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MATTERS

analysis|answers|action

Summer 2024 Issue 2

Riding the Wave

of Public Health Laboratory

Funding into the Future

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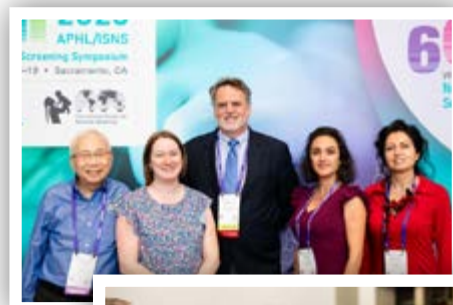
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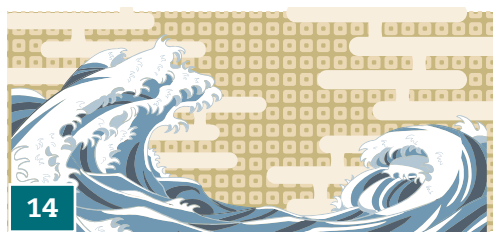
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The Association of Public Health Laboratories (APHL) works to strengthen laboratory systems serving the public's health in the US and globally. APHL's member laboratories protect the public's health by monitoring and detecting infectious and foodborne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

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The Benefit and Promise of Mid-Career Leadership Roles

As I get ready to hand the president's gavel to my worthy successor, Dr. Megan Crumpler, I have the opportunity to reflect on my leadership journey within APHL. While I will still be on the Board as past-president, I won't be so involved in the day-to-day workings as I was. But this gives me a chance to reflect on my years in the president-elect and president positions.

Attending APHL 2024 really gave me the chance to connect and re-energize my passion for public health. Being able to interact in person with my colleagues, whom I also consider to be friends and, for some, family, to me and my team in South Dakota was refreshing. To have a meal with somebody, to sit down and to have a drink with somebody, to meet somebody new, to see a lot of the new faces who are now leading America's public health laboratories is a great, yet humbling, experience. It seems like every month there's more new faces at all levels of public health laboratories, and that revitalization of our ranks is essential for us to stay fresh, focused and current.

I have also come to greatly respect and adore the APHL team. They are a team that we, as public health laboratory leaders from around the country, don't always get to see working behind the scenes. These past years have completely redefined how I interact with, how I view, and frankly how I appreciate all of the hard work that happens before, during and after a meeting, event or conference. We celebrate people like Terry Reamer at these events because we see the results. But unless you're really involved in the planning or leadership positions, we don't get to see the hard work that happens on those days when Terry's sitting in an office trying to book the next three conferences. Or as Camille Walker is reaching out to our sustaining members for their participation in our Innovate sessions. From governance practices and

procedures to conference planning and execution, it's been very educational for me, and it has allowed me to really develop and mature my appreciation for what APHL does to fully support its members.

I can't tell you how thankful I am to have been able to do this at an early point in my career. It has been formative and has transitioned how I view public health, my public health laboratory, and my fellow laboratory directors and their staff. I think my experience is going to enhance public health laboratory science in South Dakota for many years to come, because I was able to have that 30,000-foot view, while I was working on the ground in my state.

While I look forward to many more years in this community, the reality is that we continue to see intrusion of politics into public health. We experienced this throughout the pandemic. Our Kati Kelley lecturer, Dr. Peter Hotez, highlighted for us how politics is truly shaping public health, and in many ways not for the better. But to be able to reflect, connect and find the bright light in everything we do is a gift. I know that public health is always going to be my passion, and I want to say a big thank you for the past year. I'm proud to have served and I'm very excited to support Megan in the next year.

“ I can't tell you how thankful I am to have been able to do this at an early point in my career. It has been formative and has transitioned how I view public health, my public health laboratory, and my fellow laboratory directors and their staff. ”



Timothy Southern, PhD
President, APHL

Changing the Association for Changing Times

If you think about APHL presidents now and you think of our presidents 20 years ago, the same commitment is there in terms of science and leadership. What's changed is their roles back home in their public health laboratories. It is a very different job than it was 20 years ago, 15 years ago, 10 years ago and five years ago. While it used to be overseeing a facility of highly educated experts and engaging mostly in science, in today's world, they take on a larger variety of roles: tour guide, communications expert, mentor, cheerleader, as well as scientific leader. I think the same thing is true with APHL.

At APHL, we are not stagnant because our members are not stagnant. The issues certainly change all the time, and we focus on changing our ways of thinking with the times, changing with whatever is thrown at us, trying to also predict and to be on the front end of whatever it happens to be. For example, we've been thinking about the workforce development crisis for a long time. We've been plotting, we've been planning, and when the opportunity came, we made a case that there needs to be an infusion of resources so that we can reinvigorate what was a once rather small fellowship program. But it was also understanding the time that we're living in, understanding what the opportunities are, what the challenges are. The commitment hasn't changed, the work life has changed. And we have to adapt with it to support our members best.

One of the benefits that I have in my role is that I get to work with a great group of people, but transition and change does happen. In my many years at APHL, I have had the good fortune to have worked with many individuals at all levels of our membership. If you look across our organization and to our past leadership, many of those folks are still engaged. So, we don't let you go—once you're in, you're in! What is interesting to me about APHL's member leadership is that they

are more early- to mid-career than in the past. That's a good thing because not only do they have many more years to give us in different ways, but they are also a reflection of the changing demographics within our membership and offer new ways of thinking and approaching different situations.

As a membership organization, member engagement is critical. In my presentation at the opening session at APHL 2024, I commented on the fact that we have over 5,300 people engaged in APHL activities—committees, subcommittees, workgroups, focus groups and taskforces. As I was preparing that slide, I kept wondering “Who ARE all these people?” Then I saw a few of them—over 1,300 strong—at APHL 2024! I also was able to show photos of recent groundbreaking, many of which were in rural and frontier communities, reflecting Tim Southern's priority of engaging those communities. We know it takes time for these things to rise to a certain level of awareness. But when they do finally get there, it enriches all our experiences.

The continued member engagement is so exciting. You feel it at in-person meetings, you feel it on virtual platforms when talking to colleagues and peers, and you feel it during those committee calls when our folks really connect on issues that they are passionate about. We want that energy to also come through our podcast, through our communication channels and through all the publications we have. Because all those voices matter. I used to joke inside APHL that we would often go to STP—the same 10 people, same 20 people, same 30 people—when we needed some expertise or wanted to have our members' voices heard. That is not the case anymore. The world does change, and APHL changes as needed. While I get to have a new boss every year, I also get to partner with people for a long period of time. And that keeps me coming back, year after year. ■

“The commitment hasn't changed, the work life has changed. And we have to adapt with it to support our members best.”



Scott Becker, MS
Chief Executive Officer, APHL

APHL Internship Pool Offers Summer Relief to Wisconsin

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

The Wisconsin State Laboratory of Hygiene (WSLH) dove into the Public Health Laboratory Internship Program last summer hosting 17 interns. This year, the laboratory is looking to host 14 summer interns.

In 2023, 17 interns—15 in the Environmental Health Division, one in the Communicable Disease Division and one in the Office of Information Services—spent the summer assisting laboratory personnel and gaining valuable skills. The laboratory also gained experience with hosting the interns.

“We never imagined the program would get so much initial interest from supervisors and we could not have accomplished this without the support from APHL to get us started,” said Camille Danielson, Environmental Chemistry director. “Together with APHL, we worked through the questions and obstacles to make this a success.”

Over the past year, Danielson encouraged both managers and experienced staff to sign up as mentors.

“It’s a growth opportunity for them, especially if they want to move up and change their job to a more supervisory role,” Danielson said. She added that they have a few senior chemists and quality assurance (QA) staff that have signed up as mentors.

An Unexpected Windfall

The interest was not only with the supervisors.

The applicant response was overwhelming with over 40 applicants this year compared to 30 in 2023. WSLH advertised at the University of Wisconsin–Madison student jobs website and sent APHL’s informational flyer to local technical colleges, professors at other campuses and to other large universities to try and spread the word.

Jayden Jones, an intern from the University of Wisconsin–Madison was in the first group and has extended her internship twice.

“Last spring I was in the process of applying for internships for the summer and it’s such a challenge sometimes to find something that interests you,” Jones said. “And also, I am a student and I need to make money, so I was looking for something that worked for me.”

Jones, a May graduate, studied global health. Her global health program sends out a regular email highlighting news, events on campus and other relevant topics like internships, which is where she learned about the Public Health Laboratory Internship Program.

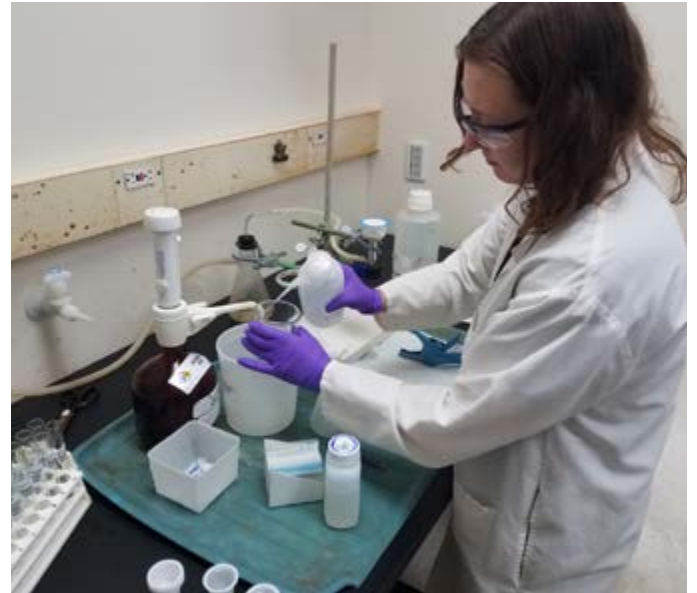
“I honestly was like, ‘Oh I don’t feel like I’m qualified for that.’ Besides my coursework, I haven’t had much laboratory experience. I ended up applying and I’m so glad that I did, because a year later it’s completely changed things for me.”

Another intern who benefitted from the internship experience was the University of Wisconsin–Madison’s Lucy Wellso, who also has extended her internship twice. She was looking for an internship online when she came across the opportunity.

“When I started college, I didn’t think that I wanted to pursue a degree in public health. But now seeing the interconnection between environmental health and public health, it’s something that I’m definitely more interested in,” Wellso said. “The fact that there would be hands-on experience in a laboratory that’s not just an academic laboratory really piqued my interest.”

A Part of the Public Health Laboratory Team

In addition to the hands-on experience, the interns got a taste of what real life in a laboratory might look like. Wellso



Lucy Wellso filters samples before they are analyzed for ammonia and nitrate analysis on a Lachat FIA instrument in the Wisconsin State Laboratory of Hygiene’s environmental inorganic chemistry laboratory. Photo: Jan Klawitter/WSLH

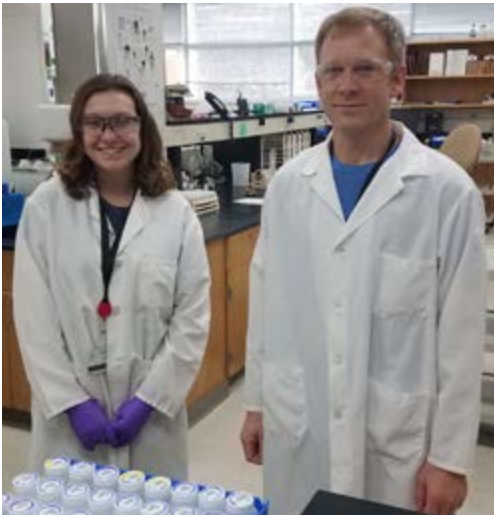
worked in the environmental division where the work is more seasonal and more demanding in summer. The summer interns provided some much-needed help.

“I’ve really enjoyed being in the laboratory and not just in an academic setting. But what I like is it’s continuous and it’s so important for human health to get water tested,” she said.

Wellso also had the opportunity to attend several meetings that she enjoyed being included in. The conversation centered around what the spring season is going to look like (with water testing) and how the laboratory will work through the water samples, what everyone’s responsibilities are and how they collaborate as a team.

Jones had the opportunity to learn different facets of laboratory procedures and testing of samples.

