



LAB MATTERS

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Winter 2023 Issue 4

Building Trust in Public Health Through Communications

Inside:

- 8 Mercury Surveillance: A Collaborative Effort to Help a Family
- 20 Considerations for Implementing Wastewater Surveillance in Rural Communities
- 26 Strengthening Respiratory Laboratory Networks

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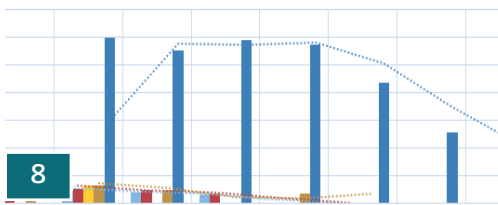
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The Association of Public Health Laboratories (APHL) works to strengthen laboratory systems serving the public's health in the US and globally. APHL's member laboratories protect the public's health by monitoring and detecting infectious and foodborne diseases, environmental contaminants, biological and chemical terrorist events, genetic disorders in newborns and other diverse health threats.

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Taking Stock

Gynene Sullivan: Scott, I've heard you speak repeatedly about how during the pandemic, public health laboratories and APHL took on the role of "truth teller," as we were the steadying voice amongst all the noise—not only telling the public health laboratory story but telling the public health story as well.

Scott Becker: The concept isn't just to say, "Hey! Look at us, this is what we did." It's to go deeper and ground ourselves. Pre-pandemic, I knew that public health laboratories were truth tellers—we deliver information for analysis, answers and action. But during the pandemic, truth took on a whole other dimension. When things started to escalate in the early days and there was so much misinformation being shared, I kept saying, "Science is the way to go because science will give us the answers we need." How naïve I was. I remember people around me being very fearful, and my message was heard but not accepted because others saw what I didn't see. And that knocked me off-kilter so much so that when I heard from a high-level administration official, "You all need to go faster," I replied, "If we only had a test that worked." That was the moment I felt like I found my voice; in my head something clicked and said, "OK, no one else is going to tell the laboratory story. We need to do that and it's something that I know our members will do in their communities, and that APHL can do nationally."

Tim Southern: One of the things that I realized quickly in South Dakota is that it wasn't just about being the truth teller, it was also about being a good storyteller. And you bring up a good point about science—where we think we will share the data and sway the masses. It didn't work like that because science is hard to see and touch. Science is out of reach of most people because there's very little common language that we can use. Even at the highest levels of state and federal government, people didn't know laboratory science from any other discipline, so they really relied on folks like public health laboratory directors to help tell the COVID story. I remember working closely with [former director of the Utah Public Health Laboratory] Robyn

Atkinson-Dunn during the early months of the pandemic. We were on calls together twice a week with a federal team to raise their public health laboratory science acumen so they could turn around and better serve our communities. I remember when my governor and members of her cabinet visited the laboratory in early 2020, and I had to tell a story that I had never told before; I had to use a whole different language to get it done, and that was a process of trial and error. To be honest with you, it probably took a good six or eight months to finally bring that complex science into focus for our senior leaders, help them understand everything we were trying to accomplish, and why we could not move faster. The story I had to tell wasn't just about a broken test—it was also about broken supply chains and a growing cascade of failures.

Sullivan: Usually laboratory jobs don't come with as much of a personal and professional cost as was seen during the pandemic. How did those costs change you, your passion or your love for your work?

Becker: The personal cost for me was the stress of what we were dealing with. It was attacks on APHL as an association from foreign actors, and attacks on me personally from nasty letters and emails. Getting called by the FBI made me realize we weren't in the same universe we were a month earlier. But all the attacks made me want to double-down on the communication and on the need to get the right information out. I never thought we would talk directly to the public, but we did and the information we conveyed was sound and grounded.

Southern: I remember very distinctly the early months of 2020 and the frenetic pace. It was one of the only times that our public schools pulled kiddos back home and provided a remote learning program. As a single father, those days were some of the most challenging for my little family. I would go to the emergency operations center (EOC) in the morning before my son was even awake. At lunchtime I would bring him whatever was being catered at the EOC and help

him with homework. In the evening, we would prepare a simple meal and then he would eventually drift off to bed and I would continue working from home. My 13-year-old grew two inches that spring and I didn't even realize it. As challenging as those first months were personally and professionally, the past six months have been some of the hardest months for me since the pandemic started. The de-escalation from the pressure and intensity and the 18-hour days, that's been hard. And it's not just hard on me, it's hard on my staff as well. But we are finding ways to get our minds and our bodies back to a place where we're not feasting on stress. For what feels like the first time in years, we are focusing on self-care, creating a culture of support for one another beyond the laboratory, and we are finally taking the much-needed time to reconnect with family. We're also refocusing on the testing programs that took a backseat during the pandemic, and we are finding creative and productive ways to invest in our infrastructure, our facility and our staff.

Sullivan: It sounds like you're talking about coming back from a tour of duty and you're reacclimating to whatever life used to look like before you went off to war, with a little post-traumatic stress disorder (PTSD) thrown in. Do you think sharing those stories of personal struggle are important?

Becker: Absolutely, because even though the head is part of the body, mental health doesn't have the same status as other aspects of health. We're talking about a whole segment of the population who worked through the pandemic and worked on the pandemic. I think our public health workforce writ large had a very different experience than others. I think that stress and strain will be with us for the generation that went through it, and we've got to help each other. APHL is presenting a series of **stress reduction and psychological safety webinars** to open up those lines of communication. Because once we start this conversation, it's imperative that we continue to talk about it.



Scott Becker, MS and Tim Southern, PhD

Southern: A physical wound can often be seen. It can be touched, it can be bandaged, it can be tended. But emotional and mental wounds are often unseen, and it really requires an introspective person to be able to articulate, “This is how I’m feeling, and I don’t know if I have all the tools I need to manage this.” That was one of the remarkable things about the pandemic. As the frenetic pace continued, the time I spent interacting with my staff grew to be less about science and more about the scientist and the person. I remember the most profound conversation I had with my lead COVID-19 scientist had nothing to do with the laboratory; she lost her father during the pandemic, and she was having a conversation with a very small group of us about that loss. I think one of the things that helped her most profoundly wasn’t that we tried to make her feel better, but that we were listening and sharing the simple message, “You’re not alone. I have been there. We are here for you.” Those personal connections brought my team closer and continue to hold us close.

Becker: Yes. You go through something with a group, and it can be profound. The pandemic was that sort of ground-changing experience for all of us. For me, it was the second time in my career that I thought, “Is this really the place for me? Is this the kind of thing I want to do right now?” It’s a totally legitimate question that individuals must answer on their own. I know people who have left the field and that was the best thing for them. And I know people who have stuck by the field and are transforming it. For me the answer was yes—this is where I want to be. I’m not the person I was before because of the things that we went through. And honestly, a lot of that was because of communication. What we were conveying, and how we were saying it, were the things that elevated our voice. We’re still undergoing profound changes.

Southern: We absolutely continue to experience profound changes. Federal funding has allowed our public health laboratories to invest in our workforce and infrastructure in meaningful ways. Our association is growing and changing, in terms of our amazing APHL staff

and our membership. But much of the change we continue to experience post-pandemic is home-grown. It’s laboratory leaders and staff coming together to lift each other up and to lift the communities we serve. I hope as a community we can continue to take advantage of that positive momentum. I hope we continue our advocacy for our most vulnerable communities and find innovative ways to improve public health laboratory service accessibility and equity. I hope we continue our advocacy for our federal partners like CDC and FDA to affect positive change in the wake of the pandemic. I hope our member laboratories will continue partnership building and advocacy with and for one another. And I hope we as an association can continue to work towards building a national public health laboratory system that helps ensure our preparedness for whatever comes at us next. ■

Laboratory Call Proves Strong for One Fellow

By Rudolph Nowak, MPH, senior specialist, Marketing & Communications

Having married, taught school and raised her children wasn't enough to overcome the call of the laboratory for one fellow in the **Public Health Laboratory Fellowship Program: an APHL-CDC Initiative**. Janet Lynch, recently an environmental health fellow and, as of August 31, 2023, a new employee at the **Wadsworth Center, New York State Department of Health**, is proof that there are no barriers that can impede that call.

"I went to school for chemistry and in the process I got a minor in physics and a major in math. After graduation I ended up getting married and having a kid, so the best thing for me at that point was to teach," Lynch said. She taught while her children grew up, but her interest in research grew as well.

"I was learning about medical research and drug development and thought 'this is interesting to me,'" she said.

After her children were grown, Lynch decided to go back to school, a bit unsure if it was the right path for her. She entered a biotechnology certificate program at her local community college which gave her an opportunity to return to the laboratory, and secured an internship at a research laboratory.

"I realized that science had really changed since I finished my bachelor's degree, so it was good that I went back and got some more experience and learned about the new instrumentation (and) computers."

The experience helped Lynch decide to pursue and complete a doctorate in Chemistry at the State University of New York. Her desire was to work at the state level as a research scientist, and that public health may be the best avenue to reach her goal.



Janet Lynch

"I found the APHL fellowship and it looked really appealing to me. It gave me the opportunity to get into the laboratory, find out what public health laboratories were actually doing and do some research. It checked a lot of the boxes that I was looking for."

Lynch knew it was a national fellowship, but she was hoping to stay close to home.

"I really wanted to stay in New York State because my kids are here, my husband is here and we own property. It would have been hard for me to move."

She crossed her fingers and waited for offers. "I did get the opportunity in Albany, so I jumped at the chance."

The fellowship also gave her the opportunity to attend two conferences, APHL 2023 in Sacramento, and the National Environmental Health Association Conference in New Orleans. While she enjoyed both conferences, Lynch believed the best part of the fellowship were the people.

"Wadsworth built a nice camaraderie among the fellows. There were New

York State fellows and APHL fellows, so Wadsworth had monthly meetings with all the fellows, and they used the APHL curriculum to guide the meetings. It was a great way to meet people. And we could learn together."

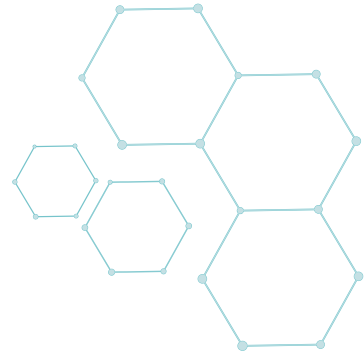
The comradery and Lynch's life experience led to some questions from other fellows and coworkers about her career path.

"Several people were asking questions about what it took to complete the PhD, why I did it and if I had any advice," Lynch said. She also gave advice to mid-career laboratorians thinking of pursuing a doctorate to advance or change careers.

"There are considerations when you get to be a certain age and you're going back to school. And so I shared my experiences with them," Lynch added. As she begins her new position at Wadsworth Center, she reflected on her fellowship experience.

