see what our waste bins have looked like.

They're going to stock the room. And as you can see to the right, it says supplies needed for containment room. We have a whole list of supplies. There's more than this that go in there. We try to keep some things-- anything that doesn't expire, we keep in a kit that can just be grabbed and put in there. But they're stocking the room with everything that we need. They're preparing what we call go kits. We have a high-level PPE go kit, and then we have different kits for testing materials. That way they are kits that are disposable.

They go in. They don't come out. But they are there when we're ready and needing them to use. We also have them gather the testing materials, and QC is performed on the Piccolo and PocH. If we really need to, if something's going on with the Piccolo, we do have an Istat process as an alternative. So we could potentially do an Istat, but we like that Piccolo for that complete metabolic. It tends to work very well for us. So we're making sure QC is done on those instruments, making sure everything is good to go and that everything's working and prepping some shipping materials. Next slide.

This is just an example of what's in our malaria go kit and what that might look like. We use a heme color stain. We have stain and disposable conicles. You can see everything's kind of in a bag, that timer. We don't necessarily throw away the timer, but we do have it in a bag, and only the buddy is holding these. The buddy doesn't necessarily pass everything into the safety cabinet to the tester at one time. It's piece by piece according to how it's scripted out. But this is just an example of what that kit would look like. Next slide.

The buddy system. We talked about the buddy system already, but I just thought I'd throw this in here just to describe what we do. One tech performs testing. The other tech who is the buddy records the results. They prevent others from going in the room. They communicate. There are times that we might have to-- somebody might tell us we have a call and that buddy will either communicate what's needed to be communicated to the caller or they will tell them that we can't talk right now.

But the main purpose for that buddy is to observe technique for the performing tech to have them slow their pace, to provide supplies, and to make sure that that person is safe. They have to keep them safe. We do have a runner that's an additional tech just in case we need some supplies, did we forget something, do we need to put something in the shipping box, or do they need to handle the phone calls. We kind of call them the bouncer, too, so that nobody comes in and bothers us. OK. Next slide.

Instrumentation. For our rule out testing, we can use the Istat. We have now moved to the Piccolo for that. We also have a PocH. We do utilize the Cepheid Ebola cartridge, but this cartridge has a lot of limitations because it only covers the Zaire strain. So it's just something to go into knowing this is the limitation of this cartridge, and any way it goes, that result is really not something that we can hang our hat on. Any way it goes, negative, positive-- if it's positive, it's definitely going to the county. If it's negative, what does that mean?

This is really still all about what that conversation is with the county and infection prevention, the patient's physician, and our medical director. So it's a nice thing to have to have a little knowledge and if you understand the limitations that go with it, but don't hang your hat on it. And it's something that you really have to think about. How would you incorporate that? Where does your instrumentation live for that? It's something to really think hard about before implementing that. But I think the other kinds of things that we're doing with the instrumentation on here works really well. And this is just an example here as well of some scripting that we came up with for the Piccolo. Again, you can see every single movement is scripted. All of our processes take a very, very, very long time. We've also had to think about what's the

order of our process? What's going to go first? What's the first priority to get started? What things take the longest?

Once they're on board an instrument, which one's longer? The Piccolo? The PocH? Which one do you want to start? How long does it take for that slide to dry? So you really have to think about the order in which it makes sense to do things as well, and exactly every single step that you do, every motion that you take, what is the risk in that motion. And so that's what we're doing here. And I just wanted to throw some of our scripts up here to give you some examples. Next slide.

Engineering controls. We have all of these different types of engineering controls, and it's things for you to think about as well. Locked freezers, cap centrifuge buckets, autoclaves, negative air pressure. You want to make sure you limit access. And I'm going to go real fast because I know we're going short on time, but more for you to think about there. And here we just have some pictures of what some of those controls look like. We do have scripts for if we have a patient long-term and if we have to something on the line in core lab. Our little autoclave is down there on the right, and the category A waste shipping containers are there on the top right. Next slide.

So after any kind of event, if we have a real-- if we have a patient that's coming in as a rule out for anything, viral hemorrhagic fever or any other kind of emerging disease, we think it's really important to have a debrief. Sometimes that is a hospital-wide debrief where we'll have representatives from each department involved, but we always do a laboratory debrief with our laboratory staff, our medical director, lab director, and then we invite other parties in there.

We walk through from the patient arrival to the final determination of status. We walk through what happened in the event, what worked well, what didn't work well. And we find that that is also really important to keep improving our processes. OK. Next slide.

Some additional planning. I just threw this in here. We have a little bit different scenario where we have some-- there are laboratory staff that are phlebotomy. It's a phlebotomy team that does a little bit extra. They'll do some of the point-of-care testing as well. And we looked at different scenarios of what could possibly happen if a sample came into the ED and samples have not been collected, but they get notified. Or let's say they get notified after samples have already been tested by the liaison. Or what happens if the samples have gone through the tube station but we haven't tested it. So we've tried to think up all of these scenarios that could happen, and we have a procedure around every scenario. So I know it sounds like a lot and it is a lot, and it's a lot to review and it's a lot to keep up on. We just felt that it was worth the time to really do that. Next slide.

And these are just some examples that have come out of what those extra scenarios are. Some decontamination of the liaison area. Here's all the places that have to be decontaminated. Here's what the supervisor on duty would need to do and need to check, all the different areas. So we have lots of different checklists for them as well based on whichever scenario the patient fit into. And I think that might be my last slide, so thank you very much and please let me know what questions you have.

Sean Courtney: All right. Thank you so much. That was a great presentation. It's always nice to hear from laboratories and how they prepare for various emerging pathogens, so thank you for joining our call. I do not see any questions at this time and I know we're kind of reaching the end here, but I guess I'll say if we do receive any questions, we'll be sure to forward them on to you Laura. But again, I just want to reiterate thank you for joining our call today. It was a really great presentation.

Laura Knoll: Great. Thank you. And please do forward any questions you have. I'm happy to answer.

Sean Courtney: Absolutely. All right, well, thank you, and thank you to all of our speakers today. And as a reminder, we typically hold these calls on the third Monday of each month. They're scheduled for one hour, and our next call will take place on Monday, April 15, at 3:00 PM. Please let us know if you have any suggestions for future topics-- I'm sorry. Excuse me. Topics for future calls, as we look forward to continuing to discuss any hot topics and to answer any of your lab and testing community needs. As we mentioned before, we'll try to get this audio transcript and slides from today's call posted on the website within the next couple of weeks. We should have those from our February call posted hopefully later today. Apologies for that delay.

Also you can find CDC on social media, on Facebook, Twitter, Instagram, and LinkedIn, and so please follow those to stay updated with any of the latest news and recommendations. And again, thank you all for joining us today, and we continue to be grateful for your work. And we will talk to you again on the 15th of April. Thanks, everybody. Have a good one. Bye.