“My laboratory works with antibiotic resistance of *Candida auris* and receives swabs from nursing homes and assisted living facilities from all around the country. Last summer they were getting hundreds of swabs every day from these facilities,” she said.



Lucy Wellso and mentor Tony Plourde. Photo: Jan Klawitter/WSLH

Jones was busy labeling the swabs and checking them in. She also helped with specimen receiving by getting samples prepared and sent to their proper department.

“I think it’s a lot more attractive to the students because it’s not only working for the state laboratory, but you’re also associated with a nationwide organization for public health,” Danielson said. “I think it also is just the perception that it will look better on their resumes. I think all those factors, the association with APHL, the increase in pay and the added educational benefits, made it a much better pool.”

Laying the Foundation for Strong Next Steps

Danielson believes exposure to so many features of a public health laboratory provides interns with valuable insights into both environmental and clinical public health work, quality improvement, quality assurance practices and regulatory principles.

Jones is not sure about her next steps—she has been applying for jobs but has also thought about applying for the Public Health Laboratory Fellowship. Wellso also has some options after graduation.

“I was looking at the fellowship as one of my options or there is a laboratory assistant position coming open in my current laboratory. I’m more interested in the Fellowship because I would get to go to conferences and become a more well-rounded laboratory scientist,” Wellso said.

Jones added that the internship has been eye opening.

“I’m just so thankful that I got this opportunity,” she said. “As a senior who is going into the workforce, it’s been helpful to me because I have seen the day-to-day work and the testing that the laboratories perform.” ■

An Internship Program’s Humble Beginnings

The ability for WSLH to handle the large number of interns is because of the foundation the program was built upon.

Royce Riessen, a former inorganic chemist at WSLH and current APHL staff member, learned about APHL’s new internship initiative during his first meeting with his Emerging Leadership Program (ELP) cohort. Riessen found the potential benefits for the laboratory intriguing and brought the information to WSLH leadership.

WSLH had never hosted interns, so there was a bit of hesitation on the commitment. They have hired summer students before but on a much smaller scale. There were concerns about managing the program without an internship coordinator. Nevertheless, leadership was excited about this potential resource for the laboratory that also would help the students.

Riessen and Danielson scheduled a quick informational meeting with APHL’s internships team to find out how the program could benefit the future public health workforce and the laboratory’s immediate needs. The program was then proposed to WSLH Director James Schauer, PhD, PE, MBA who suggested a pilot program in the Environmental Health Division (EHD).

With their inaugural class of 17 interns across three divisions, organization was crucial. From day one, the laboratory knew it was important to allow the interns to get to know the various aspects of a public health laboratory and meet as many staff as possible. It all began on orientation day. The interns were invited to the main laboratory for an overview of the facility, a tour and pizza. Later in the summer, tours were coordinated for other facilities and included an important meet and greet with the laboratory director.

The required competency-based core curriculum modules were also used for interns to reflect in a group setting with laboratory subject matter experts facilitating discussions on safety, ethics, quality and other topics. Supervisors also encouraged the interns to reach out about areas of interest and then facilitated shadow opportunities for them in areas other than where they were working.

Danielson believes the internship program will have a long-lasting impact for WSLH and the public health laboratory workforce.

APHL 2024: Laboratory Science and Public Health Meet in Milwaukee



The APHL 2024 Annual Awards winners. Photo: Wale Ariztos Photography

Over 1,300 public health scientists and administrators attended APHL 2024 in Milwaukee, WI May 6–9. APHL welcomed over 100 fellows and interns from the Public Health Laboratory Fellowship Program: an APHL-CDC Initiative. Peter Hotez, MD, spoke to a rapt audience about the rise of anti-science during the Dr. Katherine Kelley Distinguished Lecture. And APHL presented its annual awards for outstanding achievements in laboratory science, creative approaches to solving today's public health challenges and exemplary support of laboratories serving the public's health. The following awards were presented:

Lifetime Achievement Award. Recognizes individuals who have established a history of distinguished service to APHL, made significant contributions to the advancement of public health laboratory science or practice, exhibited leadership in the field of public health and/or positively influenced public health policy on a national or global level. This is not a retirement award, but a true Lifetime Achievement Award.

- **David Mills, PhD, HCLD, retired**

Gold Standard Award. Given to an APHL member who makes or has made significant contributions to the technical advancement of public health laboratory science and/or practice.

- **Susanne Crowe, MHA**, laboratory director, Florida Bureau of Public Health Laboratories–Jacksonville

Silver Award. Honors a laboratorian with 10 to 15 years of service in a

Governmental public health laboratory (either Public Health or Environmental/Agricultural laboratory). The honoree will be recognized as a leader both within their home laboratory as well as external to their laboratory.

- **Lisa Wallace**, responsible official and principal investigator, West Virginia Office of Laboratory Services



David Mills. Photo:Wale Ariztos



On the Front Line Award. Honors an individual or laboratory outside of the APHL membership who makes significant contributions to the advancement of public health laboratory science and/or practice.

- **Barbara Cassens**, director, Office of Partnerships, United States Food and Drug Administration

Emerging Leader Award. Honors an individual whose leadership has been instrumental in one or more advances in laboratory science, practice, management, policy or education early in their career.

- **Kelly Oakeson**, PhD, chief scientist of bioinformatics and next generation sequencing, Utah Public Health Laboratory

Leadership in Biosafety and Biosecurity Award. Honors a laboratorian with over 10 years of related service in the field of biosafety and biosecurity in a state and/or local public health laboratory. The honoree will be recognized as a leader both within their home laboratory as well as external to their laboratory (for example, by serving in a leadership role in committees/taskforces at the national level).

- **Anna Liddicoat**, MPH, biosafety/biosecurity officer, North Carolina State Laboratory of Public Health

LEAD Award. Established in 2021, this award recognizes the legacy of Eva J.

Perlman, APHL's first chief learning officer, who over three decades helped shape the public health laboratory workforce and represented the attributes of "serving those who have served." This award honors an individual who exhibits the attributes of a leader, encourager, advocate and developer, and who has 10 or more years of service in a state, local or territorial public health laboratory, or other public health laboratory partner.

- **Denise Toney**, PhD, HCLD, director, Virginia Division of Consolidated Laboratory Services

Champion of the Public Health Laboratory Award. Recognizes federal, state and local elected officials or executive branch employees who have recognized the importance of state and local governmental laboratories that perform testing of public health significance either through support of legislation or federal agency decisions.

- **Congresswoman Rosa DeLauro**, Third Congressional District in Connecticut

Presidential Award. The APHL Presidential Award was selected by Dr. Tim Southern during his Presidential year (2023-2024) for the significant contributions that were made to the association's work to promote policies that strengthen public health laboratories. This year there are two Presidential Award winners.

- **Jim Pirkle**, MD, PhD, retired

- **Marilyn Bibbs Freeman**, PhD, deputy director, Virginia Division of Consolidated Laboratory Services

Healthiest Laboratory Award. Given to an APHL member laboratory that is committed to safety, environmental process, environmental policy and employee health and wellness.

- State jurisdictional award winner: **Kentucky State Public Health Laboratory**
- Local jurisdictional award winner: **San Francisco Public Health Laboratory**

Thomas E. Maxson Education, Training and Workforce Development Award. Established in 1998 in memory of Dr. Maxson, this award honors an APHL member who is a public health or clinical laboratory practitioner, trainer or educator who has made significant contributions to public health laboratory practice by creating, delivering or developing continuing education opportunities, programs, policies or practices for the laboratory community.

- **Rolinda Bailey**, safety officer, Tennessee Public Health Laboratory ■

North Carolina's Coordinated Response to Lead Contamination in Food: An Insider's Perspective

By Marc Komlos, supervisor, Inorganic Chemistry Laboratory, North Carolina State Laboratory of Public Health



The NC State Laboratory of Public Health Inorganic Chemistry Laboratory tests WanaBana™ fruit puree samples from elevated blood lead investigations. Photo: NCDHHS

Periodically, the media reminds us of our potential exposure to contaminants in our food supply. These stories make us realize the importance of robust safeguards for the vastly complex system through which we import, manufacture and distribute food. Specifically, last year's detection of lead contamination in the WanaBana™ brand of apple cinnamon fruit puree pouches by the [North Carolina State Laboratory of Public Health \(NCSLPH\)](#) catalyzed an international investigation involving multiple recalled products derived from the same cinnamon source in South America. This investigation highlights a trend that finds foods and spices as a more common source of lead exposure where, traditionally, a public health laboratory and its partners may have focused on drinking water, paint, dust and soil.

Lead is Often Detected in Foods and Spices

The first three WanaBana fruit puree samples were collected from two separate households and received by the NCSLPH's Inorganic Chemistry Laboratory without any prior indication that these would be consequential samples. Most elevated blood lead investigations involve a range of sample matrices, and the inclusion of foods and spices is routine. However, these samples were associated with a unique brand name that the laboratory had not seen before. Upon issuing the reports for these samples, I thought it was noteworthy that the sample flavor labeled as "apple cinnamon" was above the [US Food and Drug Administration \(FDA\)](#) reportable 1 ppm limit referenced by the [Childhood Lead Poisoning Prevention Program \(NCCLPPP\)](#). Since the laboratory has processed cinnamon spice samples

as part of lead investigations previously, I was aware that cinnamon could be a contaminating source. This product seemed to be worthy of more attention.



Marc Komlos, Inorganic Chemistry Laboratory Supervisor. Photo: NCDHHS

It wasn't until I received a call from a NCCLPPP investigator while still onsite collecting samples from a third household that I realized how much attention it would attract.

The investigator knew the previous results of the WanaBana fruit puree pouches, and we wanted to assess all WanaBana products related to this elevated blood lead investigation. We realized that identifying lead contamination in these new products would likely result in regulatory involvement, and we felt it necessary to get a more comprehensive assessment of the source of the lead. Was the culprit a specific lot, a flavor, or was it being leached from the packaging itself? Since this household stocked at least four different flavors of unopened packages comprised of at least ten different lot numbers, we knew we had a good opportunity to gather comprehensive data. Ten samples were collected and analysis confirmed that lead was only found in the contents of the WanaBana apple cinnamon fruit puree flavor. A valuable lesson on the importance


of communication with agency partners was reinforced.

A Coordinated Response

Prior to the release of the laboratory report from the third household, I was scheduled to be out of town for personal reasons. However, I have a great team consisting of ICP/MS Chemist Travis Dunbar, Inorganic Chemistry Lead Program QA Officer Kenneth Greene, and NCSLPH Manager Chris Goforth who were able to support the release of this critical data. The flurry of communication that followed was intense and emphasized the significance of the moment as the previous testing was supported by these new results. I had spent much of that week on the phone accompanying Chris and Kenneth on their work commutes and evenings at home discussing the myriad of emails and data collection for the North Carolina Division of Public Health's (NCDPH) response to support the FDA's nationwide public health advisory. I was relieved to hear FDA's data review supported our results,

and I felt the initial analysis cycle was complete when additional product testing was completed by the state's regulatory body, the NC Department of Agriculture and Consumer Services (NCDA&CS).

WanaBana issued a voluntary recall of all lots of the apple cinnamon fruit puree; FDA, the **US Centers for Disease Control and Prevention** (CDC) and NC Department of Health and Human Services press releases warned the public about the contaminated products; news stories made their way across broadcast and print media; and the investigation into the contaminated cinnamon supply continues. Thousands of children were exposed to harmful levels of lead from a seemingly innocuous source. Unchecked, this exposure would have continued. The success of NCSLPH working closely with local, state and federal partners was a critical component of the complex safeguards need to protect the public. This story demonstrates a commitment from the unsung heroes at the bench to the very altruistic goal of public service. ■


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From Small to Large and Back Again: Planning for Automated Processes Present & Future

By Michael Mottet, principal laboratory planner, HDR



HDR Panther Trax U-Shaped

As technology advances on its unrelenting march forward, it profoundly changes how we live and work in our daily lives. In laboratories, automation is one of the key innovations that continues to reshape the laboratory environment. As laboratory planners and designers, we are paying close attention to this trend and working alongside laboratory management and leadership to create spaces that can accommodate automation now and into the future.