"I think the fellowship was a great opportunity for me. I feel like the training allowed me to get a nice overview of how public health works. I really enjoyed the training and the support that APHL gives to the fellows—it is really excellent." ■

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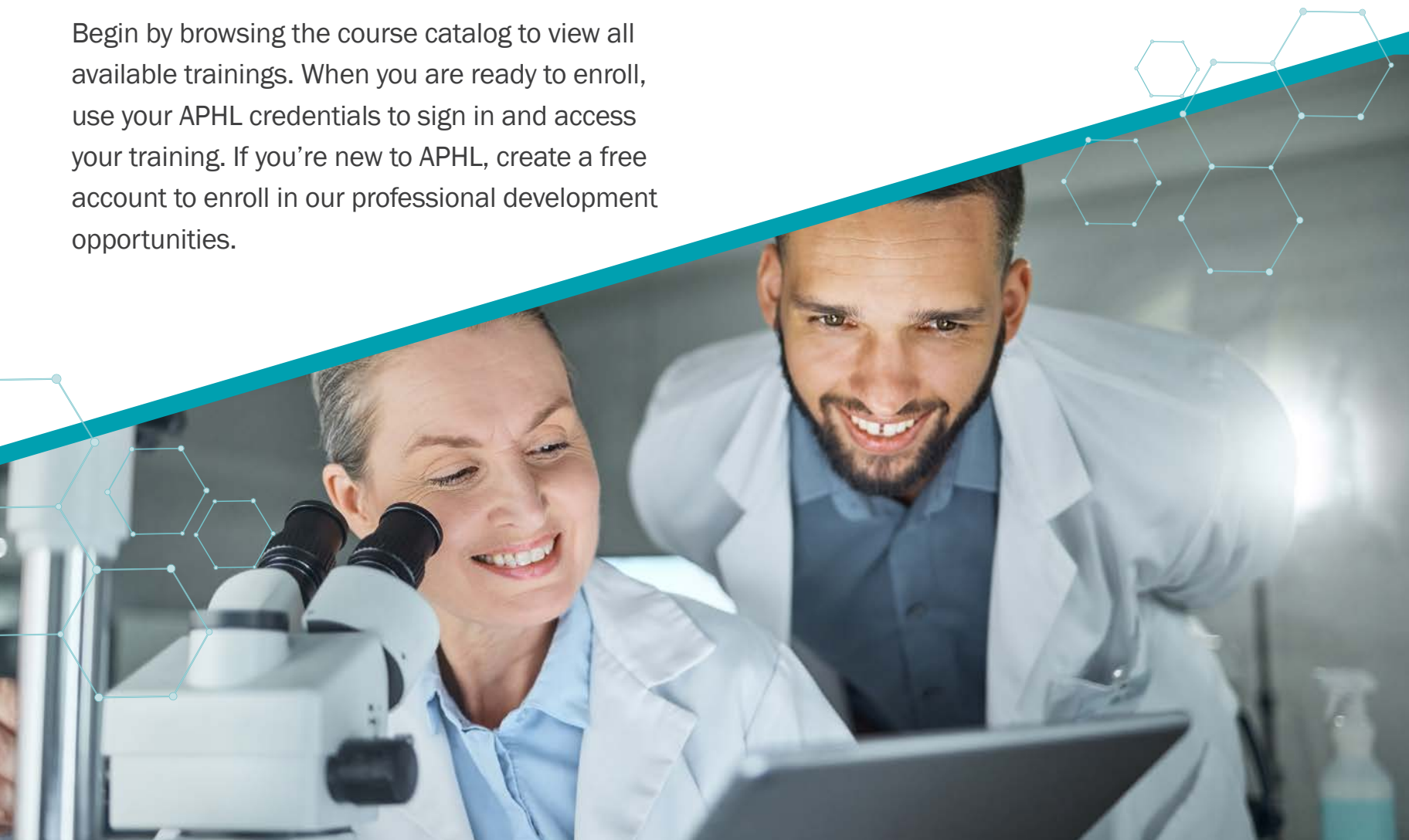
The Association of Public Health Laboratories (APHL) is thrilled to officially launch the APHL Learning Center (ALC) with over 100 professional development opportunities and growing!

The ALC is APHL's new learning management system that offers high quality educational activities on a variety of topics in convenient formats, from laboratory-specific resources to those serving the broader public health community. You can search for and enroll in training, complete evaluations and manage your certificates all in one place.

Begin by browsing the course catalog to view all available trainings. When you are ready to enroll, use your APHL credentials to sign in and access your training. If you're new to APHL, create a free account to enroll in our professional development opportunities.

Take advantage of the APHL Learning Center to access on-demand trainings and resources to strengthen your public health laboratory work.

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PulseNet 2.0: The Future of Genomic Surveillance for Foodborne Outbreaks

By **Courtney Wheeler**, ASRT contractor, Division of Foodborne, Waterborne and Environmental Diseases, Enteric Diseases Laboratory Branch, US Centers for Disease Control and Prevention

In 2019, the **US Centers for Disease Control and Prevention's (CDC's) PulseNet**—the nationwide laboratory network for detection of foodborne outbreaks—transitioned to whole genome sequencing (WGS) as the gold standard for foodborne outbreak detection and surveillance. Since then, the bioinformatics demands for processing data have expanded. To better support those needs of partners, CDC is launching PulseNet 2.0.

Where PulseNet is Going

PulseNet is committed to serving the needs of member laboratories who are at the forefront of foodborne outbreak detection and surveillance of illnesses caused by enteric bacteria. To better support the bioinformatics needs of state partners, PulseNet is developing a cloud-based analytic platform to enhance data analysis, management and visualization capabilities of WGS data for outbreak detection and surveillance. This platform will improve efficiency and reduce time needed to upload and analyze sequence data while preserving the core functions of PulseNet—enteric pathogen identification and cluster detection to identify and monitor outbreaks. The new PulseNet platform will use open-source bioinformatics tools for data management and analytics and increase options for data visualization. Integration of open-source tools in

a cloud-based platform supports CDC's **Data Modernization Initiative** by improving efficiency in analysis workflows, decreasing barriers to data processing and centralizing data storage. Together, these improvements will streamline how we store, process, access and share data to detect outbreaks earlier and faster.

How We're Going to Get There

The initial phase of the PulseNet 2.0 minimum viable product (MVP) was internally tested by CDC PulseNet staff from June through September 2023. PulseNet 2.0 pilot laboratories received demonstrations of the application and additional feedback was gathered to optimize the system according to partner needs. This initial round of the MVP platform development is expected to be certified by CDC PulseNet and migrated to a production environment by December 2023 where PulseNet 2.0 pilot laboratories will perform external validation of the system. The transition to the fully operational capacity PulseNet 2.0 system is anticipated to start in the third quarter of 2024.

What You Will Get

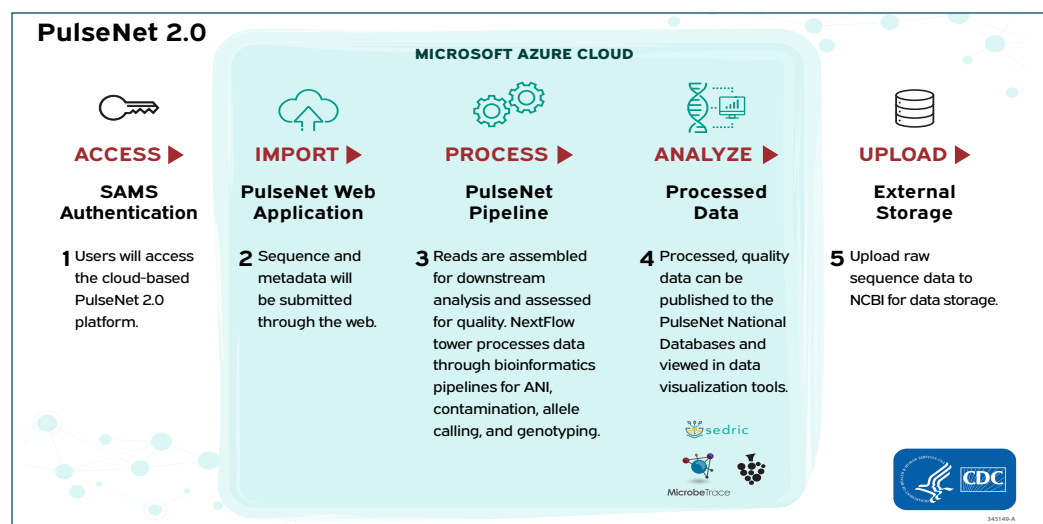
PulseNet 2.0 will offer greater flexibility and functionality through a centralized data storage space. All data published to the PulseNet national databases will

be stored in the cloud hosted by CDC through Microsoft Azure. A centralized data storage structure will simplify analysis and decrease processing time by eliminating the need to “push” and “pull” data between local environments and CDC databases. CDC prioritizes data security and is committed to securing sensitive information in their cloud-based services. If users cannot access cloud services, then they cannot access PulseNet 2.0. However, all bioinformatics tools will be containerized and accessible to use in other cloud or computing environments outside PulseNet 2.0.

PulseNet 2.0 will host the tools and bioinformatics software used to analyze sequence data and identify clusters. These tools will be stored in containerized repositories that are accessed by workflow management programs like NextFlow Tower. Together with the reference databases, these tools comprise the calculation engine. Processed data can then be visualized using open-source software like MicrobeTrace, GrapeTree and NextStrain and shared with other systems like CDC's SEDRIC, all within the cloud.

Open-source tools enable customization of PulseNet pipelines and the potential for members to create custom analysis pipelines in the future. Containerization allows for quick alteration of individual components and updates or integration of novel tools within a pipeline without affecting the rest of the workflow. Additionally, customized pipelines provide the opportunity for automation of analysis. Pre-built pipelines will allocate data to each of the proper containers in a workflow, reducing demand on users to manually manage data through each analysis job.

Member laboratories will no longer have locally stored analyzed sequence data; however, each laboratory will have their own “Lab View” window to manage data before publishing to the PulseNet national databases. Each laboratory view will be created from data currently in PulseNet



national databases for that user. At this time, there will not be an option to have local database fields. However, PulseNet is working to create additional fields for non-PII data such as local cluster codes in response to feedback. Local data that is not uploaded to the national databases will not be transferred to PulseNet 2.0. Prior to the transition, member laboratories should evaluate what data in their local databases should be saved, archived or uploaded to the PulseNet national databases.

Looking Forward

Looking toward the future, PulseNet 2.0 will be a pilot program for the larger Advanced Molecular Detection (AMD) Platform, projected for deployment in 2025. This platform intends to integrate with CDC-sponsored programs generating genomic data for genomic epidemiology analytics. More information will be available as the AMD Platform is developed, and PulseNet will ensure timely communications about updates that may impact results. Additionally,

PulseNet anticipates providing further details on the transition and timeline for future functionalities within PulseNet 2.0 in early 2024. ■

We would like to acknowledge Steven Stroika; Lavin Joseph, MS; Christine Lee, PhD; Kelley Hise, MPH; and Heather Carleton, MPH, PhD from Division of Foodborne, Waterborne and Environmental Diseases, Enteric Diseases Laboratory Branch, CDC; and Jennifer Adams from APHL for their expertise, feedback and support in shaping this article.

Frequently Asked Questions:

What do we need to do to prepare for the transition to PulseNet 2.0?

Provide your IT department with the [PulseNet 2.0 White Paper](#) to begin assessing needs and concerns. Member laboratories will be responsible for ensuring their surveillance data is currently uploaded to the national databases and a plan is made for other data in your BioNumerics databases that might need to be saved. Participation and feedback on PulseNet 2.0 development will continue to help guide development. Please share your thoughts and concerns with PulseNet@cdc.gov.

What will happen to my data in BioNumerics after the transition to PulseNet 2.0?

BioNumerics will no longer be supported after the transition to PulseNet 2.0. The program and analyzed data will still be accessible while you own a license to use the software. BioNumerics will no longer work for new analyses using CDC resources like the calculation engine, connection to the PulseNet national databases or NCBI uploads.

What about the data not in the national databases, can we get that into PulseNet 2.0?

Currently, only data uploaded to the national databases will be transferred to PulseNet 2.0.

When will we see the PulseNet 2.0 system if we are not a pilot lab?

Initial MVP testing was completed in mid-September 2023 and CDC PulseNet has started introducing the PulseNet 2.0 MVP platform while development continues towards a fully operational system.

Will there be training before FOC is completed?

CDC PulseNet intends to begin developing training and training modules on the platform to ready users to onboard to the system as soon as its surveillance ready. PulseNet anticipates this to start in early 2024.

Do we need a MS Azure cloud environment?

PulseNet members will access the cloud through SAMS authentication in a web browser. PulseNet 2.0 will be hosted in Microsoft Azure cloud through CDC; members will not need their own Azure environment.

Will there be a cost?

There will be no initial cost to PulseNet participating laboratories and it is not anticipated that there will be future costs.

What IT requirements do I need to prepare my lab for?

Provide your IT department with the [PulseNet 2.0 White Paper](#) to begin assessing needs and concerns.

What if our IT is wary of our data submitted to a cloud environment?

CDC PulseNet is aware that some members may not be able to access a cloud environment. CDC's cloud is safe and secure; however, we are exploring options to allow access to functions of PulseNet 2.0's cloud through a web application.

Mercury Surveillance: A Collaborative Effort to Help a Family

By Jocelyn Hover-Jeansonne, MPH, CT coordinator, Texas Department of State Health Services – Central Campus

Early one evening in mid-November 2021, the **Texas Department of State Health Services (DSHS) Chemical Threat (CT) Response Laboratory** in Austin received an inquiry about capabilities to analyze biological specimens for mercury levels. It was suspected that multiple linked families had been exposed to significant amounts of elemental mercury, but their exposure had gone undiagnosed for many months. The primary exposure took place in Missouri during July 2021 and would move within the borders of the Lone Star State in August 2021. The causative agent would not be identified for several months, and the source material would not be recovered. Three children would continue to experience symptoms, including a 2-year-old in Texas, leading to many medical clinic visits, trips to the emergency room department, hospitalization, laboratory testing and a variety of diagnoses prior to heavy metal exposures being considered. A breakthrough would come when exposure to elemental mercury was confirmed by treating physicians in Missouri after two adolescents had been hospitalized. This information soon was brought to the attention of treating physicians in Dallas where the youngest exposed was in the hospital. Mercury is a liquid element that is easily vaporized and inhaled at room temperature. Exposure to mercury, even small amounts, may cause serious health problems and impact the nervous, digestive, and immune systems, lungs, kidneys, eyes and skin.