Today, modern laboratory equipment can deliver test results in hours instead of days. These machines can cap, decap and add reagents to tubes automatically—requiring little interactions from laboratorians during and after tests are initiated. These advancements greatly improved efficiency as laboratory testing practices became more and more specialized due to increased state and federal testing requirements, and events like the COVID-19 pandemic further emphasized the importance of efficient, fast laboratory results.

The rapid development of automated testing systems and equipment presents a challenge for designers and planners. On the one hand, advancements in technology have allowed automation equipment to be reduced in size, freeing up bench space. However, as demand for

higher throughput rises, the machines are once again larger to accommodate high volumes. The greater number of process steps that can be automated again requires machines to be larger. It's a peculiar, somewhat complicated dance which requires planners to implement designs that can accommodate a range of instrumentation types and sizes. The following are three major considerations related to planning for an automated future.

- **Embrace open labs with moveable casework.**

Open laboratory planning allows the space to house any size of testing equipment and allows staff to easily rearrange the layout to accommodate the equipment they use.

- **Upgrade utilities to meet increased demands.**

Automation equipment is often highly specialized and comes with a range of operational criteria. Planning laboratories for ease of access to utilities such as electrical, special gases, 208-volt power, backup power, purified water and data connectivity for the laboratory information management system (LIMS) is imperative.

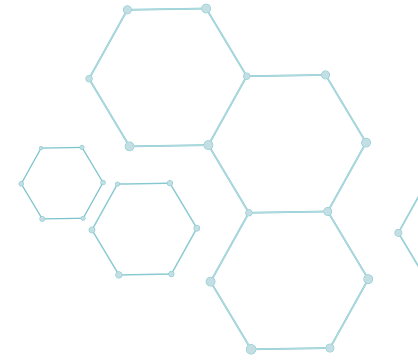
- **Consider key details early in the design process.**

As laboratory equipment has become more specialized, it has also become more sensitive to indoor and outdoor influences, such as daylight. Vibration, temperature, humidity and sunlight must all be considered during the design process. Sunlight can be particularly troublesome as laboratories have started to prioritize glass walls and views of the outdoors to promote staff well-being. One way to counter this is by using mechanized shades outside of the laboratories boundaries. As another example, testing equipment require floor drains, so the layout of those drains needs to be planned for at the start of the design process.

The HDR-designed Alabama State Public Health Laboratory exemplifies many of these tenets in action. It features open laboratory spaces with overhead service carriers, allowing an array of utilities to be fed from above. The space features modular flexible laboratories and post-occupancy, the laboratorians reorganized the flexible casework systems to better complement their workflow and machines.

Automation is still in its infancy but is sure to revolutionize the next generation of laboratory design. Laboratory management should recognize and plan for it today, so they can be better prepared for tomorrow. ■

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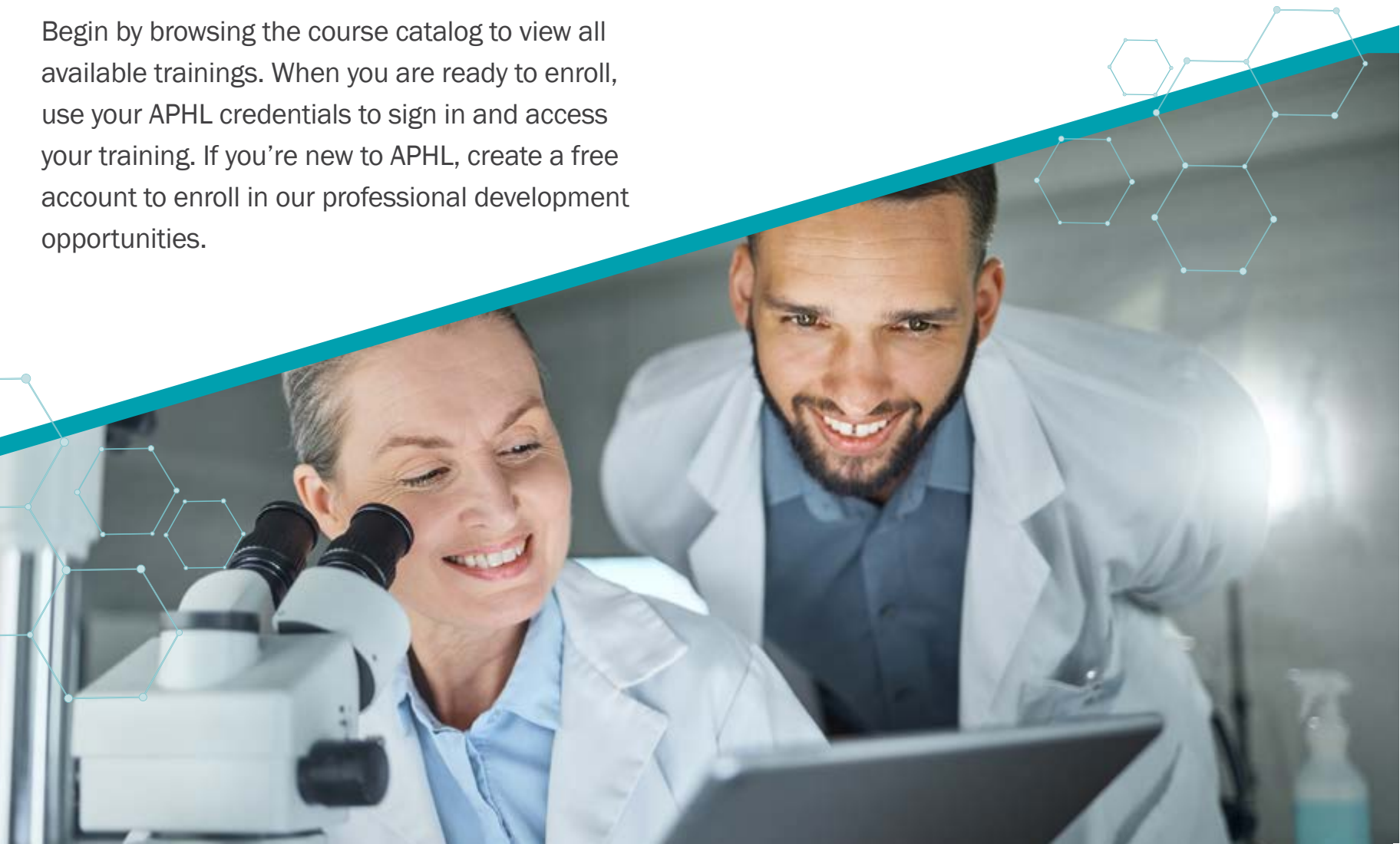
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Rapid *Candida auris* Screening and Echinocandins Resistance Detection Through an Automated High-Throughput Extraction and Real-time PCR Solution

By Macy Veling, PhD, Principal Application Scientist, Revvity Health Sciences, Inc; Christodoulos Filippis, PhD, Institute for Experimental Immunology, affiliated to EUROIMMUN Medizinische Labordiagnostika AG; Peishan Xie, Application Scientist, Revvity Health Sciences, Inc; Kathleen Wilke, Institute for Experimental Immunology, affiliated to EUROIMMUN Medizinische Labordiagnostika AG; Melanie Harder, PhD, Institute for Experimental Immunology, affiliated to EUROIMMUN Medizinische Labordiagnostika AG; Ulf Steller, PhD, Institute for Experimental Immunology, affiliated to EUROIMMUN Medizinische Labordiagnostika AG; and Yanhong Tong, PhD, Sr. R&D Manager, Revvity Health Sciences, Inc.

All authors are employees of Revvity or EUROIMMUN, companies that manufacture diagnostic tests and instruments. They did not benefit from any potential or actual financial gain as a result of the work.

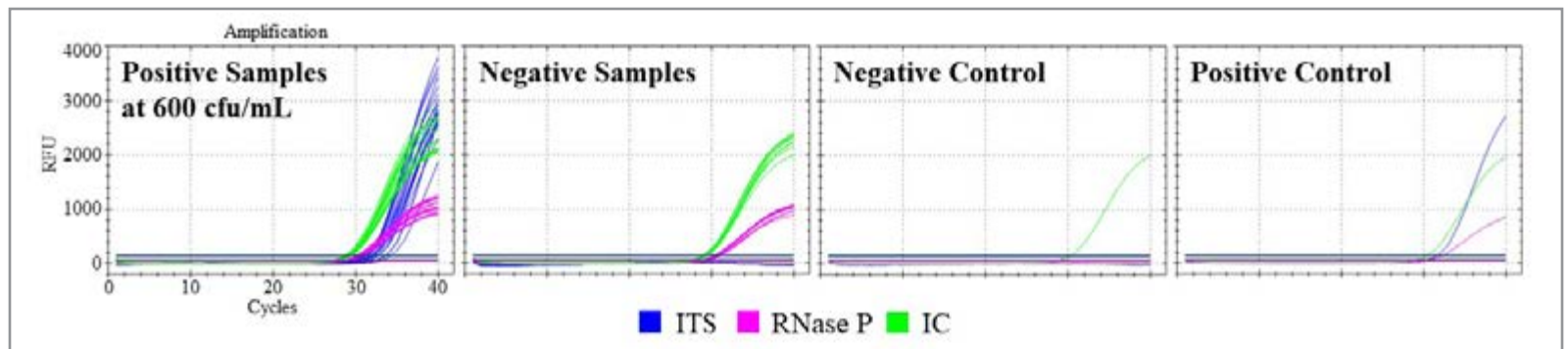


Figure 1. Sensitivity confirmation for the *Candida auris* Detection Real-time PCR Reagents workflow (total ~3 hours)

A potentially deadly fungal infection by *Candida auris* including the multidrug-resistant strains is spreading globally at an alarming rate. Such infection not only can cause severe illness and spread easily among patients in healthcare facilities but also can lead to failure of treatment due to resistance, making *C. auris* a high-priority pathogen to be monitored. Unlike traditional culturing methods, which could take days for species and drug resistance identification, real-time PCR provides a rapid solution for *C. auris* screening and potential drug resistance detection. Here, we present an automated extraction workflow together with two real-time PCR assays: the *Candida auris* Detection Real-time PCR Reagents (herein screening assay) with dUTP/UNG carryover prevention system integrated for qualitative *C. auris* screening and the EURORealTime *C. auris* ECH-R (herein resistance assay) for both *C. auris* and echinocandins resistance detection. These solutions are suitable with samples collected from human skin swabs, environmental surface swabs or laboratory cultures.

Methods

The chemagic™ Pathogen NA Kit H96 (Revvity, CMG-1033-G) is designed for fungal pathogen extraction with the chemagic™ 360 extraction system (max. 96-reactions/run). Both the screening (Revvity, DXMDX-RGT-1001) and the resistance (EUROIMMUN, MP 2866-0125 or MP 2866-0100) assays utilize sequence-specific oligonucleotides to amplify the partial genetic region of the internal transcribed spacer (ITS) 1 & 2 for *C. auris* identification.¹ Primer/probe sets to detect internal control (IC; only screening assay) and endogenous human gene (RNase P) are included for extraction and PCR process monitoring as well as for skin swab sample quality check. In the resistance assay, additional primer/probes to detect three highly-echinocandins-resistance-associated mutations (S639F/Y/P) on the FKS1 gene HS1 region (FKS) are included.²⁻⁴ An extra probe for validity purposes monitors amplification of the FKS on all strains.

Analytical sensitivity was evaluated for both PCR assays by spiking *C. auris* positive wild-type culture samples

(various concentrations) and human gDNA into the Eswab collection/transport system (BD, 220245), followed by extraction and one of the PCR assays. Plasmid constructs containing the relevant *C. auris* gene sections were spiked into PCR for S639F/Y/P sensitivity evaluation. Specificity of the oligonucleotide sequences of both PCR tests was analyzed in silico using BLASTn and publicly available *C. auris* genome sequences plus non-*C. auris* microorganisms (either belonging to the *Candida* family or commonly found in skin infections).^{5,6} Furthermore, a wet-lab study with gDNA from eight closely related *Candida* species was evaluated.

Results

The analytical sensitivity for the entire workflow with culture showed 100% *C. auris* detection at a concentration as low as 600 cfu/mL for both PCR assays, and 100% FKS detection at 1800 cfu/mL for the resistance assay (Figure 1–2). For S639F, S639P and S639Y detection, sensitivity using synthetic plasmids showed 100% detection at 30 copies/reaction (Figure 2).