Journey to Diagnosis

Symptoms in the family members started to appear as early as July 2021 in the form of rashes; however, the rashes were not linked to mercury. Two of the adolescents in Missouri developed high persistent pain and weakened immune systems leading to hospitalization. From July through November, the youngest child of the Texas family presented with fever, cough, rash, anorexia, abnormal white

blood cell counts, conjunctivitis and ear pain. Testing for respiratory syncytial virus (RSV), COVID-19, influenza and streptococcal pharyngitis, along with other viruses and bacteria typically tested for on hospital respiratory panels, were repeatedly negative. Prior to July 2021, the 2-year-old female had no significant medical history. On October 31, 2021, after many out- and in-patient assessments, referrals to pulmonary and rheumatology specialists, the parents informed treating physicians of extended family members who were being treated for confirmed mercury toxicity. Two urine samples were collected and sent for commercial laboratory testing for mercury. Empiric treatment for mercury toxicity was initiated prior to receiving the laboratory results due to the long turnaround times. The advantage of sending these samples to the DSHS CT Laboratory in Austin would be expedited testing with results available within 24 hours of sample receipt, thus providing the treating physicians tangible information for treatment decisions. The commercial laboratory was also only able to report “greater than 80 mcg/L” for these samples. Through the DSHS CT Laboratory, a greater analytical measurement range (AMR) for mercury in biological specimens is available allowing for more significant measurements of the mercury bio-burden for potentially exposed individuals.

Collaboration

The **Agency for Toxic Substances and Disease Registry** (ATSDR) Region 6 notified the DSHS Health Assessment and Toxicology (HAT) program of the potential mercury exposure of the Texas family and thus began a collaboration—facilitated by DSHS HAT—involving the exposed family, the Texas Commission on Environmental Quality (TCEQ) Amarillo Regional Office, the DSHS Public Health Region (PHR) 9/10 and the DSHS CT Laboratory to help the



Mercury exposure rash in 2-year-old female. Photo: TX DSHS

family of five children, two adults and two canines.

Decontamination

Mercury testing of the homes revealed hazardous mercury vapors as high as 3 mcg/m³ (Texas) and 40 mcg/m³ (Missouri). The Texas family relocated until remediation was complete. TCEQ removed mercury-contaminated household items and ventilated the home. The remediation was completed and TCEQ cleared the home when mercury concentrations were <0.5 mcg/m³. Residential mercury contamination was below those expected to cause immediate health concerns, but were still higher than the ATSDR's action level (0.001 mg/m³) for long-term exposure. Therefore, DSHS HAT worked with DSHS Region 9/10 staff and DSHS CT Laboratory to conduct biosurveillance of the exposed family members and pets until their mercury levels returned within normal/reference range.

Biosurveillance & Laboratory Testing

The DSHS CT Laboratory prepared and analyzed a total of 78 urine samples and 21 blood samples for mercury testing. These samples were prepared and

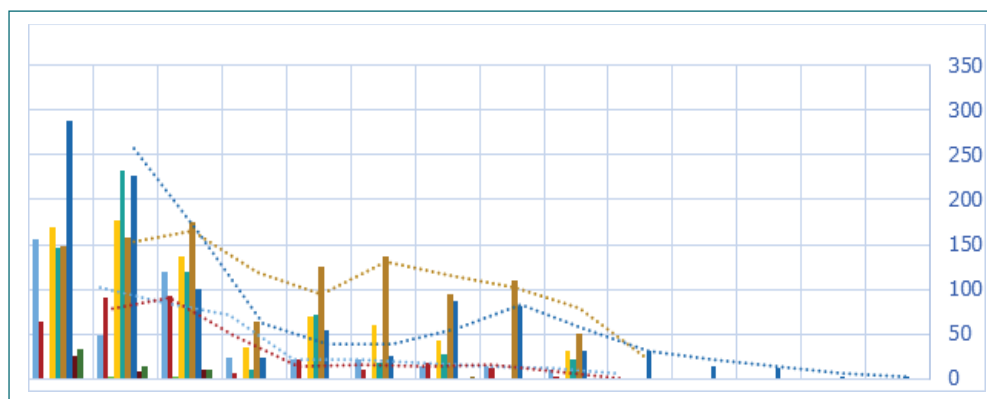


Figure 1. Uncorrected Urinary Mercury (mcg/L) Biosurveillance Tracking

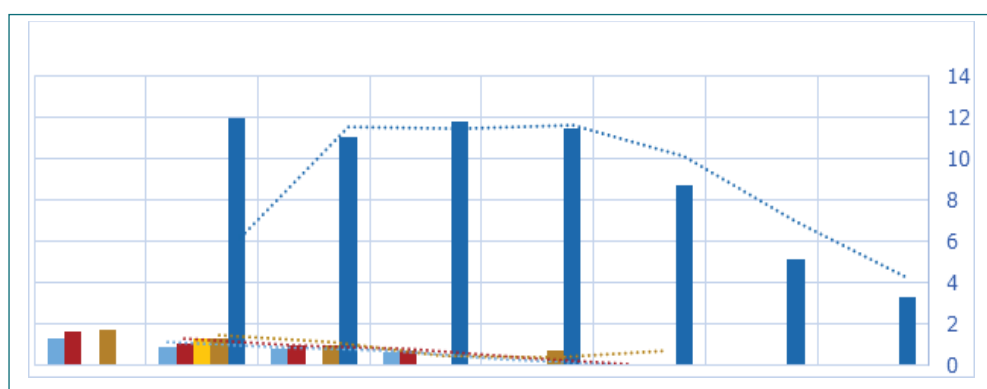


Figure 2. Blood Mercury (mcg/L) Biosurveillance Tracking

quantitatively analyzed using modified versions of the **Laboratory Response Network for Chemical Threats (LRN-C)** Mercury in Urine and Blood Metals Methods on an Agilent 7900 ICP-MS system. Each sample received was analyzed and reported to the submitter within 24 hours and was discussed in regularly scheduled after action meetings.

Biosurveillance (blood and urine) samples were collected and tracked over a 20-month period based upon individual exposure for each family member. DSHS worked with the attending physicians and medical experts providing treatment to the affected child, canines and other family members until the family members' levels of mercury in blood and urine dropped below clinically relevant ranges.

Interpretation & Results Reporting

Clinically relevant levels of mercury were found in 64% (urine) and 29% (blood) of the submitted human samples. Sixty-seven percent of the canine samples had levels of urine mercury above 10 mcg/L. The 2-year-old female underwent chelation therapy in November 2021 as she was symptomatic, and the first sample analyzed by the DSHS CT Laboratory was collected post chelation therapy. All other members of the family were asymptomatic, and the decision to monitor them was made in lieu of medical countermeasures.

At each stage, final reports of the clinical testing were delivered to DSHS HAT and the DSHS PHR 9/10 Medical Director. This case demonstrates that it takes a collaborative spirit and a multi-agency approach to help families exposed to heavy metals. It also proves that the skills and resources available through the LRN-C are crucial in supporting complex exposure scenarios and biosurveillance. ■

Three Decades of Collaboration: Working with Public Health Labs for Diagnostic Excellence and Innovation

By Jennifer Schneiders, PhD, president, Hologic Diagnostic Solutions

“Coming together is a beginning. Keeping together is progress. Working together is success.” – Henry Ford

Public health laboratories are truly the front line against infectious diseases, playing a vital role in diagnostic testing, reference testing and disease surveillance, while at the same time performing critical research to inform public health policy. For more than 30 years, Hologic has been honored to partner with public health laboratories and we are proud of the advancements we have achieved together.

Understanding the Importance of Flexibility

Prior to the pandemic, I had the fortune to attend the APHL Corporate Leadership Council. Although I have seen many levels of collaboration between laboratorians and industry over the years, I was amazed at the level of partnership that APHL has facilitated between public health laboratories and industry partners. Hologic is honored to have been one of the first and longest-standing industry partners with APHL.

This close partnership has helped provide our Research and Development teams with insight into the rapidly evolving needs of the modern molecular laboratory. While many public health laboratories often provide high-volume testing for sexually transmitted infections, there are numerous low-volume tests that require timely and accurate results. This need for flexibility resulted in the Panther® system as the replacement for the large batch processing Tigris® system. The Panther® system was designed to be flexible—able to handle large-volume assays as easily as low-volume, with simplified workflow and minimal waste. Understanding constant budget and staff shortage challenges, improvements were designed to integrate into existing Panther®

systems, not requiring completely new instruments.

Laboratories Provide Crucial Insights for Assay Development

Being able to test for multiple organisms from the same sample is critical in public health. Given the uncertainty of patients returning to the clinic, the ability to provide a comprehensive diagnosis and appropriate treatment after the initial visit can help reduce costs and most importantly minimize further transmission.

Based on feedback from laboratories, Hologic developed the first FDA-cleared nucleic acid amplified test (NAAT) for *Mycoplasma genitalium* and is currently developing an *M. genitalium* macrolide resistance assay. As prevalence data continues to grow, the level of concern around this long-undiagnosed infection continues to rise. Hologic is partnering with some public health laboratories across the country to track *M. genitalium* and macrolide-resistant prevalence.

Open Access™ Enables Tailored Testing and Collaboration

After SARS-CoV-2 was sequenced in early 2020, Hologic used the Open Access™ capability of our Panther Fusion® module upgrade to develop and optimize our first SARS-CoV-2 test. Public health laboratories in Canada and Germany also used their own Panther Fusion® systems to rapidly create laboratory-developed tests (LDTs) that could be fully automated and run at high volumes. Usage of this Open Access™ capability by public health laboratories continues to rapidly grow. Today, public health laboratories around



the country are using Open Access™ to develop LDTs for a variety of pathogens, including vector-borne illnesses and emerging threats, such as *Candida auris*, which is often difficult to identify. Outbreaks of *C. auris* in healthcare settings are of particular concern, and many public health laboratories are initiating surveillance of this pathogen.

These experiences have brought laboratories from all over the country together to share information, and we have been proud to foster continued collaboration. We believe that public-private partnership is critical to solving public health crises and know that to be successful, we must all work together.

The Future Ahead Together

As we continue to move through this new world of public health testing, research and surveillance, we will continue to support you as you meet the testing demands of today and the demands of an unknown future. ■

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Emerging Infectious Diseases and Antimicrobial Resistance Genes in Wastewater

By **Kayley Janssen**, Wisconsin State Laboratory of Hygiene; **Morgan Roos**, Molecular Quantification Core, Colorado State University; **Jim Huang**, Molecular Quantification Core, Colorado State University; **Jacob Bierstedt**, Illumina, Inc.; **Irina Khrebtukova**, Illumina, Inc.; **Evelyn Doolittle**, Wisconsin State Laboratory of Hygiene; **Griffin Knuth**, Wisconsin State Laboratory of Hygiene; **Dash Cooper**, Wisconsin State Laboratory of Hygiene; **Ellie Olsen**, Wisconsin State Laboratory of Hygiene; **Adelaide Roguet**, Wisconsin State Laboratory of Hygiene; **Jeffrey Koble**, Illumina, Inc.; **Ying Lin**, Illumina, Inc.; **Kate Broadbent**, Illumina, Inc.; **Courtney Gonzalez**, Illumina, Inc.; **Robert Schlaberg**, Illumina, Inc.; **Gary Schroth**, Illumina, Inc.; **Carol Wilusz**, Molecular Quantification Core, Colorado State University; and **Scott Kuersten**, Illumina, Inc.