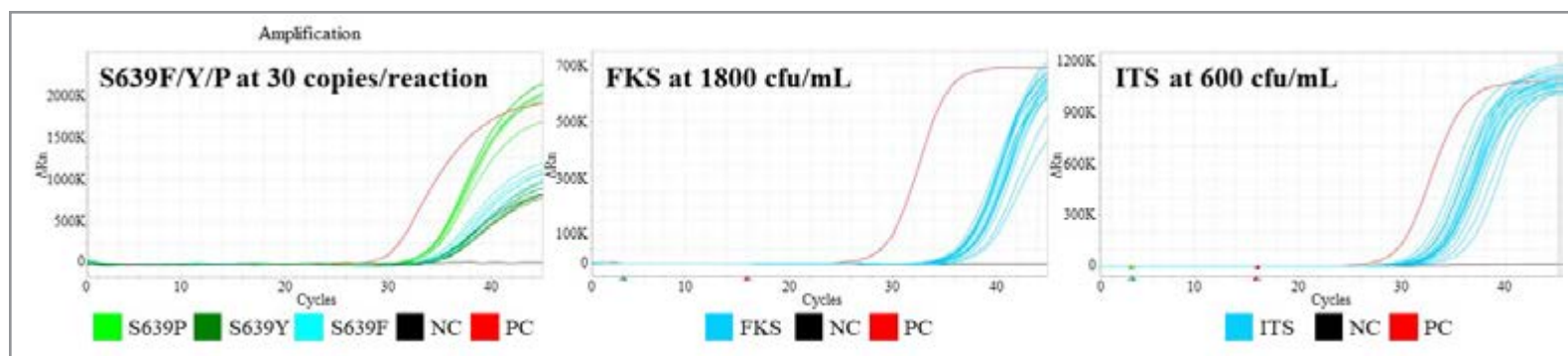


Figure 2. Sensitivity confirmation for the EURORealTime *C. auris* ECH-R workflow (total ~3 hours). NC: negative control, PC: positive control

In silico analysis predicted all five clades of *C. auris* (42) genome (as of May 8, 2023) to be detectable by both PCR assays, with exception of 10 strains identified in Lebanon in 2021.⁷ For the resistance assay, 2,834 additional *C. auris* strains (as of Nov.17.2023), of which 88 contain echinocandins-resistance-markers (22xS369F, 19xS639Y, 47xS639P), showed 100% match to the FKS-specific or respective mutation-specific oligonucleotide sequences.

Cross-reactivity was not identified among non-*C. auris* microorganisms for ITS and FKS oligonucleotides. A wet-lab study confirmed no cross-reactivity observed among *C. albicans*, *C. duobushaemulonii*, *C. glabrata*, *C. haemulonii*, *C. krusei*, *C. lusitaniae*, *Kodameae ohmeri* and *Saccharomyces cerevisiae*. Plasmids (107 copies/reaction) carrying the FKS gene encoding S639 (1xTCT- and 1xTCC-codon, wild-type) and S639T showed no relevant cross-reactivity with the mutation-specific probes.

In summary, both PCR assays together with the automated chemagic™ 360 extraction system provide high sensitivity and scalable solution for choice of either rapid *C. auris* screening or together with echinocandins resistance detection. ■

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Riding the Wave of Public Health Laboratory Funding into the Future

By Melanie Padgett Powers, writer

A burst of emergency federal funding during the COVID-19 pandemic allowed public health laboratories to upgrade, improve and invest. Laboratories modernized equipment, hired personnel, created more efficient processes and expanded public health programs such as next-generation sequencing and wastewater surveillance.

But supplemental funding has begun to recede. The boom-and-bust cycle of public health funding is well-known to public health professionals. They've seen it time and time again, which spurred laboratory directors during the pandemic to think critically and sustainably about how to invest COVID-19 dollars beyond the initial pandemic response.

“With an impending fiscal cliff coming for public health laboratories, we have found that it was important to think about how capacity built during COVID-19 could be repurposed for other pressing needs within our state and any future testing needs.”

Emily Travanty, PhD

“With an impending fiscal cliff coming for public health laboratories, we have found that it was important to think about how capacity built during COVID-19 could be repurposed for other pressing needs within our state and any future testing needs,” said Emily Travanty, PhD, laboratory director at the [Colorado Department of Public Health and Environment](#).

State, local and territorial public health laboratories receive most of their funding from the federal government, primarily through the [US Centers for Disease Control and Prevention](#) (CDC). From fiscal year (FY) 2014 to 2023, CDC’s budget increased by just six percent after adjusting for inflation, according to [Trust for America’s Health](#).

There won’t be much growth in the coming year either. In 2023, Congress passed the debt ceiling agreement, or the Fiscal Responsibility Act of 2023, which rescinds COVID-19 relief funding and sets spending caps for two years. Under these limitations, President Biden’s fiscal year 2025 budget request includes mostly flat or tiny increases. For CDC, Biden requested \$9.68 billion, a \$499.2 million increase, according to the [National Association of County and City Health Officials](#). However, there was no request for a funding increase for [Public Health Emergency Preparedness \(PHEP\) cooperative agreements](#), which is where public health laboratories get most of their preparedness funding. There was also no request for increased public health infrastructure and capacity money.

Modern Equipment

Two primary areas public health laboratories invested in during the pandemic’s early days were equipment and personnel. Surge funding allowed laboratories to buy a lot of new

equipment. This was necessary not only to respond to the need for COVID-19 testing and surveillance, but it often benefited multiple laboratory programs and initiatives. And for some laboratories, it was a long time coming, after years of working with older, slower and less-efficient machines.

Now, laboratories have faster, more efficient and modern machines, including next next-generation sequencing equipment and high-throughput molecular testing platforms. They have been able to pivot from COVID-19 testing to an expansion of their previous work, such as adding more sexually transmitted infections to their testing list.

In Colorado, the focus from the beginning was diversification to allow for sustainability. Colorado was the first state to open a drive-through COVID-19 testing site. Initially, the laboratory could test about 160 samples a day. After new equipment arrived, laboratory staff rapidly scaled up to 20,000 samples in one day, Travanty said.

“We had to add additional equipment in order to meet that demand, and we focused on open platforms. And that was the key to sustainability of our funding,” Travanty said. “We put our funding into separate instrumentation for extraction and amplification, so that it could, in the future, be applied to extraction and amplification to detect other pathogens.”

The Colorado State Public Health Laboratory also replaced its refrigerators, freezers and biosafety cabinets. The diversity of equipment helped mitigate supply chain issues and later allowed the staff to pivot to non-COVID-19 samples. “Those pieces of equipment have also been able to be used for things like the Mpox response, some *Neisseria meningitidis* testing, West Nile virus surveillance, and, of course, flu,” Travanty

said. “We have been talking recently about ‘Are we prepared to surge if we are needed to for any future respiratory and flu-type outbreaks?’”

Wastewater Surveillance

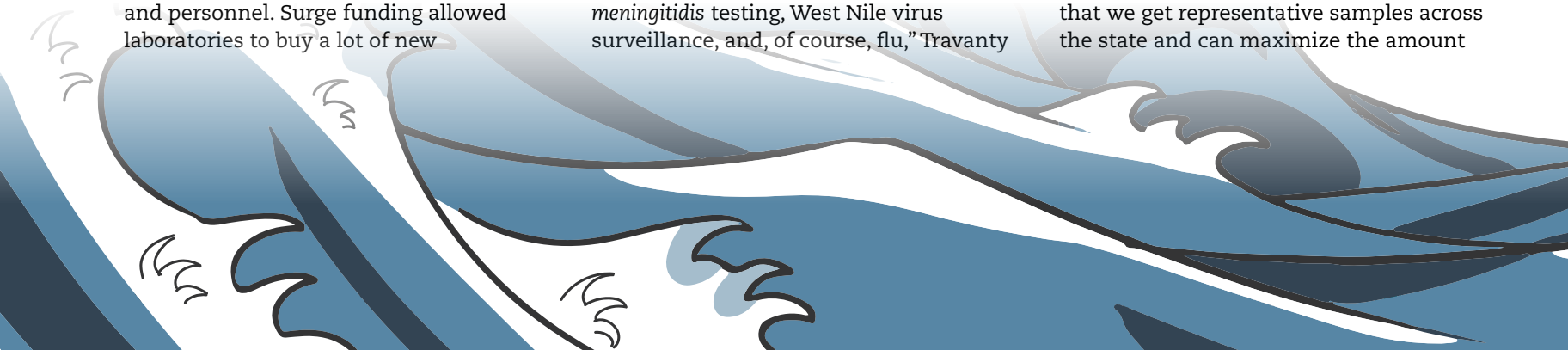
New equipment has also allowed laboratories to expand their wastewater surveillance programs. In September 2020, CDC launched the [National Wastewater Surveillance System](#) to detect SARS-CoV-2 in wastewater across the country and track COVID-19 prevalence. This was the first time wastewater surveillance was used as a federally supported and centralized public health tool.

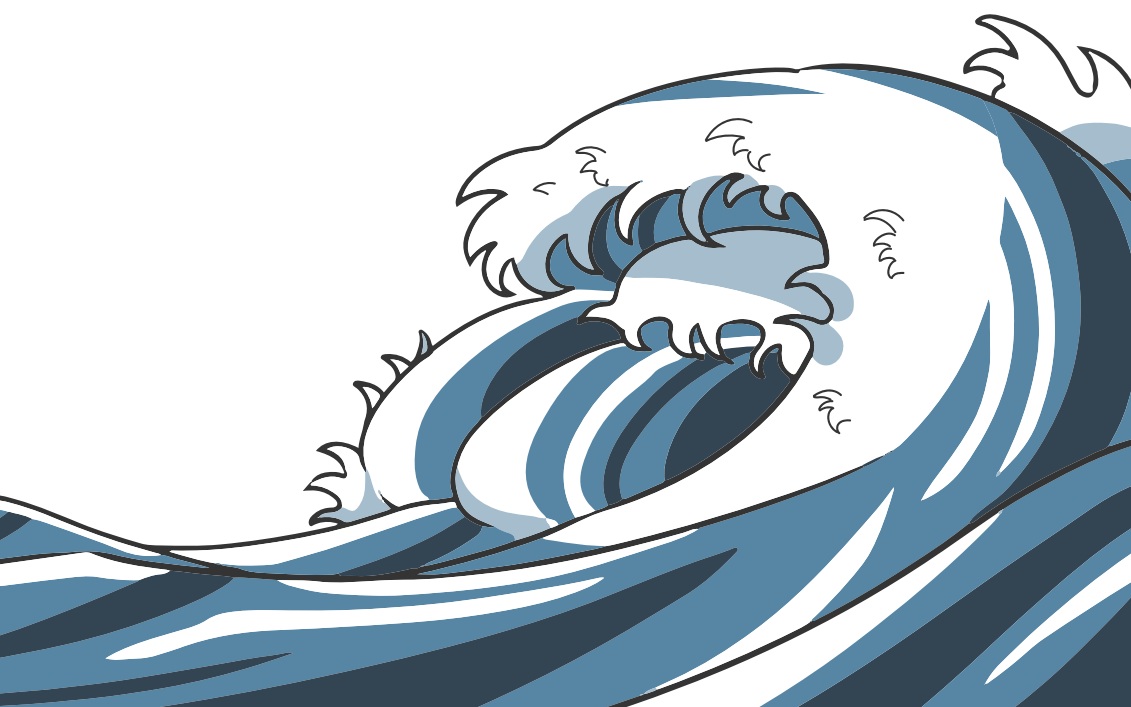
Public health laboratories embraced wastewater surveillance as an early warning sign for potential outbreaks. Like many states, Delaware used COVID-19 funding to implement a wastewater surveillance program, initially to detect SARS-CoV-2, then other pathogens.

“We have expanded wastewater testing for not only COVID-19 but multiple respiratory viruses, as well as any emerging threats, such as fungal diseases like *Candida auris*, or vector-borne diseases like West Nile virus, and even food-borne diseases such as hepatitis,” said Gregory Hovan, MBA, director of the [Delaware Public Health Laboratory](#).

Colorado already had a strong sequencing program focused on foodborne illness when COVID-19 hit four years ago. The laboratory was able to quickly pivot expertise in genomic surveillance to add wastewater testing, beginning first by looking for evidence of SARS-CoV-2 and then adding other respiratory viruses, like flu and respiratory syncytial virus (RSV).

Now, Travanty said, laboratory personnel are looking to “right-size the testing so that we get representative samples across the state and can maximize the amount





of information that we can get from each sample.” The program has some of the most wide-reaching implications, she said, in terms of informing public health efforts and helping residents across the entire state of Colorado.

Personnel and Construction

When COVID-19 testing launched in 2020, laboratories needed to quickly scale up personnel to respond to the demand. Many laboratories hired short-term contractors, who could be onboarded quickly. As the need for testing declined, the number of laboratory personnel went back down, too. However, some states have kept a few people, moving them into other open permanent roles and/or securing grant funding for their salaries.

Like in many states, contractors in Tennessee were hired and shifted around to different areas based on how the needs changed. Some of the contractors moved into permanent positions, but some who were supported by COVID-19 funding remain with the laboratory.

“This bolus of funding has been incredibly helpful, but as it recedes, we’re looking at alternative ways to create that revenue for the laboratory and fill in the gaps that we anticipate they’re going to leave,”

said Kara Levinson, PhD, MPH, D(ABMM), director of the [Tennessee Public Health Laboratory](#).

The laboratory’s funding for personnel ends in 2026 and 2027, Levinson said. “We’ve got a little bit of time, but we’re thinking about it now. We’ve tried to be strategic all along, but this is really where we’re starting to plan and find alternative ways to fund those gaps,” she said. That includes looking for grant funding and analyzing the laboratory’s fees-for-service.

When the pandemic began, Delaware’s public health laboratory had about 50 full-time positions. That number doubled in response to the pandemic. Now, the laboratory has about 60 full-time positions. Some of those roles are now supported by ongoing grants, including PHEP and Epidemiology and Laboratory Capacity.

“So, we have options,” Hovan said. “We’re working with our division partners to utilize the best resources and determining how the positions are going to be utilized in the future.”

Some states were able to use funding—and garner support from state lawmakers—to renovate or expand their

“This bolus of funding has been incredibly helpful, but as it recedes, we’re looking at alternative ways to create that revenue for the laboratory and fill in the gaps that we anticipate they’re going to leave.”

Kara Levinson, PhD, MPH, D(ABMM)

space or even build a new public health laboratory.

Delaware’s laboratory, which opened its current building in 1990, is undergoing a \$35 million expansion. The addition will nearly double the current 26,000-square-foot space, which will allow the laboratory to expand its programs. In addition, the infectious disease epidemiology team will relocate to the laboratory.

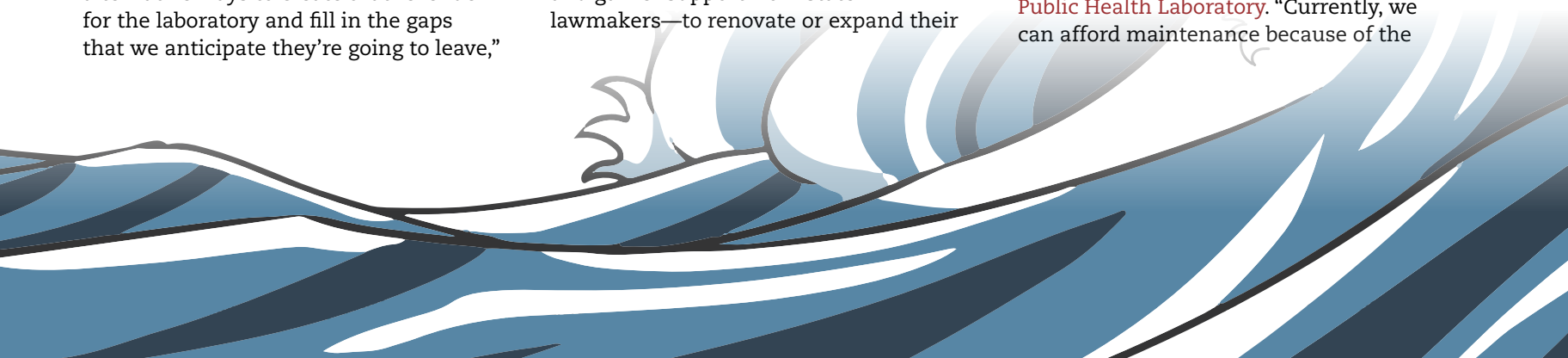
Tennessee will have a brand-new public health laboratory in a couple of years, thanks to the surge in federal funding. “We’re very excited about that,” Levinson said. “We’re finishing up the programming and design and about to move into construction.”

The current building was originally a TB hospital that was retrofitted into a laboratory in the 1980s. The new building, which will be built behind the old one, will increase space by about 30 percent. “It’s also going to be set up much more efficiently for laboratory processes and workflows,” Levinson said.

Funding Challenges

As COVID-19 funding recedes, modern equipment, new staff and building renovations will stay. However, laboratory directors are concerned about stagnant federal funding and ongoing costs. One challenge that comes with the new equipment is the annual maintenance agreements.

“We have so many new instruments,” explained Lixia Liu, PhD, MP(ASCP), D(ABMM), director of the [Indiana State Public Health Laboratory](#). “Currently, we can afford maintenance because of the



“I think it is our responsibility to let people know what we are doing. So when they were coming into our laboratory, we took the opportunity to showcase all different aspects of our public health laboratory services.”

Lixia Liu, PhD, MP(ASCP), D(ABMM)

funding. However, after that, that is a huge expense. So, being able to keep up that will be a challenge for us.”

Leslie Wolf, PhD, HCLD(ABB), director of the [Louisville Metro Public Health and Wellness Laboratory](#) in Kentucky, said she cannot justify keeping the maintenance agreements on all the new equipment now that the COVID-19 testing demand is so low. “We’ve kept it on the ones that we know we’ll use for other purposes,” she said. That includes the new automated high-throughput nucleic acid purification machines that they use to test mosquitoes for diseases.

But other equipment is not being used. In addition, Wolf has learned some manufacturers are replacing equipment with newer versions. And even equipment that is state-of-the-art today might be antiquated or obsolete when needed for the next outbreak or pandemic. “I thought I was planning for sustainability and future use, but it didn’t quite go that way,” she said.

Wolf has seen this boom-and-bust cycle plenty of times, unfortunately. “I’ve been in the field of public health, primarily in infectious diseases, since 1997, and I’ve seen it happen so many times, that a lot of money is thrown at the disease of the day,” she said. “It seems that for many of our governing bodies, the memories are short. I saw us go through that with TB in the ‘80s: ‘Oh, we’ve solved TB; it’s not a problem.’ And so, funding was severely cut and then cases started coming back.”

Wolf can name several other infectious diseases where she saw this cycle of successful public health initiatives, then funding cuts, then disease return: syphilis, HIV, West Nile virus, Zika.

Data and Stories Used for Advocacy

When the pandemic started, public health laboratories received the brightest spotlight in years. Many in the public never even thought of laboratories before, let alone wondered what they did. If ever

there was a time to advocate for public health funds, this was it.

In Indiana, Liu is thankful for the support public health receives from state lawmakers. Republican Governor Eric Holcomb created a [Public Health Commission](#) in 2021 to study Indiana’s public health challenges and successes. In 2023, Holcomb rallied support in the Republican-led Legislature to increase funding to local health departments in Indiana by 1,500 percent, according to a [2023 Politico article](#).

To keep the funding coming, it will be important for public health leaders to explain their successes and needs. While Liu was not a member of the Commission, she said she is not shy about telling health department leaders what the laboratory needs. In 2023, Liu’s team gave a laboratory tour to the governor and his cabinet members. “He was so impressed by what we do in the laboratory, and he also had the staff in his office come in for another tour.”

Word got around, and in March 2024, the health department’s executive board—which includes physicians, hospital administrators, a veterinarian, a nurse, a dentist and a pharmacist—came in for a tour.

“A lot of people outside of a public health laboratory really do not know much about it,” Liu said. “I think it is our responsibility to let people know what we are doing. So when they were coming into our laboratory, we took the opportunity to showcase all different aspects of our public health laboratory services.”

As the team explained the functions of the six laboratory divisions, Liu said it was important that they illustrated how those services could help improve the health of Hoosiers across the state. “We try to use real-life stories to connect our testing to the health of the community,” she said.

Even as federal funding recedes, laboratories have stories and data and evidence that they can use to advocate for sustained state and federal public health funding.

“COVID-19 enabled us to demonstrate what we can do when those funding barriers are removed,” said Levinson in Tennessee. “You can throw money at a problem, and we can show you what we can do with it. And, we can do a lot; we can make significant progress in a short amount of time and really show what it takes to make a public health laboratory even more effective.” ■





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Environmental Microbiology Outbreak Response: New Resources to Help Address Critical Needs

By Vaishali Dharmarha, PhD, senior specialist, Environmental Health; and Sarah Wright, MS, manager, Environmental Laboratories

Environmentally transmitted infectious disease outbreaks are a considerable public health burden. The [US Centers for Disease Control and Prevention \(CDC\)](#) estimates that each year 17 major waterborne infectious diseases cause approximately 7.15 million illnesses, 118,000 hospitalizations, 6,630 deaths and \$3.33 billion in direct healthcare costs.¹ Factors such as [climate change](#), aging water distribution infrastructure, expanded and complex plumbing and industrial water systems, and the rise in the number and type of recreational water areas will potentially increase disease burden by creating conditions conducive to pathogen growth.^{1,2} Environmental microbiology data are critical to understanding of environmentally transmitted infectious disease outbreaks, particularly for these nascent systems and climate-impacted pathogens. Environmental data help to answer questions such as:

1. What are the key exposure routes?
2. Why did this outbreak occur here?
3. Why did it occur now?

Answers to these questions can provide the rationale for developing effective prevention and mitigation measures.

In collaboration with epidemiologists and other environmental health professionals, state, territorial and local public health laboratories play an essential role in quick and effective environmental microbiology testing related to outbreak responses in their jurisdictions. To increase this capacity across the United States, CDC's Environmental Microbiology and Engineering Laboratory at the Waterborne Disease Prevention Branch has partnered with APHL to build a laboratory community. In November 2023, the APHL Environmental Microbiology Outbreak Response Community of Practice (EMOR CoP) was formed to help the now 127 members from 30 states, four local and



Irrigation water sample collection by dead-end ultrafiltration at a case exposure site in Utah related to an *E. coli* O157:H7 outbreak. Photo: BreAnne Osborn/Utah Department of Health

four territorial public health laboratories share best practices.

Evaluating EMOR Capacity and Identifying Gaps

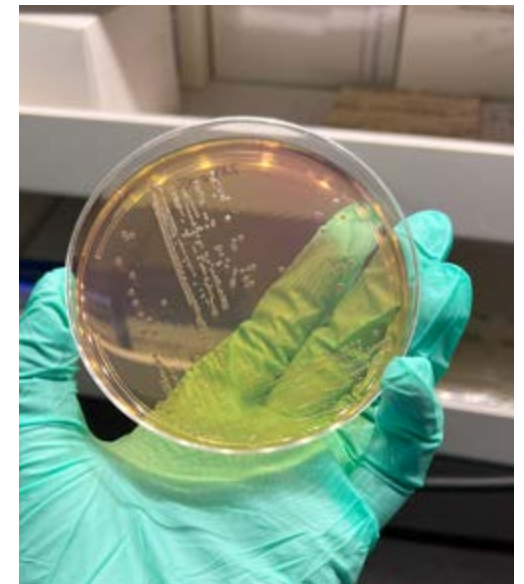
A key function of the community is to evaluate current US EMOR capacity and identify gaps in public health laboratories. Currently, the most common capabilities are routine water testing for generic *Escherichia coli*, coliforms and other fecal indicator bacteria in compliance with the Safe Drinking Water Act and/or Clean Water Act, as well as food testing in response to common foodborne outbreaks. Non-regulatory water testing for *Legionella*, *Cryptosporidium* and cyanobacteria were the next most common capability, but very few laboratories reported capabilities for other outbreak-associated, environmentally transmitted pathogens. Instead, laboratories reported needing to rely on outside resources—such as private or federal laboratories—for response-related environmental testing. For example, jurisdictions collaborated with CDC to conduct environmental

investigations, confirm exposures routes and develop prevention strategies. These investigations include:

1. Testing in response to an *E. coli* O157:H7 outbreak associated with pressurized irrigation water in Utah being used for drinking and recreational purposes
2. A fatal *Naegleria fowleri* infection in a child associated with playing at a splashpad in Arkansas
3. A campylobacteriosis outbreak associated with municipal drinking water in Nebraska.