The **SARS-CoV-2** pandemic accelerated the integration of genomics into pathogen surveillance. It demonstrated the value of monitoring wastewater for infectious diseases and antimicrobial resistance (AR) as an important means to aid public health professionals in predicting upcoming trends with potentially large impacts on communities. Increased SARS-CoV-2 nucleic acid detection in wastewater by molecular methods precedes increases in COVID-19 hospital cases by days to weeks, providing an opportunity for non-invasive monitoring of community-level prevalence trends.^{1,2,3,4} As hospitalization rates have decreased and at-home testing has replaced point-of-care or centralized laboratory testing, wastewater data may be a more reliable indicator of SARS-CoV-2 circulation in the community.⁶

Method

Digital droplet polymerase chain reaction (ddPCR) methods to detect and quantify pathogens in wastewater have become routine in wastewater surveillance and provide a sensitive and targeted means to track increases in SARS-CoV-2 and other infections.⁵ This approach has distinct advantages for both sensitivity and throughput. However, it is limited to a single (or, at best, a small number of) pathogens for any assay.⁷ Next-generation sequencing (NGS) offers a potent alternative to monitor large numbers of distinct pathogens simultaneously. It has the added benefit of providing strain level and potentially full genome coverage of the pathogens. Importantly, there are a myriad of methods for sample collection, concentrating the microbes and extracting the nucleic acids from wastewater samples. However, additional studies to identify how pre-analytical factors impact the number and types of microorganisms detected in such samples are an important prerequisite to routine

implementation. Through the end of 2022 and the beginning of 2023, Illumina collaborated with researchers at the **Wisconsin State Laboratory of Hygiene** and **Colorado State University** to evaluate sample collection approaches and, more importantly, sample concentration and extraction methods for wastewater-based surveillance by NGS.

Testing

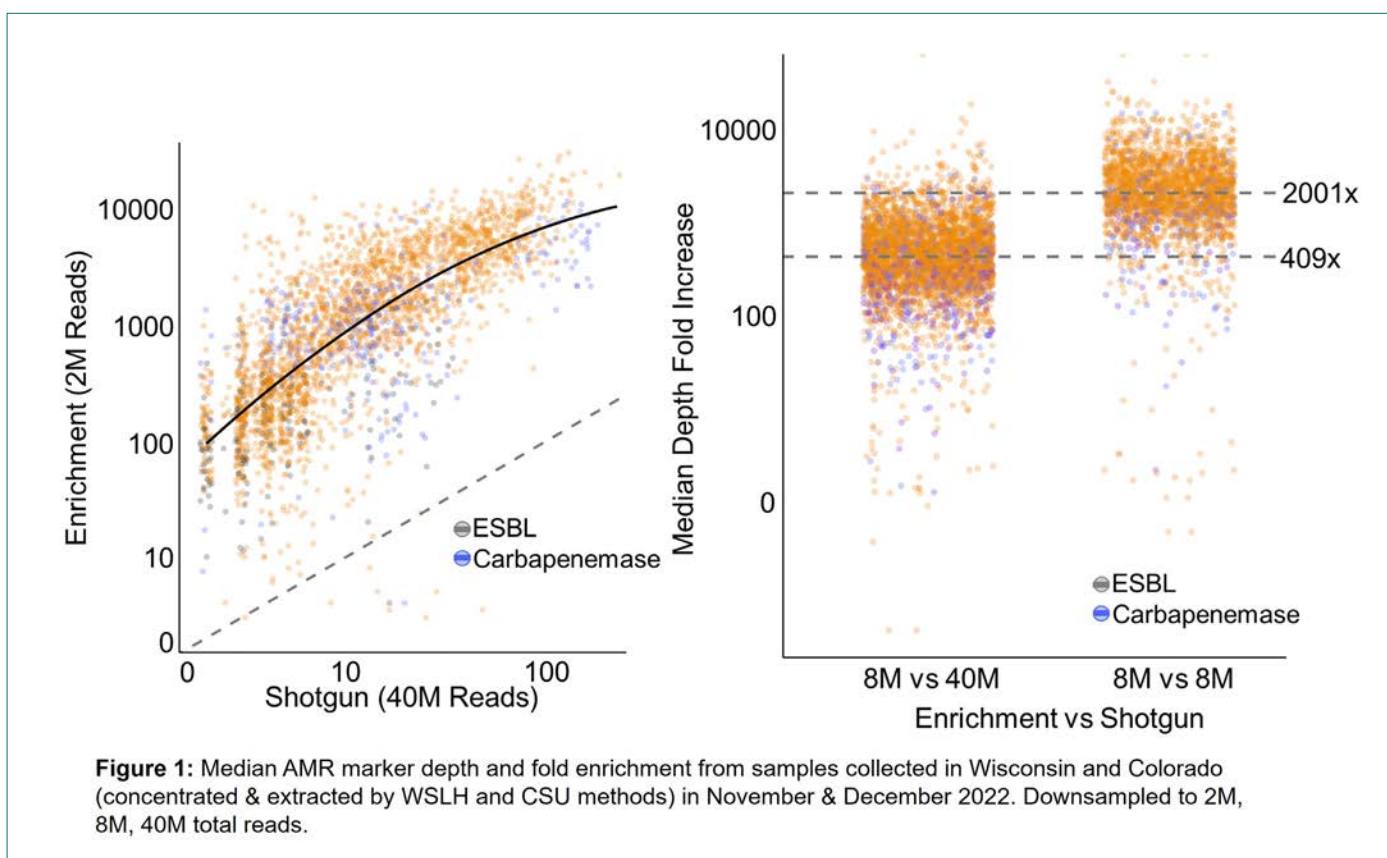
Utilizing influent, the effects of sample storage, concentration technique and extraction method on pathogen detection were compared. Sample concentration methods evaluated in these studies including the Concentrating Pipette from InnovaPrep and Nanotrap® Microbiome Particles from Ceres Nanosciences. Furthermore, four different extraction techniques were performed on samples from different wastewater sources, including college dorms and water treatment plants in Colorado and Wisconsin. Following concentration and isolation, the nucleic acids were sequenced with various NGS protocols to evaluate their ability to detect and characterize a broad range of pathogens and AR genes. These included shotgun metagenomic approaches and shotgun metatranscriptomics with ribosomal RNA (rRNA) depletion using Illumina's RiboZero™ Plus Microbiome. In addition, two precision targeted NGS assays, the Urinary Pathogen ID/AR Panel (UPIP) and the Viral Surveillance Panel (VSP)—both products available through Illumina—were utilized to enrich and profile a broad spectrum of microbial sequences of interest. Both bait-capture panels utilize biotinylated probes that hybridize to the genomic regions of interest for specific targets. UPIP targets 174 genitourinary pathogens and >3700 AR markers, while VSP targets 66 DNA and RNA viruses.

Samples were sequenced very deeply (100 million reads per sample) and then down-sampled to 8-20M reads for most of the analysis to compare the performance of enrichment vs. deep shotgun sequencing.

Results

The samples prepped using InnovaPrep and Ceres Nanosciences products showed negligible differences in viral pathogen detection yield by ddPCR and by NGS methods as well as genome coverage by NGS. However, the microbial content of concentrated wastewater samples changed over time and with the number of individuals contributing to the wastewater system. Additionally, the specific NGS method used for detection affected the type of pathogens detected and the genomic coverage of those pathogens. In general, shotgun DNA and RNA approaches demonstrated high detection yield for viruses that are abundant in wastewater, such as hCoV-OC43 and human polyomaviruses. Compared to traditional shotgun methods, VSP enrichment enhanced the number of viruses observed (mainly enteric, oncolytic or respiratory in nature), allowed for more granular strain identification, and increased the callable positions and coverage of viruses (e.g., BK polyomavirus (DNA), aichivirus A (RNA), astrovirus (RNA) and hCoV-OC43 (RNA)) in wastewater samples. Inclusion of a bait-capture step with UPIP prior to sequencing improved AR marker detection, coverage and depth; enriched samples show a >2X increase in average detection and a 409X increase in median depth at 5X fewer reads than shotgun methods (Figure 1).

Overall, bait-capture enrichment provides an expansive and bioinformatically economical NGS approach for surveillance of viral and bacterial pathogens in wastewater, a complex



environmental sample, at much fewer reads than DNA and RNA shotgun workflows. Combined with optimized concentration and extraction methods, NGS delivers efficient, comprehensive genomic coverage compared to quantitative PCR methods. As bottlenecks to routine implementation of wastewater-based surveillance are addressed via technical advances, cross-sector collaborations, data standards development, and sustained funding and policy support, there is untapped potential for NGS to provide an improved understanding of pathogen circulation at the population level. ■

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Building Trust in Public Health Through Communications

By Jill Sakai, PhD, writer

Communications have always been an essential element of successful public health efforts, but perhaps never more so than during the **COVID-19** pandemic, when the world suddenly faced a brand-new, poorly understood threat that seemed to be everywhere. Everyone had questions. What was this new virus? How did it spread? How do you avoid it? How do you know if you have it? What do you do if you get sick?

In addition to their round-the-clock work on testing, public health laboratories quickly became a focal point for providing information. And as misinformation seemed to spread as quickly as the virus itself, APHL and laboratory staff found themselves in the role of “truth-tellers.” Ensuring that timely, fact-based information was reaching health and other officials, policymakers, the media and the general public was vital in the effort to slow COVID-19. It was also critical in the effort to communicate the role public health laboratories played—and the challenges their teams faced—to a much broader audience.



If we can't effectively communicate what public health is, how are we ever expecting legislators and the public and business leaders to understand?"

Brian Castrucci, DrPH



This environment presented both challenges and opportunities. Especially early on, questions far outnumbered answers. The sheer volume of laboratory work was overwhelming and unrelenting. Illness and social distancing left everyone stretched thin. And for many laboratorians, talking about their work to external audiences hadn't been a big part of what they were used to doing. Laboratory directors, staff and others had to step into more public-facing communications roles.

But all that attention also created opportunities to stay visible and share messages about the essential work and services that public health laboratories provide for their communities. Advocacy efforts at both federal and state levels have boosted government funding for public health. The American Rescue Plan included \$7.6 billion for public health workforce. And this year in Indiana, coordinated communication efforts helped lead to a 1,500% increase in public health funding.

Such outcomes are far from certain everywhere, however. "Any time things are in the consciousness of the public, through the media, that can be both a time of opportunity and a time of risk," said Judy Monroe, MD, president and CEO of the [CDC Foundation](#). Poorly executed communications can sow confusion and create division. But authentic and transparent communication can be a powerful tool to build authority, support and trust with communities and other stakeholders. So how can directors and other laboratorians learn to wield them more effectively?

Knowing Your Messages

The essence of good communication is knowing what you want to say, and

finding the right words to convey the messages to the target audience.

The first step is to figure out the key ideas you need to get across, and state them in clear, concise, understandable terms: *Masks help reduce the spread of the virus that causes COVID-19. PCR tests are very effective at identifying whether a person has the coronavirus.* Effective messages should be accurate and fact-based, but it's often not possible to convey the full nuance and detail you might tell a fellow laboratorian—and that is okay.

"People don't need to know all the caveats," said Kelly Wroblewski, MPH, director of APHL's Infectious Diseases program, who became a frequent spokesperson for APHL throughout the pandemic. She noted it can be paralyzing to try to say the perfect thing when information is complex and shifting quickly. Over time, she's gotten more comfortable "not to give the technically 100% accurate answer, but give the 'close enough to correct' answer that people are going to understand."

It helps to consider the perspective of your intended audience and what they really need to know from you. That will vary from place to place, said Scott Shone, PhD, HCLD(ABB), director of the [North Carolina State Laboratory of Public Health](#). His state has a mix of very urban and very rural areas with very diverse needs, he noted. "I have to be able to figure out the message that's going to address the community to whom I'm speaking ... and how do I hone my message to address their concerns or where they might be getting other messaging."

Some of this comes down to word choice. Shone quickly learned to say "test" instead of "assay" and "look at the virus' genetics" instead of "whole genome sequencing." With practice, he was

able to reach people from the Research Triangle to eastern farm communities to western industrial centers. The team's efforts paid off. At a time when governmental trust took a big hit, he said, "trust in the North Carolina Department of Health actually was one of the highest in the country because of the way we communicated."

Remember, too, that good communications can encompass more than just words, said Myra Kunas, director of the [Minnesota Public Health Laboratory](#). Dashboards, data visualizations, infographics and even spreadsheets can all be valuable ways to share information. Early in the pandemic, her team even gave a staff member from the governor's office a tour of the laboratory to help convey the complexity of the testing environment. What's most important is to share the laboratory's expertise as best you can in that moment. "Communications sometimes needs to be fine tuned, but when you get it right you can reach someone you couldn't before," Kunas said. "At the end of the day, that's what we're here for—to prevent disease outbreaks, make sure babies are safe, and ensure drinking water is safe."

Breaking Through the Noise

With the extra visibility and awareness of public health has also come an influx of misguided and misleading information—intentional and not—said Peter Kyriacopoulos, APHL's chief policy officer. COVID-19 "has inextricably linked

public health into the cycle of active disinformation that has been going on in other arenas for decades,” such as politics, he said.