APHL-CDC-Public Health Laboratory Collaboration to Strengthen EMOR

Jurisdictions reported relying on outside laboratories for environmental outbreak sampling and testing capabilities due to several challenges. EMOR funding has been limited, and only recently received through the CDC Epidemiology and Laboratory Capacity cooperative agreement. Further, these funds are only accessible to laboratories affiliated with



Culture plate of the outbreak pathogen *E. coli* O157:H7 isolated from an irrigation tap at a case residence in Utah. Photo: Mia Mattioli/CDC



The splash pad at the Country Club of Little Rock during the inspection by the Arkansas Department of Health which provided confirmation of outbreak pathogen *Naegleria fowleri*. Photo: Forrest Montgomery/Arkansas Department of Health

their jurisdiction's health department. This poses a barrier for jurisdictions whose environmental microbiology testing capabilities may be situated in the laboratories affiliated with the jurisdiction's environment department whose testing may be restricted to regulatory and compliance requirements. Moreover, staffing with environmental expertise has limited program growth in several jurisdictions both due to minimal funding and a high demand for public

health laboratory scientists in general. Finally, laboratories have also communicated the need for training resources to be able to develop various environmental microbiology outbreak response capabilities, such as sampling plan development, environmental sample collection and emerging pathogen testing.

To support the development of EMOR capacity at the local level, the CoP is collaborating with CDC to build a programmatic strategic framework document. The resulting document will help jurisdictions understand program needs to conduct high-quality environmental investigations in response

to waterborne outbreaks regarding staffing, trainings and laboratory processes, reporting, and partner and national collaborations. Combining this knowledge with access to a nationwide community for sharing best practices, the US will be better prepared to respond to emerging water-related pathogens and reduce the burden of environmentally transmitted infectious diseases. ■

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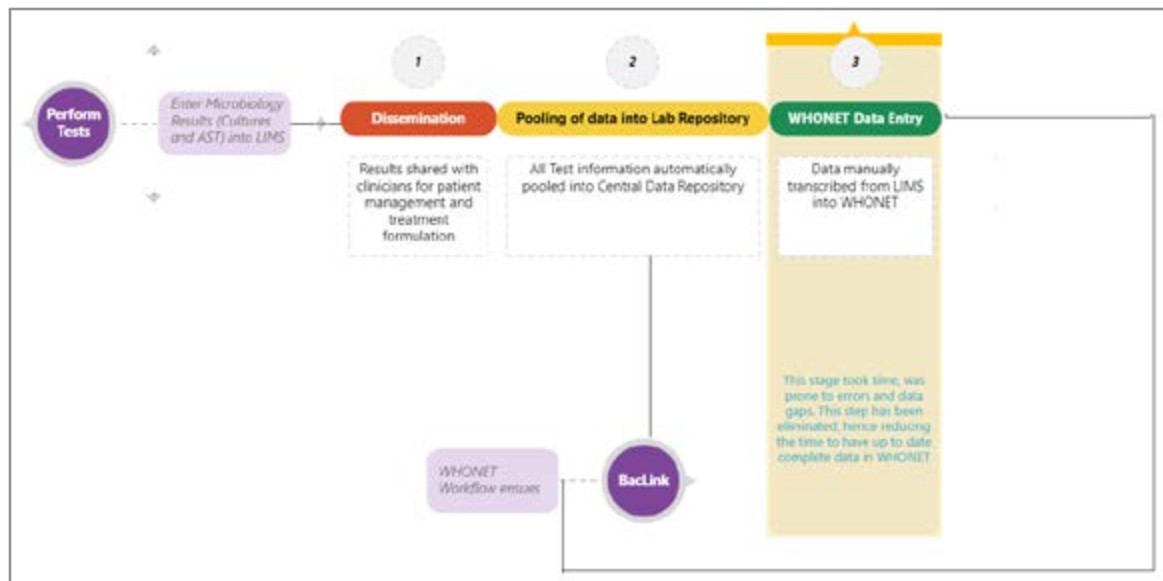


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Innovating AR Data Reporting to WHONET in Zambia

By Kasimona Sichela, program coordinator, Informatics, APHL Zambia; and Reshma Kakkar, manager, Global Health Informatics



WHONET Flow.

Antimicrobial resistance (AR) is a growing concern in public health. Timely and accurate reporting of AR pathogen data is essential for the development of antibiograms, tracking resistance trends and the control of infections to prevent large-scale morbidity and mortality. Globally, laboratories are challenged with reporting AR data due to lack of standards, manual data entry and duplication of effort.

APHL Zambia has developed a practical approach to identifying appropriate solutions for AR reporting. A key strategy is to establish a country-specific laboratory data repository, regardless of systems or tools being used at individual laboratories/hospitals. This approach entails collaborating with existing systems including laboratory information system providers, while establishing new technologies where required. The emphasis is on transmitting AR data to a designated central repository that minimizes the effort needed to report on AR and establishes a single point for data integration with AR surveillance and AR reporting systems. This data centralization approach used by Zambia has gained traction in multiple countries and supported an emphasis on laboratory data standards as national governments

realize the unique opportunities afforded to them. In addition, **WHONET**, a microbiology laboratory database software supported by the **World Health Organization (WHO)** Collaborating Center for Surveillance of Antimicrobial Resistance, is a widely accepted standard for laboratories to report AR data.

Zambia, through the Zambia National Public Health Institute (ZNPPI), has developed an **integrated framework for AR surveillance**. This framework builds on the work initiated by other global cooperating partners that include the WHO, the **Food, and Agriculture Organization of the United Nations (FAO)**, the **World Organisation for Animal Health (WOAH)** and **United Nations Environment Programme (UNEP)** among others. The surveillance activities are supposed to feed into WHO's **Global Antimicrobial Resistance and Use Surveillance System (GLASS)**.

The framework stipulates the laboratories targeted according to the scale-up schedule, which also incorporates a One Health approach. Laboratories enrolled in AR surveillance are required to utilize WHONET for data management, as it has analysis features tailored to the program. However, as far back as 2013, the Zambia Ministry of Health (MOH) adopted the

use of a single laboratory information management system (LIMS) in public health laboratories. The laboratories have consistently been using the LIMS to capture laboratory order requests made for the purposes of clinical care, therefore the LIMS data are up to date. Additionally, all data from laboratories using LIMS for managing microbiology testing have their data aggregated in the Open Laboratory Data Repository (OpenLDR) hosted at MOH headquarters. However, since the laboratories that are part of the surveillance network had to re-enter the information into WHONET for analysis and reporting to GLASS, they

usually had several months of data entry backlog for WHONET. The implication is that whatever analysis was being done was usually retrospective, and any alerts generated would not be timely.

The approach decided on was to leverage the already existing complete dataset in OpenLDR at the MOH. An automated utility script would run at scheduled intervals against the OpenLDR. The data exported in the desired data format would then be shared with the laboratories responsible for AR surveillance. After a process of data review and /or data cleaning, the data are then imported into WHONET using a WHONET-provided utility called BacLink.

Training was conducted with the MOH and partners supporting AR surveillance on how to utilize BacLink to address the data gaps. Participants were able to start utilizing WHONET. The outcome of the training and use of data from the OpenLDR is that hospitals no longer have data entry backlog for WHONET. Additionally, the historical data are also more complete and up to date. Two of Zambia's largest hospitals have since even begun working on their antibiogram guides based on complete data from the last two years. ■

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Building Partnerships & Strengthening Workforce Development within Asia-Pacific

By Kristy Kubota, MPH, manager, Global Health

Building networks and strengthening laboratory and case reporting systems are critical for the ability to respond to infectious diseases and prepare for novel emerging threats. An important component in building strong foundations to support public health systems is in workforce development. It is even more critical in the laboratory sector where changes in diagnostics and innovation happen rapidly, which ultimately shapes how diseases are detected and methods for surveillance are conducted in new and evolving ways.

In 2022, in response to the COVID-19 pandemic, a new partnership was unveiled between the **US Centers for Disease Control and Prevention (CDC)**, through the CDC Thailand Country Office and the National Institute of Health, Ministry of Public Health to develop and lead training activities to strengthen the public health laboratory workforce in Thailand and throughout the Southeast Asia region. The Training Center for Excellence in Medical Sciences (TEMs) facility, located at the National Institute of Health campus in Thailand, developed capability to train personnel on the latest laboratory methods to support outbreak and response activities for a wide variety of pathogens. The facility has both



From left: Hasini Walpola, Centre for Pathogen Genomics, Peter Doherty Institute for Infection and Immunity; Orapan Sripichai, PhD, Thai National Institute of Health; Heather Carleton, PhD, MPH, CDC; and Ratana Tacharoenmuang, PhD, Thai National Institute of Health

laboratory and bioinformatics training capabilities to allow scientists to learn entire workflow processes from sample submission to bioinformatics analysis and reporting.

Since its establishment in 2022, the TEMs group has completed more than 10 trainings ranging from Biosafety Level Three (BSL-3) to next-generation sequencing technologies and other molecular testing to support SARS CoV-2, norovirus and other viral and bacterial pathogen detection. Additionally, APHL organized a genomic epidemiology

bioinformatics training to more than 12 public health scientists within Thailand. In 2023, the facility opened a new bioinformatics hub, which allows scientists to be trained in a variety of tools and platforms currently used to support CDC surveillance activities.

Collaboration with PulseNet Asia-Pacific

More than 35 people attended a two and a half day genomic epidemiology training held in conjunction with the PulseNet Asia Pacific Regional meeting in November 2023. Participants represented ministries of health from more than 15 countries to learn genomic epidemiology principles and tools for the analysis of enteric bacteria as part of initiatives under the Global Antimicrobial Resistance (AR) Laboratory and Response Network. Participants learned bioinformatic analyses using Galaxy and Terra workflows for cluster and AR gene detection. More importantly, this training offered real-life examples of how to use sequence data generated for public health decision making.

In June 2024, APHL, CDC and PulseNet Asia Pacific Coordinators at The Peter Doherty Institute for Immunity and



Heather Carleton, PhD, MPH, chief of Enteric Diseases Laboratory Branch, CDC

Infection, Centre for Pathogen Genomics, University of Melbourne will be organizing a wet-bench and bioinformatics training for sequencing enteric bacteria using Oxford Nanopore Technology (ONT) at TEMs to scientists participating in the PulseNet WGS feasibility study project. PulseNet International has been implementing PulseNet protocols for the detection and surveillance of antibiotic resistant bacteria within the Asia-Pacific region. This includes training laboratory scientists on current PulseNet wet-bench methods and using bioinformatic workflows in Terra as part of the Global AR Laboratory and Response Network surveillance activities. This will be the first training for PulseNet International on the Oxford Nanopore sequencing platform. Offering this ONT training will enable public health laboratories to utilize alternative sequencing instrumentation, which leverages the investments from the COVID-19 pandemic to sequence enteric

bacteria as part of PulseNet and the Global AR Laboratory and Response networks.