Active disinformation is an organized effort to push back against governmental views and actions. In public health, Kyriacopoulos said, “it really came to the fore during the COVID-19 response with all of the suggestions that the pandemic wasn’t a big deal; that you didn’t need to pay attention to anything that scientists were saying”—especially those from governmental organizations. Disinformation, by design, seeds confusion, which leads to distrust. Ultimately, it hinders the effective delivery of public health services.

In such an environment, it’s critical to “present accurate facts in an accessible way so that people can understand,” he said, with simple, consistent narratives that can cut through a swirl of noise. “I think it is really going to call on all of us to tighten our language skills and our collaborations so that there is a very solid, unified front” from public health organizations across all levels of government and beyond.

But it became clear early in the pandemic that the American public did not have a clear understanding of what public health was or did, said Brian C. Castrucci, DrPH, president and CEO of the **de Beaumont Foundation**. As federal agencies issued guidance, it was often left up to local officials, the media or even the general public to interpret what those statements meant for people’s lives and actions. “

If we can’t effectively communicate what public health is, how are we ever expecting legislators and the public and business leaders to understand?” Castrucci said. “Our strength would be in having a consistent set of messages that were vetted and tested.”

In summer 2020, that collective sense among public health leaders spurred the creation of the **Public Health Communications Collaborative** (PHCC). Initially founded by the CDC Foundation, de Beaumont Foundation and **Trust for**

America’s Health, the PHCC launched as a centralized communications hub to produce timely, science-based public health messages and resources and coordinate their dissemination to health departments and agencies throughout the country.

Over time, the group expanded its efforts to include misinformation alerts about worrying trends and messages, said Monroe. “In today’s world, there needs to be incredible diligence.”

From Information to Communication

The challenge is further compounded by an erosion of public trust in health information from government officials during the pandemic.

To ensure people hear and—crucially—believe you, it’s imperative to establish yourself as a voice of authority and source of valuable, trustworthy information. One piece of this is to be as transparent as possible about what you know and how, as well as the expectation that recommendations may change as better science becomes available, said Wroblewski. It’s best to assume people are unfamiliar with public health and may need extra context. Wroblewski tries to align herself with her audience. “I have the same desire for answers,” she said. “I can share how I think about things day-to-day, how I decide when to test, what I tell my family and friends and

what I’m doing to keep myself and my family safe. But I can also speak to how new information changes my thinking.”

“Our health officers ... have an opportunity now to be heard. My advice to everyone is start by listening,” said Monroe. Intentional listening lets you take the pulse of your community and understand what people are feeling and experiencing and what they need from you. If people are angry or frustrated, for example, that’s where you need to start, she said. “When you listen intentionally, they will have messages for you that you can translate into really productive communications.”

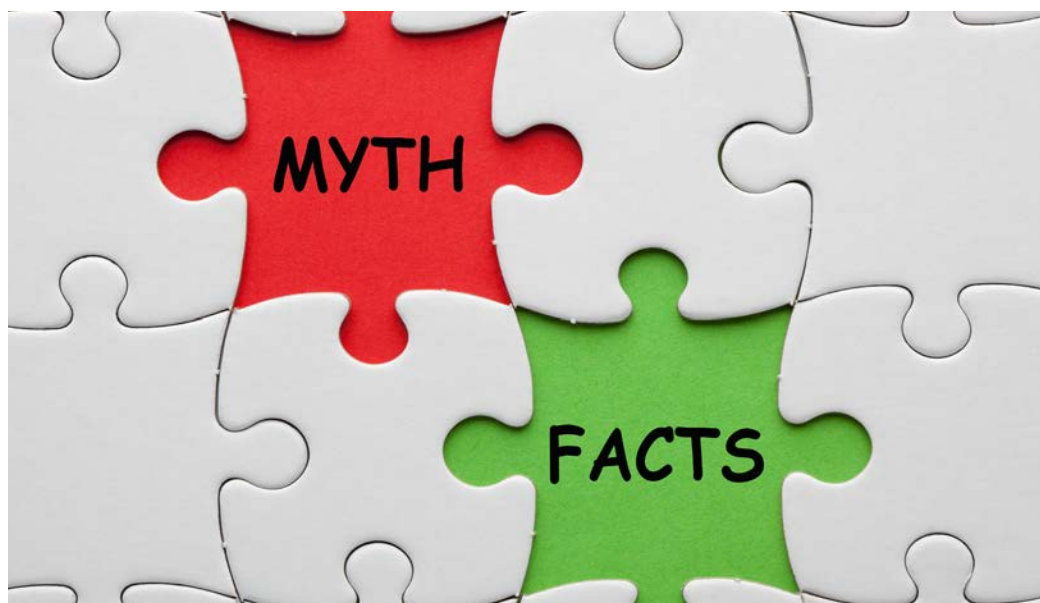
To resonate, communications need to acknowledge the reality of people’s lives, Castrucci noted. This is especially true when public messages from experts about how people should be living their lives may seem out of touch. The recommendation to stay home if you’re sick may seem straightforward. But missing work has high consequences for some people, Castrucci said. “If the choice was either I get someone sick, or my kids don’t eat, I’m getting you sick.”

He recommends embracing the human side, balancing messages about case counts and school closings with empathetic messages. “I know this is hard. But I believe this is the right thing for our community,” he said. “We will get through it. We will band together as this community always has.”



Advocacy efforts at both federal and state levels have boosted government funding for public health. The American Rescue Plan included \$7.6 billion for public health workforce. And this year in Indiana, coordinated communication efforts helped lead to a 1,500% increase in public health funding.





Tips and Takeaways

- Know your messages. Practice saying them and refine them as needed.
- Redirect questions that are not on point so you can share relevant information.
- Keep things simple and only answer the question at hand. Extra information can be confusing.
- Preparation is key, but don't overthink it. Be confident in your expertise.
- Nurture authentic relationships with community partners.

“I think it is really going to call on all of us to tighten our language skills and our collaborations so that there is a very solid, unified front.”

Peter Kyriacopoulos

Sometimes, though, public health officials simply aren't the best messengers. In such cases, an effective strategy can be to tap into existing social networks and find someone who's already part of the community to help carry your message. “What I think we did smartly was engage trusted community partners,” such as religious leaders, college basketball coaches and social media personalities, said Shone. “I think that was quite effective.” The state health department even got NASCAR driver Richard Petty to do a public service announcement. In North Carolina, “he's the king,” Shone said. When he speaks, “it carries weight.”

Even local voices can be powerful—business leaders, a local DJ, the parent who runs the local youth soccer league, Castrucci said. “There's good data that show that those microinfluencers are better at getting people vaccinated for flu than the CDC messaging.”

Turning Visibility into Support

Such experiences highlight the value of community partnerships. Communications with other types of external groups can also build on the increased visibility of labs and maintain momentum, said Kyriacopoulos. Now is a great time to share the services public health laboratories provide and why you are valuable to your community.

Since the start of the pandemic, Megan Crumpler, PhD, HCLD(ABB), director of the **Orange County Public Health Laboratory** in California and APHL president-elect, has seen more recognition within her broader agency and interest in the laboratory's projects and publications. Now she makes a point of sharing regular updates about the laboratory's work—“kind of like keeping a CV” for the laboratory—and is getting encouraging feedback, she said. “It's a great mechanism for us to be able to show that we're still relevant and doing good work.”

She is also building on relationships with public health leadership organizations in the state to play a larger role in advocating for public health policy. She has spoken in front of the California Senate Health Committee and had the opportunity to contribute to relevant legislation, such as for an emerging infectious disease surveillance system and funding for public health laboratory workforce training.

“It's been a really cool experience to be able to have a seat at the table, and now when anything laboratory-related comes up, they come to me,” Crumpler said. “There's mutual respect between the organizations, and they see us as a good source of trusted information.” ■

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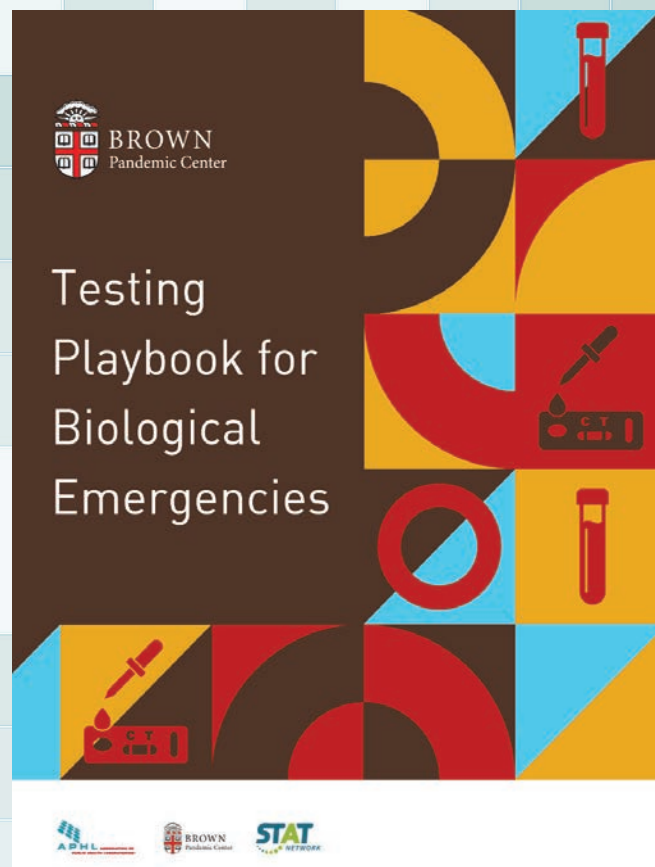
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Considerations for Implementing Wastewater Surveillance in Rural Communities

by **Aparna Keshaviah**, MSc, principal researcher and director, Wastewater Research, Mathematica; **Allison Wheeler**, MSPH, manager, Wastewater Surveillance Unit, Colorado Department of Public Health and the Environment; and **Erin Morin**, MHS, specialist, Environmental Health

Implementing effective wastewater surveillance for **SARS-CoV-2** in rural communities requires additional considerations such as ensuring privacy while sampling in smaller populations, limited laboratory and utility capacity due to fewer personnel and resources, access to representative clinical data for interpretation, and transparent, timely and targeted communications. However, when these factors are considered and addressed, wastewater surveillance can aid in decreasing health inequities in rural communities and serve as a valuable public health tool by providing beneficial information about community health trends.

In summer 2020, **Mathematica** secured funding to launch wastewater surveillance for SARS-CoV-2 in Jackson County, North Carolina. With a population of approximately 43,000 residents, Jackson County is a rural area located in the Southern Appalachian Mountains. Mathematica's goals were to provide local officials with a more comprehensive picture of COVID-19 exposure risk and create a pathway for sustainable monitoring through inclusion in the North Carolina Wastewater Monitoring Network.

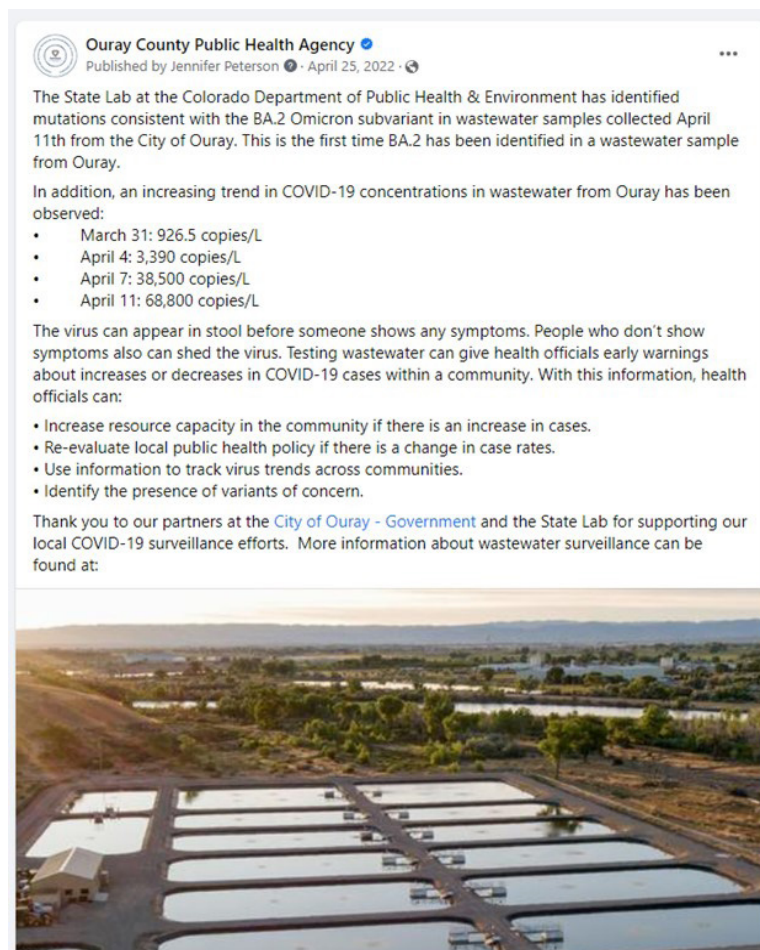
The **Colorado Department of Public Health and the Environment** (CDPHE) also implemented wastewater surveillance for SARS-CoV-2 at the pandemic's start, collaborating with both urban and rural areas. A rural utility in Ouray County serving approximately 1,000 people, began collecting wastewater samples for SARS-CoV-2 testing in February 2022 as a participant in the Colorado Wastewater Surveillance Program. Both Jackson and Ouray Counties considered the following factors to successfully initiate wastewater surveillance in their communities.

Privacy Concerns

Due to the small population of rural communities, privacy concerns can be more prevalent compared to an urban area and reporting practices should be adjusted if monitoring small utilities. Sewershed level-sampling results in pooled community wastewater samples, which allows for the anonymity of residents. Additionally, Colorado does not publicly release data for small populations of 1,000 people or less.

Capacity

The lack of a nearby laboratory caused problems for Mathematica that would have likely been less pronounced in an urban area. This resource constraint forced them to ship their samples to be tested at another laboratory, which caused an information lag. However, by developing a strong partnership with an out-of-state laboratory, data were reliably gathered within a usable timeframe. When the utility in Colorado could no longer sample due to limited staff capacity, the Ouray County Public Health Agency volunteered to assume the responsibility.



An example of the social media posts that were distributed by Ouray County and CDPHE. Photo: CDPHE

They continued collecting samples and communicating the results to ensure the community did not have a break in information.

Data Interpretation and Access to Representative Clinical Data

In rural communities, individuals are less likely to have medical insurance compared to their urban counterparts, leading to decreased healthcare-seeking behavior and data gaps.¹ Wastewater surveillance data can help to fill this

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gap, particularly since utility sewersheds with smaller populations are likely to have less signal dilution than in larger sewersheds with more wastewater inputs. In Jackson County, Mathematica was able to interpret this high-quality granular data into definitive results that informed risk messaging to the public. Clear communications were then developed to target resources for public health action.

Transparent, Timely and Targeted Communications

The key to wastewater surveillance success is establishing communication patterns that earn the residents' trust, resulting in meaningful public health action. Mathematica created short memos and weekly emails to share plain-language summaries of patterns

in the data, and has also developed a **series of briefs** on best practices. To explain community risk based on wastewater surveillance data, the Ouray County Public Health Agency released transparent social media posts developed to be easily understood.

Both Mathematica's and Colorado's experiences have shown wastewater surveillance can be successful in rural areas when specific considerations are accounted for and addressed, yielding valuable and actionable information that is beneficial to public health. Mathematica's success in North Carolina led to Jackson County being one of the first rural communities to be included in the state's program expansion and in Colorado, Ouray County Public health agency used wastewater data to

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effectively message their community about disease risk, proving wastewater surveillance can be successfully executed in a rural community. ■

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Using Public Dashboards to Effectively Communicate Overdose Surveillance Information

By Kelsey Granger, MHS, specialist, Environmental Health

As the overdose epidemic persists and evolves, modern approaches to display and communicate overdose data are necessary. Approximately 106,699 people died of a drug overdose in 2021, and polysubstance (use of more than one drug) overdoses emerged as a significant contributor to overdose deaths, causing nearly half of all overdose deaths in 2019. Federal and state partners have begun to communicate aggregate overdose data via public-facing dashboards. While the US Centers for Disease Control and Prevention (CDC) has national non-fatal overdose dashboards like the Drug Overdose Surveillance and Epidemiology (DOSE), state health departments are also using dashboards to communicate timely overdose data to the public, through close collaboration among public health laboratories, epidemiologists and communications officers.

Rhode Island Non-Fatal Overdose Biosurveillance Data

In July 2019, the Rhode Island Department of Health (RIDOH) began requiring hospitals to submit urine specimens from patients who were admitted to emergency departments for suspected opioid overdoses to the RIDOH State

Health Laboratory (RI SHL) for definitive testing to determine substances implicated in overdoses, including opioids, opiates and fentanyl analogues. Since October 2021, the RI SHL also tests for stimulants and benzodiazepines, and now collects blood specimens which provide clearer information on substances responsible for overdose. Demographic information—including gender, location and age—are submitted with each specimen.

RIDOH overdose information is available in two formats. For data-savvy public health partners, the main data hub is hosted on ArcGIS and features graphic visualizations of various characteristics of non-fatal overdose data. Designed for the public, PreventOverdoseRI.org serves as a central location for all overdose data for the state.

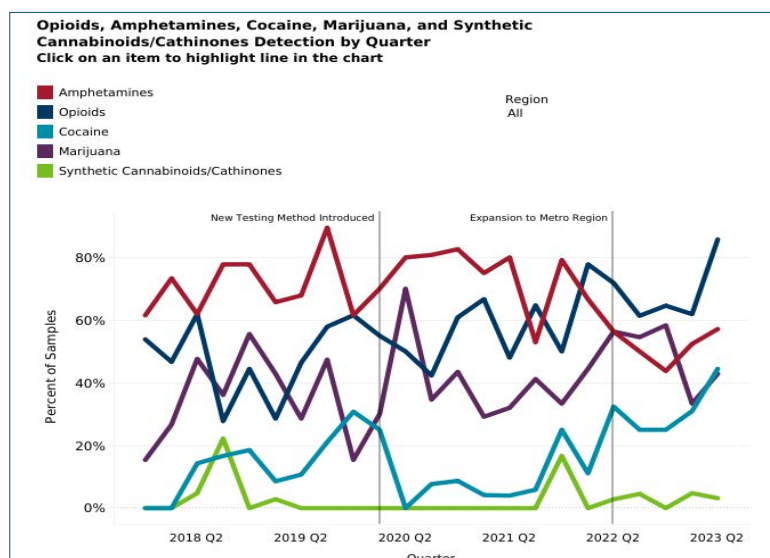
“The websites together serve as a one-stop shop for anything they want to know around substance use, rather than having to visit multiple pages,” states Benjamin Hallowell, team lead, RIDOH Substance Use and Epidemiology Team. The centralized nature of RI’s overdose data has workload benefits too—since launching the public site, the number of data requests received by RIDOH has

drastically declined. Previously, health department staff sometimes had dozens of data requests to respond to per week.

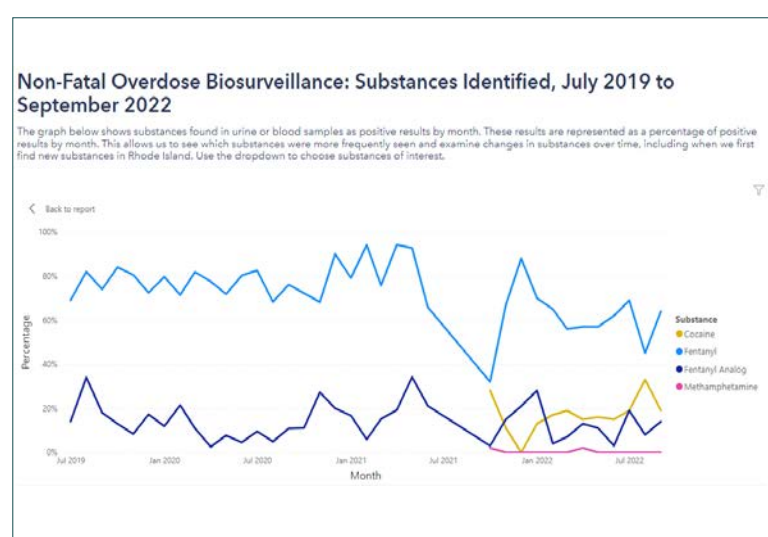
Minnesota Drug Overdose and Substance Use Surveillance Activity (MNDOSA)

MNDOSA was launched by the Minnesota Department of Health (MDH) in 2017 to rapidly track cases of substance misuse and overdose resulting in hospitalization. Specimens are submitted by hospital partners to the Minnesota Public Health Laboratory for detailed toxicology testing to identify substances used—including for severe or unusual cases—for which MDH also collects data on the circumstances and risk factors involved in the case. Minnesota tests for over 900 substances to identify substances or combinations of substances present at the time of treatment, which gleans valuable insight on polysubstance overdose trends. To ensure data is accurately contextualized, MNDOSA has close collaboration with clinical and poison center partners, exemplified in this report.

MNDOSA displays data through regularly updated graphs on the MNDOSA website and provides accessible versions of each



This view is one of several available views of the MNDOSA dashboard. Viewers can click on an item to highlight a line in the chart for a particular substance and change the region for which information is displayed



One view of the RIDOH dashboard. Viewers can select drugs of interest and hover over data points for additional information

information graphic. When scrolling on MNDOSA, pertinent information for overdose trends in Minnesota are easily elucidated. For example, substances most detected by MNDOSA are amphetamines, and combinations of opioids and amphetamines are also frequently detected together. Information from MNDOSA helps inform overdose and substance use prevention efforts, as collection of demographic information helps identify populations most at-risk.

“As we expand throughout the state, we envision MNDOSA will operate as an alert and response system, allowing for data sharing across regions as new trends and substances are seen in communities, and enabling communities to leverage their data to inform responses to outbreaks or spikes in overdoses,” says Deepa McGriff, PhD, epidemiologist, MDH. ■

*On International Overdose Awareness Day, August 31, 2023, CDC awarded \$279 million in funds through two Overdose Data to Action (OD2A) cooperative agreements, **OD2A: LOCAL** and OD2A in States.*

OD2A funding was awarded to 90 jurisdictions in localities and states across the country to support the implementation of overdose prevention activities and to enhance the collection of overdose data. Under OD2A in States, 20 state health departments received funding for laboratory biosurveillance activities. In biosurveillance, clinical specimens collected from patients who were treated for an overdose at a hospital emergency department are submitted to a public health laboratory for definitive testing to determine substances implicated in overdoses.

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Laboratory Design Matters Workshop Goes International

By **Maria Landron**, senior specialist, Global Health; **Jocelyn Isadore**, manager, Global Health; **Lucy Maryogo-Robinson**, director, Global Health; **Sherrie Staley**, deputy director, Global Health; **Warren Hendrickson**, vice president, Science + Technology Principal, HDR, Inc.; **Michael Mottet**, associate vice president, Principal Planner, HDR, Inc.; and **Victor Waddell**, bureau chief, Arizona Bureau of State Laboratory Services

The Laboratory Design Matters workshop is an interactive workshop designed to help attendees improve biosafety and biosecurity in their facilities, organizations and respective countries. The workshop was launched as a virtual pilot in November 2020 during the COVID-19 pandemic response. There was a recognized need and increased interest in renovations and construction of public health laboratories. Since then, APHL, in collaboration with APHL members as faculty, offered a one-day in-person workshop during the APHL Annual Conferences in 2022 and 2023, hosted in the United States. But the workshop was always intended to be offered internationally—with additional experience and improvements, Laboratory Design Matters was successfully launched internationally for the first time in 2023.

The first international workshop was delivered in Nairobi, Kenya, September 12-14, 2023. It was a three-day in-person workshop, and the invitation was open globally. There were 32 attendees representing 10 countries: Botswana, Cameroon, Ethiopia, India, Kenya, Oman, Rwanda, Tanzania, Uganda and Zambia. Each country brought experiences, opportunities and challenges related to laboratory design, biosafety and biosecurity. The workshop included multiple interactive sessions and group activities, including:

1. Completion of a situational analysis to identify the strengths, weaknesses, opportunities and threats (SWOT analysis) of the laboratory.
2. A thorough risk assessment exercise.
3. An activity to recognize flaws in a laboratory floor plan.

The workshop also included several open forum sessions, allowing attendees to share experiences and ask questions.



Workshop attendees take a break in Nairobi, Kenya.