The Future of TEMs

Since 2022, TEMs has trained more than 300 scientists from Thailand and the region. The utilization of TEMs has grown from CDC programs to other institutions and funders implementing programs within the region. The efforts to develop TEMs as a regional workforce and laboratory diagnostics strengthening program can serve as a model to support additional similar workforce initiatives for both laboratory scientists and bioinformaticians in other regions of the world. ■

Goals of the Training Center for Excellence in Medical Sciences:

- Enhance lab workforce capacity to respond to infectious disease threats through training on advanced lab technologies and bioinformatics
- Support outbreak response testing within Thailand and region

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Removing Barriers by Bringing Testing to the Community

By **Timothy Southern**, PhD, laboratory director, South Dakota Public Health Laboratory; and **Susan Trow**, PhD, specialist, Infectious Diseases

After reaching historic lows in the early 2000s, syphilis transmission has steadily increased across the United States.¹ Outpacing this nationwide trend, South Dakota has experienced a staggering increase in syphilis. The South Dakota Department of Health (SDDOH) reported 1,504 adult cases in 2022, a 2,493% increase from the five-year median number of cases.² As of mid-December there were 1,229 cases for 2023 (1,496% increase).³

Syphilis is a sexually transmitted bacterial infection that, left untreated, can progress to severe complications in adults. Simple treatment with antibiotics can clear early cases effectively, but the consequences of undetected maternal transmission during pregnancy can be extreme. Congenital syphilis can result in miscarriage, birth defects, stillbirth and illness or death after birth. As the infection has spread to unprecedented levels in women, this is cause for alarm. In 2022, there were 40 cases of congenital syphilis and three syphilitic stillbirths in South Dakota, a 1,233% increase from the five-year median.²

Many factors fuel this uncontrolled spread.⁴ The COVID-19 pandemic played a role, redirecting resources and deferring clinical services for sexual health. The syphilis outbreak has disproportionately affected Native American communities—around 75% of South Dakota's cases in 2022 were in Native Americans.⁵ Outside of the state's two most populous counties, the highest number of cases have occurred in Todd and Oglala Lakota counties, within the Rosebud and Pine Ridge reservations respectively.⁵ Many of those affected live in rural communities with limited healthcare access; geography and poverty present significant barriers to equitable testing and treatment across this vast Great Plains state. The stigma of sexually transmitted infection within these communities also can be high, preventing individuals from seeking health education or care. Finally, substance abuse is also a driver of infection.⁴

Securing Testing Access for All

Slowing the surge in syphilis requires multipronged solutions to complex factors, but one clear challenge that begs solving is making testing accessible. Timothy Southern, PhD, director of the **South Dakota Public Health Laboratory (SDPHL)** worked with providers to examine syphilis testing algorithms in use but found the approaches were falling short for identifying infections and curbing spread.

“They needed to take the test to the people rather than the people to the test” said Southern. Already anticipating this need, SDDOH had begun considering rapid point-of-care (POC) options in 2017, guided by SDPHL's expertise. The earlier evaluation pre-pandemic had faltered, however, when acceptable performance was not achieved with the platform examined. As time passed, the need only continued to grow. Motivated to implement a solution, Southern and the team examined the ChemBio Diagnostics, Inc. Dual Path Platform® (DPP) HIV-Syphilis rapid test, which they piloted in partnership with the **Oyate Health Center** in 2022. The center is a tribally owned primary care clinic in Rapid City, managed by the **Great Plains Tribal Leaders' Health Board**. Initially, this test was evaluated under a research use only (RUO) designation and provided free

of cost. Under piloting conditions, good performance was achieved.

Public Health Collaboration for Solutions

When the DPP HIV-Syphilis rapid test received FDA Clinical Laboratory Improvement Amendments (CLIA)-waived status in 2023, SDPHL was able to work within its jurisdiction to utilize the test clinically. It is now in use at multiple clinic locations of Horizon Health Care, a federally qualified health center operating in rural, underserved areas. Southern and the SDPHL team worked with Indian Health Services, SDDOH Office of Disease Prevention and state epidemiologists to ensure positive rapid tests are actionable and correctly reported to the state.

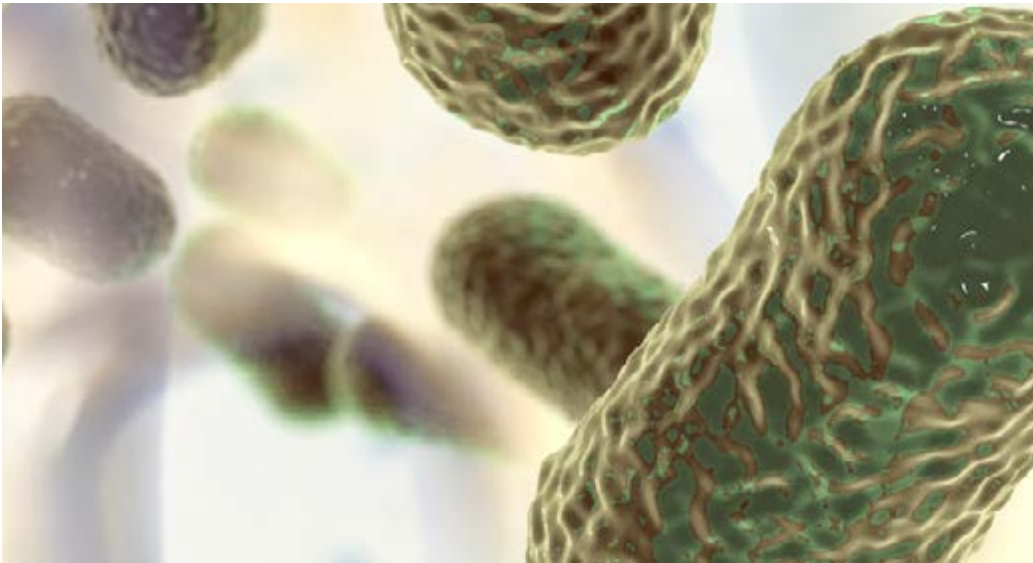
The deployment of this test is not an instant solution to South Dakota's challenges; the epidemic of syphilis is ongoing. However, it provides a tool for expanding testing access to treat the populations hit hardest. Despite also facing a 2023 shortage of Bicillin® L-A (the injectable long-acting penicillin formulation used to treat syphilis), SDDOH has worked to support providers in following priority actions and CDC guidance to ensure South Dakota patients still receive the treatment they need.^{2,6} ■

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A Little Help from the NGS Quality Initiative: Validation of Carbapenem-resistant *Acinetobacter baumannii* (CRAB) Whole Genome Sequencing

By Shannon Mahoney, senior specialist, Advanced Molecular Detection



Carbapenem-resistant *Acinetobacter baumannii* (CRAB) are classified as an urgent public health threat by the US Centers for Disease Control and Prevention (CDC) due to frequently being resistant to nearly all antibiotics used for treatment. CDC estimated in 2019 there were 8,500 infections among hospitalized patients, which were associated with an estimated 700 deaths. Patients can be asymptotically colonized, meaning the organisms may be present on or in the body without causing symptoms, and they can persist in the environment, potentially causing large and difficult to control outbreaks in healthcare facilities.

Some CRAB may contain genes that enable the production of carbapenemase enzymes, which destroy carbapenem antibiotics. Patients infected or colonized with CRAB are important to identify quickly in healthcare facilities to limit transmission to other patients and to control outbreaks. Public health laboratories, as part of the CDC Antimicrobial Resistance Laboratory Network (AR Lab Network) are tasked with identifying isolates of CRAB and determining which, if any, contain carbapenemase genes

The Orange County Public Health Laboratory (OCPHL), a member of the

AR Lab Network, had received over 300 CRAB isolates by 2022 from local laboratories in its jurisdiction for detection of carbapenemase genes. While commonly used commercial assays to detect certain carbapenemases such as OXA-48 like genes, these are less commonly found in *Acinetobacter* species. In June 2023, to more rapidly identify the genes more commonly associated with *Acinetobacter* species (i.e., OXA-23, OXA-24/40 like, OXA-58 like, and OXA-235 like), OCPHL turned to validating a next generation sequencing (NGS) approach. Detecting these genes through NGS technology meant they could reduce the turnaround time for reporting results and get those results into the hands of the infection prevention/infection control professionals. Getting the results back quickly allows more rapid implementation of actions to limit the risk of transmission and prevent potential outbreaks. To perform this validation quickly OCPHL utilized the tools published by the NGS Quality Initiative.

Launched in 2019 through a partnership between APHL and CDC, the NGS Quality Initiative's goal was to develop tools and resources to aid public health laboratories in the development of a comprehensive quality management system (QMS) for their NGS and bioinformatics work.

Nearly five years later, the NGS Quality Initiative has developed over 100 published products, addressing all 12 quality system essentials established by the Clinical Laboratory Systems Institute (CLSI). The tools published as part of the NGS Quality Initiative are designed to be customizable to fit the needs of individual laboratories.

To help validate their CRAB NGS assay, the team at OCPHL utilized the NGS Quality Initiative's Validation Plan as a resource to improve their own validation template, supplying them with a standardized format for conducting this and future NGS validations. From the Validation Plan, OCPHL was able to target their internal validation plan templates to be better configured to specific NGS components, permitting them to recategorize and modify a range of internal documentation aimed at validations.

"Before we decided to use the Validation Plan, our previous validations had started to become hurdles, as the requirements for them continuously differed from our already-changing internal template," said Julia Wolfe, supervising microbiologist at OCPHL. Wolfe went on to cite how the utilization of the Validation Plan guided OCPHL to generate a standardized template that included necessary metrics geared toward NGS testing, such as the adoption of metrics like limits of detection and applicable genome regions.

Ultimately, applications like OCPHL's are just one of a myriad of ways the NGS Quality Initiative can help serve public health laboratories and their sequencing operations. ■

Sharing Success Stories to Advocate for Funding Needs: A Call to Action

By Rachel Shepherd, senior specialist, Informatics

APHL is currently collecting laboratories' informatics success stories that showcase innovations and enhancements made possible by new funding opportunities (e.g., COVID-19, Data Modernization Initiative (DMI) or Public Health Infrastructure Grant (PHIG)). How did the pandemic illuminate gaps and needs, and how have laboratories utilized the surge in funding to implement long-needed solutions, acquire key infrastructure or fill critical positions? APHL intends to curate a collection of stories that first and foremost highlight the critical need for ongoing, targeted and sustainable informatics funding. By showcasing the progress that has been made, this series of stories will reveal what the public health community stands to lose without dedicated and long-term support.

APHL also hopes to further connect and build the public health laboratory informatics community by promoting these success stories and encouraging the cross-pollination of ideas, making laboratories aware of potential pathways and possibilities when facing common challenges. Perhaps what has worked well in one laboratory could inspire others to consider new possibilities or encourage outreach and collaboration, strengthening the community from within. In the spirit of DMI—which aims to modernize and integrate systems, infrastructure and data—we also want to centralize and share ideas, leveraging what works across the informatics landscape for the benefit of all.

If your laboratory has informatics successes to share, we want to hear from you. What were you able to accomplish that would have otherwise been impossible without new funding? In what ways were you able to improve operations and contribute to a healthier public? Topics could include but are not limited to:

- Modernization of core data infrastructure or successes related to DMI
- Enhancements to data exchange capacity or expansion of data exchange partners
- Infrastructure or equipment acquisitions and upgrades (e.g., LIMS)
- Development of evaluation and assessment capabilities
- Addition of critical staff members and needed positions
- Opportunities to streamline operations within the laboratory
- Adoption/Implementation of key policies and standards.

How to Share Your Stories

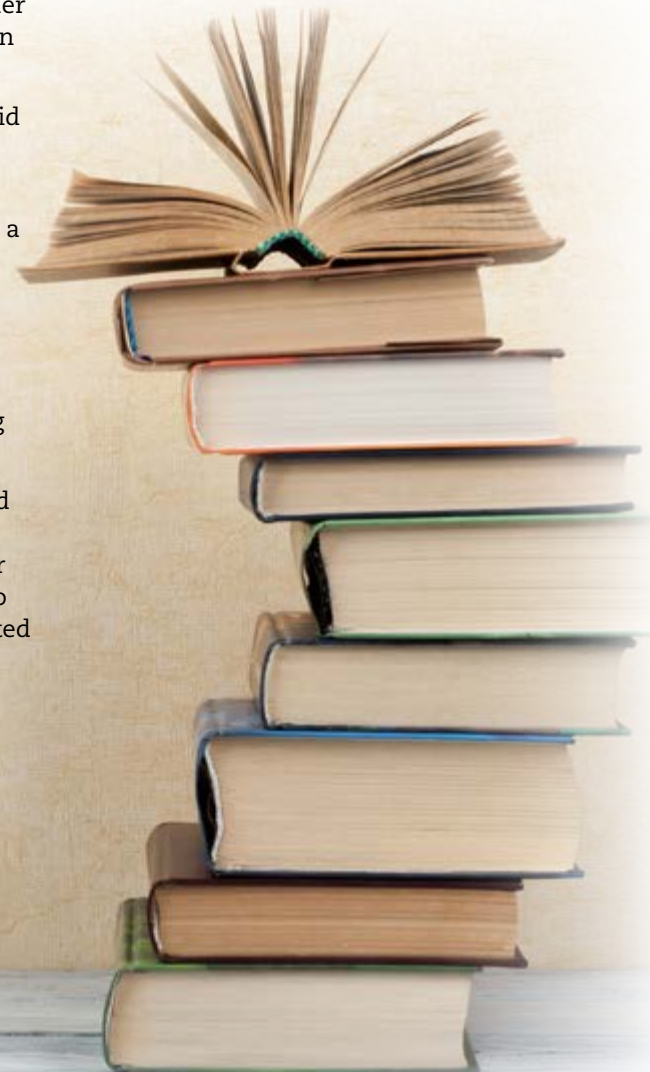
You can share your laboratories' success stories through this [form](#). Please consider the following aspects of your story when submitting:

- What was the challenge and how did you address it?
- What was the immediate and long-term impact? What has changed as a result?
- Who was involved in the project or initiative?
- Do you have any advice or lessons learned for laboratories considering similar endeavors?