An increase in participant knowledge was measured through a pre/post-test, with an increase in knowledge indicated through an average increase in test scores from 65% pre-workshop to 88% post-workshop. Attendees included biomedical engineers, laboratory technical personnel, biosafety professionals and laboratory management. There was also representation from the public sector (e.g., Ministry of Health, Ministry of Defense, and research institutes) as well as the **World Health Organization (WHO)**, the **US Centers for Disease Control and Prevention (CDC)**, and private sector companies. The diversity in the audience—not only geographically but also in the professions represented—reinforced the message embedded in the guidelines: the importance of having a comprehensive team and representation from different collaborators during the laboratory design process.

A post-workshop survey was shared with the September 2023 workshop attendees. Information provided by participants will allow APHL to adapt and enhance the workshop and identify other related training needs. ■

This awareness-level workshop targets a diverse audience: biosafety professionals, facility operations and maintenance personnel, laboratory management, biomedical engineering professionals and technical personnel. After completing the workshop, the attendees can:

1. *Perform a thorough laboratory assessment to identify issues, needs, deficiencies or problems.*
2. *Discuss how to assemble and synthesize pre-design information appropriate to the development of a laboratory facility, including risk assessment.*
3. *Summarize the use and applications of the **APHL Laboratory Facility Construction and Major Renovation Guidelines**.*
4. *Outline the steps required for renovation or new laboratory construction projects using the **Laboratory Design Checklist**.*

The workshop can also be tailored to include topics such as high containment/heightened control measures, allowing attendees to explain high containment renovation and construction design principles.

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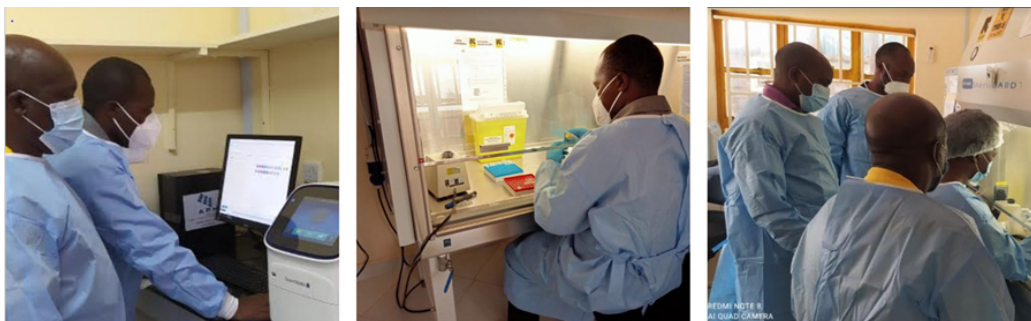
Laboratory Strengthening in Two Hard-to-reach Refugee Camps in Northern Kenya

By **Jully Okonji**, senior laboratory specialist, APHL Kenya; **Romeo Kithuka**, laboratory specialist, APHL Kenya; **Edwin Ochieng**, senior laboratory technical manager, APHL Kenya; and **Maria Landron**, senior specialist, Global Health

Kenya hosts the largest refugee population in East and Central Africa and, as vulnerable populations, they are under the protection of **United Nations High Commissioner on Refugees** (UNHCR). The **International Rescue Committee** (IRC) is a UNHCR implementing partner in health services for refugees and oversees the laboratory operations in camps located in Kakuma and Dadaab. The **US Centers for Disease Control and Prevention** (CDC) Refugee Program and the Ministry of Health in Kenya, with support from UNHCR-affiliated agencies, has consistently conducted passive surveillance of infectious diseases like polio, measles and other upper respiratory diseases in the region, targeting both host communities and refugee populations.

Since August 2021, APHL, through a cooperative agreement with CDC, has provided laboratory strengthening support to the two refugee laboratories through quality management systems implementation training to staff, provision of laboratory commodities, purchase of molecular equipment and molecular mentorship. The main objective was to improve laboratory molecular testing services for **SARS-CoV-2** and diagnostics for other infectious diseases that are prone to the two camps. Despite the harsh environmental conditions due to extreme heat and bad terrains and the nature of the vulnerable populations served, there was need to ensure quality of services were not compromised and these factors did not deter the APHL team from relentlessly providing services to the two camp sites.

The outcomes of the ongoing APHL/CDC cooperative agreement resulted in molecular laboratories being established in the Dadaab and Kakuma locations, improvement in laboratory



Laboratory staff at the IRC Kakuma Refugee Camp perform RT-PCR for SARS-CoV-2 following successful molecular PCR training by APHL staff



APHL Kenya staff conduct a laboratory quality management system mentoring session

quality services as attested by the IRC clinical teams and a UNHCR lead who had an impromptu visit to the IRC-Kakuma laboratory and organized laboratory workspaces. Further, there was improvement in staff knowledge through mentorship programs conducted. Currently, the laboratory in IRC-Kakuma is preparing for assessment by the accrediting body for ISO 15189:2022 and would be among the first laboratories in Kenya to be audited and accredited based on the revised standard. The IRC-Dadaab

laboratory is under a laboratory continuous quality improvement program. The APHL team identified gaps in data utilization that led to the IRC team being trained in data analysis and interpretation. The laboratory infrastructure developed would be able to support outbreak investigations, antimicrobial resistance gene detection, among other laboratory services that remain important for the Kenya surveillance team. ■

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Strengthening Respiratory Laboratory Networks

By Maureen Sullivan, MPH, manager, Respiratory Diseases

The emergence of **SARS-CoV-2** and the ongoing COVID-19 pandemic have changed the landscape of respiratory virus testing and surveillance. Historically, public health departments and public health laboratories worked together to develop robust partnerships with clinical laboratories and clinician offices to create influenza specimen submission networks. Leveraging these existing networks to develop a more comprehensive respiratory virologic surveillance system that includes influenza, SARS-CoV-2 and potentially other respiratory viruses, is essential for robust virologic surveillance; however, these networks have been disrupted by the pandemic. Staff turnover, overtaxed healthcare and public health systems, and changes to the way individuals seek testing have all contributed to the challenges with maintaining public health access to specimens.

What can laboratories do to remedy the situation and meet the shifting demands for surveillance data on not just influenza, but SARS-CoV-2, **respiratory syncytial virus** (RSV) and the next emerging respiratory pathogen? Communication is at the center of establishing and maintaining all successful specimen submission networks. Building relationships with clinical laboratory partners and engaging in routine lab to lab conversations helps cultivate sustainable relationships.

"An overarching emphasis on our communication with clinical labs is that they are part of public health, and the surveillance and outbreak response that we do is all dependent on their involvement – we thank them a lot for this!"

--Al Bateman
Wisconsin State Laboratory
of Hygiene

Public health laboratories foster these relationships in a variety of ways. Several publish quarterly newsletters or annual surveillance summary reports to share information back to submitters underscoring the importance of clinical laboratories' contribution to public health surveillance efforts. Other common strategies include delivering training and education, providing annual specimen submission guidance and highlighting the importance of clinical laboratory engagement in the public health system.

For example, the **Wisconsin State Laboratory of Hygiene** (WSLH) has created a Clinical Laboratory Network (WCLN) and coordinates a 10-member Laboratory Technical Advisory Committee (LabTAG), both of which have been instrumental in their success. Clinical laboratory representatives from across the state help determine what continuing education topics are most important for clinical microbiologists, and then WSLH offers numerous P.A.C.E.® accredited webinars and one-day in-person meetings on the suggested topics. This level of partnership contributes to its success.

Public health laboratories use incentive programs to encourage and motivate their partners to submit specimens. Some states have successfully recruited COVID-19 testing sites to join their specimen submitter networks. Others have leveraged existing programs, coordinating with epidemiologists throughout the state and using the newborn screening courier systems to connect new providers to the surveillance network. Anything the public health laboratories can do to minimize barriers for submission including providing free, easy-to-use specimen collection kits with clear and comprehensive instructions

Anything we can do to make the process less burdensome, it's a win-win situation!"

--Kate Fitzpatrick,
Arizona State Public Health Laboratory

have been helpful. For laboratories with electronic lab portals, the ease and speed of the specimen submission process and result tracking may be an incentive. The **Arizona State Public Health Laboratory** offers the flexibility and support of their surveillance network, including electronic test ordering for all influenza submissions with a batch entry field. It also provides the option to order collection supplies for surveillance activities and free courier service for specimen delivery, which allows rural or resource restrictive sites to participate in the surveillance system.

Collaboration, communication and coordination between public health epidemiologists, clinical and hospital laboratories, and public health laboratories can enhance current respiratory virus surveillance networks to go beyond influenza and SARS-CoV-2. By working together and focusing on comprehensive respiratory virus surveillance networks, we will better understand and respond to emerging threats and protect the public's health. ■

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Informatics Infrastructure Supports Antimicrobial Resistance Testing

By Alyssa Mattson, specialist, Informatics

Laboratory testing data is the cornerstone of public health decision making—driving patient treatment, epidemiologic investigations, outbreak response, resource allocations and policy development. Reliable and actionable testing data must move efficiently and multi-directionally—with minimal manual touchpoints—to rapidly inform patient care and public health solutions.

In the global effort to combat **antimicrobial resistance** (AR), early case detection and rapid intervention facilitate the containment of drug-resistant pathogens, making electronic data exchange a foundational component of public health response. With the inception of the **AR Laboratory Network** in 2016, the **US Centers for Disease Control and Prevention** (CDC) formalized a coordinated domestic testing and reporting strategy for 56 state and local jurisdictions, including enhanced capabilities within seven AR regional laboratories. AR Laboratory Network efforts are supported by the **Epidemiology and Laboratory Capacity (ELC) cooperative agreement**, including key informatics initiatives that ensure interoperability of testing data to improve patient care, local and national prevention efforts, and outbreak response.

Informatics Initiatives for a Changing AR Landscape

APHL has launched several important informatics initiatives to maximize data exchange across the AR Laboratory Network, with ongoing enhancements addressing emerging AR concerns and testing innovations.

“The latest informatics features are helpful when working with CDC and our state AR Lab Network epidemiologist to help find and address gaps in our reporting,” said Mary Anne Thomason, team lead for Public Health Laboratory IT Services at the **Washington State Department of Health**. “I have been able

to analyze and address data errors and have seen the number of errors reduced by half over a two-month period. We continue to make sure our data quality improves using AR tools,” she stated.

Lab Web Portal

The Lab Web Portal (LWP) serves as an electronic test order and results (ETOR) web portal solution to improve multidirectional testing data between submitters and laboratories. Implementation of this platform reduces use of paper test orders and reports, which are error-prone and inefficient. LWP provides the ability for the AR regional laboratories to achieve a two-day turnaround time, improving response time for both direct patient care and outbreak investigations.

Data for Action on Antimicrobial Resistance Threats

The Data for Action on Antimicrobial Resistance Threats (DAART) repository is an interoperable platform for all state and local ELC-funded jurisdictions to submit testing result data to CDC. Access to robust, real-time data expedites the detection of AR threats in healthcare settings and the community, providing the information needed to coordinate containment efforts. “DAART has become my ‘go to’ application to identify **Health Level Seven®** (HL7®) message errors for the different AR programs,” said Thomason. “We can download, review and correct those errors on a daily, weekly and monthly basis. I particularly like the processing monitor view that shows me how many messages have been processed by program and if any messages had issues.”

HL7® Messaging

To leverage the power of standardized reporting, focused efforts are being made to modernize the mode of data exchange to HL7® messaging. HL7® provides data standards and ensures

interoperability of data between systems. Increased adoption of HL7® messaging for the AR Laboratory Network allows CDC to receive data in a standardized format for higher quality and faster analysis.

Building for Expanded Testing and NGS

The AR Laboratory Network continues to strengthen diagnostic testing capabilities and leverage the use of new technologies such as next-generation sequencing (NGS) to better understand AR pathogens. Recently, the AR Laboratory Network expanded HL7® reporting capabilities to include NGS metadata to enable CDC to link sequencing results in the **National Center for Biotechnology Information** (NCBI) database to specimen information in DAART for surveillance of drug-resistant pathogens.

At the foundation of these initiatives is **AIMS**, a secure cloud-based public health data exchange platform. Collectively, these efforts lead to higher quality AR data, which bolsters disease tracking and trending, and guides intervention and resource needs.

Public health informatics continues to evolve with laboratory testing to leverage the functionality of electronic data exchange. Together, these efforts help prevent the spread of antimicrobial resistance and save lives. ■

*To support informatics efforts, APHL **technical assistance specialists** assist public health laboratories, public health agencies and other data exchange partners in the planning and implementation of data exchange solutions. For technical assistance, please contact informatics.support@aphl.org.*

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Fostering Trust Through Candid ColLABoration

By Sean Hannigan, specialist, Informatics

In the dynamic realm of public health laboratory informatics, a profound transformation is underway. As the digital age advances, technology intertwines with the mission to protect and improve public health. Public health laboratory experts find themselves at the intersection of data, technology and healthcare, navigating a complex landscape that demands innovation and collaboration. With the advent of the **COVID-19** pandemic, the need for laboratory informaticians to connect with colleagues became more crucial than ever before. They needed mechanisms to compare solutions and approaches, standardize data for reporting and, in short, find ways to make sense of the staggering volumes of testing data and demands. One way that APHL was able to help foster that critical community was in the expansion of groups on **CollABorate**, APHL's online community. This included a variety of system-specific laboratory information management system (LIMS) user groups and the launch of the Public Health Laboratory Informatics Community, as well as several others outside of the informatics domain.

The Power of Open Dialogue

Trust is the cornerstone of effective public health communication. For laboratory experts, cultivating trust begins within their own professional community. The

APHL ColLABorate communities provide a unique platform where laboratory professionals from diverse backgrounds can engage in open and candid discussions. In this space, transparency reigns supreme. Members openly discuss the challenges they face, the lessons they have learned, and the innovative solutions they have devised.

Sharing Evidence-Based Knowledge

In the digital age, the information landscape is flooded with data—much of it unverified or misleading. Trust in public health communications hinges on the foundation of credible, evidence-based information. APHL ColLABorate communities serve as a knowledge exchange hub where members share their expertise, research findings and data-driven insights. This knowledge sharing is underpinned by rigorous research and real-world experience. Members contribute their expertise, backed by findings and best practices. As a result, the information disseminated through these communities is not only reliable but trustworthy.

The Collaborative Advantage

In the intricate world of public health, collaboration is key. Complex health challenges demand a multidisciplinary approach, bringing together experts from various domains. APHL ColLABorate communities serve as catalysts for such collaboration, enabling laboratory professionals to work collectively on intricate issues and leveraging the collective wisdom and experience of the community. This results in more robust and effective solutions.

Transparency in Decision-Making

Public health communication frequently involves critical decision making that impacts the well-being of entire communities. The APHL ColLABorate communities provide insight into these decision-making processes within the public health sector. Transparency in decision-making is a vital component of building trust. When laboratory experts engage in open discussions about the factors influencing decisions and the expertise that informs them, it reinforces trust. Transparency fosters an understanding of why certain actions are taken, helping the public recognize the thought and expertise that goes into public health decisions. This bolsters trust in the decisions themselves and the professionals making them.

A Trust-Building Imperative

In the evolving landscape of public health laboratory informatics, trust is the bedrock upon which effective communication is built. APHL ColLABorate communities play a pivotal role in nurturing this trust through open dialogue, evidence and experience-based knowledge sharing, collaboration, peer review and transparency. APHL's ColLABorate discussion boards have a wide range of area-specific topics beyond public health Informatics including biosafety, microbiology, environmental surveillance, public health bench science and the laboratory directors community, to name just a few. As we grow to meet the needs of our members, our communities of knowledge grow too. ■



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Piloting the ISO 35001:2019 Standard

By **Stormy Chester**, specialist, Biosafety and Biosecurity and **Michael Marsico**, manager, Biosafety and Biosecurity

In November 2019, the International Organization for Standardization (ISO) published the **ISO 35001:2019 Biorisk management for laboratories and other related organisations**. The 35001 standard marks a significant milestone in the realm of biosafety by promoting a process to identify, assess, control and evaluate biosafety and biosecurity controls within any laboratory. APHL and the **US Centers for Disease Control and Prevention (CDC)** established a cooperative agreement to implement the ISO 35001 standard beginning with two public health laboratories: **New Hampshire Public Health Laboratories (NH PHL)** and **Virginia Division of Consolidated Laboratory Services (VA DCLS)**. As the pilot program concludes, APHL is eager to highlight the invaluable experience of these two laboratories and the impact implementing the standard had on the two institutions.

Jill Power, MS

**Biosafety Officer/Quality Coordinator
NH PHL**

Implementing the standard into our laboratory improved our safety practices, provided a standardized approach to manage those safety practices, created more participation and interest in our safety culture, and improved our quality management program. This standard brought quality and safety together, and I was hopeful that staff would see the value in it by improving their daily work processes. As part of leadership in the



Jill Power and Michael Stevenson. Photo: NH PHL

laboratory, it is important to make staff feel safe working with many different microbes and other potentially infectious materials. Management strives to listen to staff regarding safety concerns. Along with monitoring safe practices, performing risk assessments and measuring safety and quality objectives, implementing the ISO 35001 standard assists in standardizing the approach to assure biosafety concerns are met.

Michael Stevenson, PhD

**Deputy Laboratory Director
NH PHL**

One of the most important changes from being involved in this project was our establishing biorisk management (BRM) objectives for each calendar year. Through these BRM objectives, we strive to continuously improve the quality of our safety program. Through the pilot program, NH PHL and VA DCLS came together to share resources and experiences of how to implement and sustain the objectives of the ISO 35001 standard. Similar to the APHL Biosafety Peer Network Program, both NH PHL and VA DCLS staff were able to visit the other agency's institution to examine that laboratory's strengths and proficiencies in biosafety and biosecurity. Lessons learned from participating in this pilot project can apply to having a robust and effective chemical hygiene plan, which also is an important component for staff to work safely in the laboratory.

Ellen Basinger

**Quality and Safety Manager
VA DCLS**

Involvement in the pilot program allowed VA DCLS to identify strengths and weaknesses in our biosafety and security programs. Having the ISO 35001 standard assessment helped to identify specific elements where there could be improvements in policies and procedures. The standard evaluated five elements:

- Leadership/organization



NH PHL promotes the culture of safety by implementing a staff bulletin board to promote wellness and highlight staff, trainings, laboratory updates and quality, security and safety. Photo: NH PHL

- Personnel
- Risk assessment
- Risk mitigation
- Performance and evaluation.

After receiving the assessment findings and suggestions, VA DCLS was able to create SMART objectives to define what needed to be improved and how to reach the end goal. The program not only provides laboratory support, but also mentors and experienced individuals to help throughout the journey. The program not only helped improve the laboratory's biosafety and biosecurity program but also provided the information needed to create new programs. I would strongly recommend laboratories consider participating in this program.

APHL would like to recognize NH PHL and VA DCLS for their exceptional dedication and unwavering commitment to the 2022-2023 CDC/APHL ISO 35001 Pilot Program. APHL will continue to implement this standard and promote the value of ISO 35001 with other public health laboratories in the future. ■

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APHL and CDC Partner with the Institute of Epidemiological Diagnosis and Reference Laboratory

By **Tyler Wolford**, manager, Emergency Preparedness and Response and **Rana Rahmat**, specialist, Laboratory Response Network

The **Laboratory Response Network** (LRN) represents a cooperative initiative involving several key entities, including APHL, the **US Centers for Disease Control and Prevention** (CDC), the **Federal Bureau of Investigation** (FBI), and the **US Department of Defense** (DoD). It serves as a seamlessly integrated network encompassing state and local public health laboratories, federal agencies, military institutions and international laboratories with the expertise and resources required to address potential biological, chemical and radiological threats. Within the LRN, the **LRN for Biological Threats Preparedness** (LRN-B) plays a vital role in preparing for and swiftly responding to biological threats such as anthrax, as well as emerging infectious diseases like **Ebola**.

Beyond their proactive response to threats, the LRN actively collaborates with and provides support to laboratories in other countries when necessary. These collaborative efforts with neighboring nations like Canada and Mexico play a pivotal role in reinforcing the preparedness system by facilitating the exchange of knowledge and information, as well as aiding these laboratories in their strategic planning. A recent example of these cooperative efforts was in August 2023, when representatives from APHL and CDC, along with the **Arizona State Public Health Laboratory**, conducted an on-site visit to the Institute of Epidemiological Diagnosis and Reference (InDRE), a public health laboratory in Mexico City. This international partnership assisted the InDRE laboratory in identifying its training requirements and laying the groundwork for implementation of operational LRN capabilities. These potential training opportunities will include:

- LRN methods for threat agent detection (e.g., time resolved fluorescence and polymerase chain reaction).



Attendees from CDC, InDRE and APHL gathered to discuss training opportunities and expanded partnerships

- Collection and processing of food and powder samples.
- Response to emergencies and contingencies within a biological containment laboratory.
- Selection, set-up, use and removal of personal protective equipment (PPE).
- Biological Safety Laboratory 3 (BSL-3) standard biosafety and biosecurity practices and procedures, including cleaning and disinfection methods.
- Use of Class III biological safety cabinets.

*APHL has maintained a longstanding association with the **Canadian Public Health Laboratory Network** (CPHLN), fostering direct communication between CPHLN laboratories and state public health laboratories, promoting the exchange of ideas and information. Additionally, the CPHLN-APHL partnership paves the way for cooperative endeavors addressing technical challenges and other activities that mutually benefit their members.*

- Responsiveness to epidemiological emergencies in urban and rural areas.
- First aids and first psychological aids within biological containment facilities.

The LRN-B extends its educational offerings domestically as well, with more extensive methods courses. These include the LRN Rapid Methods Course, which concentrates on molecular detection techniques and sample handling and the LRN Conventional Methods Course, which encompasses traditional microbiological detection methods like culturing, microscopy, gram staining and biochemical testing. Moreover, the LRN-B facilitates unique training opportunities for emerging technologies. In February 2018, APHL and CDC co-hosted a training session on the **Botulinum Neurotoxin EndoPep–Mass Spectrometry** assay, attended by 14 laboratory scientists who received specialized training. In February 2023, five LRN-B laboratories and their staff participated in a virtual training for a new resazurin dye-based rapid antimicrobial susceptibility test for **Bacillus anthracis**. This virtual training opportunity will pave the way for more accessible trainings in the future.

These partnerships and international collaborations play a pivotal role in the establishment of a robust public health infrastructure capable of effectively addressing both day-to-day threats and global public health crises. Such relationships facilitate the seamless exchange of knowledge, information and resources essential for fortifying various facets of the public health system. ■

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APHL's Emerging Leaders Address Challenges in Recruitment and Retention at Public Health Labs

By **Marisa Barley**, member, Cohort 16, APHL Emerging Leader Program and senior specialist, Systems, Training and Workforce Development

Recruitment and retention continue to be two of the biggest issues facing public health laboratories. According to **APHL's 2022 Laboratory Workforce Profile Survey**, 42% of the public health laboratory workforce intend to leave their current laboratory within four years, with low salary and a lack of career advancement as the top reasons for leaving.

When Cohort 16 of **APHL's Emerging Leader Program (ELP)** met for the first time in Seattle, WA in September 2022, there was an overwhelming consensus that recruitment and retention were two crucial workforce development topics to address. During this time, and after many months of hard work and improving their leadership skills, Cohort members produced two projects to address recruitment and retention concerns at public health laboratories—the **Public Health Laboratory Ambassador Program** and the **Employee Advocacy Workbook**.

The Ambassador Program is aimed at recruiting the next generation of the public health laboratory workforce and relies on volunteer Ambassadors to work in conjunction with the **APHL Academic Partnership team** and their home public health laboratory institution. Anyone currently or previously employed within the public health sector is welcome to complete an **interest form**. Becoming an Ambassador may sound daunting but resources were created to support outreach efforts, including an outreach email template, flyers and a presentation. Ambassadors are also added to a ColLABorate group for discussions on successes, challenges and opportunities within the program. Ambassadors



are expected to participate in one documented and approved event per academic calendar year.

The Employee Advocacy Workbook is a platform built to facilitate straightforward communication between public health laboratory bench scientists and their supervisory staff to address employee communication challenges in hopes of increasing retention. The Workbook is flexible and adaptable for different management structures at all levels. The Workbook has two parts: one for employees to conduct a **self-assessment** and another for **supervisors to assess their team**. These tools include discussion topics for self-advocacy and improving communication, ideas for boosting employee morale, methods for rewards

and recognition and a **professional development tracker**.

ELP Cohort 16 piloted these projects in their own laboratories with great success and are thrilled to share them with other public health laboratory staff looking to increase staff retention at their laboratories and recruit the next generation of the public health workforce. For any additional questions related to the Public Health Laboratory Ambassador Program, please contact **academic.partnerships@aphl.org**. ■

*The APHL Emerging Leader Program brings together a cohort of laboratory professionals for a 12-month program of skill development workshops, networking opportunities, leadership exercises and project development. For more information about APHL's Emerging Leader Program, please contact **leadership@aphl.org**.*

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