If you have an idea for a story but would like some additional guidance or would prefer to have a dialogue and build your story collaboratively, please reach out to Rachel.shepherd@aphl.org. We are excited to work with you and celebrate the successes of our members. ■

For Further Reading

The [US Centers for Disease Control and Prevention](#) has sponsored similar projects across other organizations. Read about other recent successes from the public health community as told by the [Public Health Informatics Institute](#) and the [Council of State and Territorial Epidemiologists](#).



Strengthening the Biosafety Workforce

By **Stormy Chester**, specialist, Biosafety and Biosecurity; and **Stephanie Barahona**, associate specialist, Public Health Preparedness and Response



APHL Biosafety Technical Workshop instructor, Ed Kopp, demonstrates proper glove removal techniques at the APHL Technical Workshop in Tampa, FL.

Ongoing professional development significantly enhances technical and leadership skills within the biosafety workforce. In collaboration with the [US Centers for Disease Control and Prevention \(CDC\)](#), APHL has developed numerous training courses to support the role of biosafety officers. Continuing this commitment, APHL is organizing two new biosafety technical workshops, building on the insights gained from a workshop APHL hosted this past winter in Tampa, Florida.

The workshops are designed to improve the technical knowledge of biosafety professionals within public health laboratories, playing a crucial role in APHL's commitment to providing essential skills and knowledge to the biosafety workforce. The small classroom setting allows participants to set personal goals and guide the workshop to effectively address their specific needs. The workshop curriculum covers a broad range of topics including engineering controls, competencies, risk assessments, quality management, sentinel clinical laboratory outreach and leadership. Additionally, APHL integrates affinity exercises to address current challenges and outline solutions encountered by biosafety professionals. Throughout the workshop, participants were encouraged to share their experiences, highlighting the complexities of their roles and the resistance they face while establishing biosafety practices. The workshop not

only facilitates interactive discussions and networking opportunities for biosafety professionals but also empowers them to set and work towards specific goals throughout its duration.

At the workshop's end, participants provided their feedback through exit tickets, allowing APHL to understand what can improve for future training opportunities. Participant feedback emphasized more hands-on training opportunities for staff and improving existing processes related to risk assessments when they arrived back at their workplace. This constructive feedback illustrates the commitment of the biosafety workforce to continual improvement and innovation within their roles as biosafety professionals, reinforcing the importance of ongoing education and training initiatives in bolstering biosafety and biosecurity practices.



APHL Biosafety Technical Workshop attendees at the Florida Department of Health, Bureau of Public Health Laboratories—Tampa.

Stacey Alexander, MLS(ASCP), North Dakota Department of Health and Human Services

“Being able to attend an in-person biosafety technical meeting has given me a framework for knowledge to build upon back in my laboratory. Also, the ability to meet and create a network of other biosafety officers has been instrumental in my position. This network is great for gathering ideas and tools others may have already implemented in their lab when different problems or questions arise in mine.”

Rebecca Voshell, MS, Delaware Public Health Laboratory

“The in-person biosafety technical workshop is invaluable to attend. Not only is it a great networking opportunity with other biosafety officers from state laboratories, but it also provides hands-on training, group brainstorming, and an insight to how other laboratories approach various biosafety trainings, plans, and components. I found the training and discussion surrounding risk assessments incredibly beneficial as a new biosafety officer. This training helped me fill knowledge gaps, and being able to ask the instructors follow up questions and work through examples real time allowed me to come back to my lab and implement these risk assessment practices efficiently and confidently.”

Following the two upcoming technical workshops in the learning series, APHL will initiate the next phase focused on fostering and strengthening biosafety professional leadership. ■

Key Findings from the APHL 2023 All-Hazards Laboratory Preparedness Survey

By Jill Sutton Hanratty, specialist, Emergency Preparedness and Response

In fall 2023, APHL fielded the 15th annual All-Hazards Laboratory Preparedness Survey to assess the capability and capacity of state and large local public health laboratories to prepare for and respond to all-hazards threats, including biological, chemical and radiological events as well as other emerging public health threats. Distributed to the 50 state, District of Columbia (DC), Puerto Rico, Los Angeles County and New York City public health laboratories, the survey covered the 12-month period from July 1, 2022 to June 30, 2023, representing fiscal year (FY) 2022 of the [US Centers for Disease Control and Prevention \(CDC\) Public Health Emergency Preparedness \(PHEP\) Cooperative Agreement](#). APHL received responses from 53 public health laboratories for a 98% response rate. Here are some of the key findings from the assessment:

Funding and Workforce

- In FY2022, 53 public health laboratories reported receiving more than \$160.5 million in total funding to support preparedness activities. Of these funds, \$16.6 million came from the state and other sources of funding and \$143.8 million came from federal agencies, with \$86.4 million attributed to the CDC PHEP Cooperative Agreement.
- Seventeen public health laboratories (32%) experienced funding cuts and/or level funding that impacted preparedness activities. The top five preparedness activities impacted by level or funding cuts were increased staff turnover (70.6%), unable to expand capabilities for new assays/tests/methods (52.9%), unable to provide or reduced number of training courses and outreach activities (47.1%), consolidated staff positions (41.1%) and unable to purchase critical equipment (35.3%).
- Other than funding, 52 public health laboratories (98.1%) experienced

barriers to carrying out preparedness activities. The top five barriers were non-competitive salaries (79.2%), recruitment and/or retention of qualified personnel (73.6%), response activities such as COVID-19, mpox, flooding, fires, etc. (39.6%), lack of training opportunities (34%) and supply chain shortages (26.4%).

- Twenty-eight public health laboratories (52.8%) reported having a position dedicated to clinical laboratory outreach in addition to their laboratory's Biological Threats (BT) Coordinator, Chemical Threats (CT) Coordinator and/or Biological Safety Officer who may also have duties related to outreach.

Preparedness Planning and Response

- Forty-nine public health laboratories (92.5%) reported having a continuity of operations plan (COOP) consistent with National Incident Management System (NIMS) guidelines. Twenty-five laboratories (47.2%) reported having a laboratory-specific COOP and 24 (45.3) reported their state agency/department-wide COOP includes the laboratory. Four public health laboratories (7.5%) reported not having a COOP in place for FY2022, however three (5.7%) reported that the laboratory or state is developing a COOP.
- Public health laboratories conducted or participated in a total of 319 preparedness exercises in FY2022. 23.5% were discussion-based tabletop exercises and 76.5% were operations-based drills, full-scale or functional exercises. Full-scale exercises for BT or CT were the most common, making up 31.7% of preparedness exercises that public health laboratories conducted or participated in.

Biological Threats Preparedness

- All 53 public health laboratories maintain a database of active sentinel clinical laboratories for their state or jurisdiction, capturing key contact information and capabilities for 3,481 active laboratories across the country. Thirty-six (67.9%) sponsored sentinel clinical laboratory trainings for biological threats, offering 564 training classes to 999 clinical laboratory facilities, reaching 4,054 laboratorians in one year.

Chemical Threats Preparedness

- Forty-nine public health laboratories (92.5%) have either maintained (39) or increased (10) their Laboratory Response Network for Chemical Threats Preparedness (LRN-C) capabilities.

Radiological Threats Preparedness

- Twenty-two public health laboratories (41.5%) reported having the responsibility for radiological surveillance and response testing within their jurisdiction. Thirty-one (58.5%) reported not being responsible and if known, specified which agency is responsible for their jurisdictions' radiological surveillance and response testing.

APHL would like to acknowledge and thank the 53 public health laboratories that provided data for last year's survey. An in-depth summary of the findings from the 2023 All-Hazards Laboratory Preparedness Survey is forthcoming. For more information about the survey, please contact Jill Sutton Hanratty at jill.sutton@aphl.org. ■

Southeast ColLABorators Convene Regional Consortium In-Person Tabletop Exercise

By **Marie-Claire Rowlinson**, PhD, D(ABMM), chief, Bacterial Diseases, Florida Bureau of Public Health Laboratories; **Matt Johnson**, division director, Kentucky Division of Laboratory Services; and **Tina Su**, MPH, manager, Quality Systems and Analytics

On February 21–22, the Southeast ColLABorators (SEC) convened an in-person meeting at the **Alabama Bureau of Clinical Laboratories** to conduct a tabletop preparedness exercise with components that follows up on the virtual tabletop exercise that was completed by the SEC in April 2021. This meeting was supported by APHL funding focused on regional consortia quality improvement activities and strengthening capabilities.

The meeting participants worked through three public health scenarios:

Newborn Screening

Led by Denise Pettit from the **North Carolina Public Health Laboratory**, the scenario posed involved a stolen laptop and a cyberattack. The group discussed which laboratory staff should be notified, what specific questions would need to be addressed by the laboratory's information technology team, and how to ensure the continuity of the newborn screening program during this breach. As action items, the SEC laboratories will use the resources and discussion to update their newborn screening continuity of operations plans. Each state will investigate details of backing up their newborn screening LIMS and refreshing or restoring from the backup.

Laboratory Developed Tests (LDTs)

The group led by Kara Levinson from the **Tennessee Public Health Laboratory**, discussed potential scenarios if the **US Food and Drug Administration (FDA)** enforcement of LDTs is eliminated and how it would impact diagnostic, surveillance and emergency response testing and organizational structure and budget. To capture information about LDTs, there will be a discussion about how to best capture which tests in the Public Health Laboratory System Database (PHLSD) are LDTs.

Arbovirus Epidemic

Lea Heberlein from the **Florida Public Health Laboratory** helped participants consider a scenario involving travelers arriving into Florida from South America with yellow fever and local transmission without any travel history. The SEC laboratories discussed how their laboratories would work together and what resources are available for each state. The group also agreed to update their surge plans.

To prepare for future unexpected challenges, tabletop exercises are crucial for public health laboratories to test and improve their emergency response plans in a simulated scenario. They allow for identifying weaknesses in the plan,

as well as practice for communication and coordination within their regional consortia. It is important to revisit these plans regularly, especially after the COVID-19 response to ensure that the plan is as up-to-date as possible.

As a result of this meeting, the following takeaways were identified: creation of a survey that each member state will complete listing the number and type of LDTs performed in the PHL, which may lead to future regionalization of these LDTs; increased ELC funding requests for yellow fever or other arboviral diseases; and updating the PHLSD. A final point of interest was the tour of the new Alabama Laboratory, as several laboratories in the SEC are looking to renovate or build. ■

Holding this exercise in person enhanced the engagement of the participants and provided greater opportunity for each to provide direct input.



Recruiting Tomorrow's Leaders: Local Academic Outreach Initiatives Boost Public Health Laboratory Recruitment

By Amra Handzic, MBA, specialist, Academic Partnerships; and Ladan Ghedi, MA, specialist, Academic Partnerships

Local outreach efforts by public health laboratory professionals have proven pivotal in bolstering recruitment for public health laboratory science careers. Recent focus group findings by the [APHL Academic Partnerships program](#) shed light on the efficacy of various engagement activities, the motivations driving involvement, metrics for evaluating success and actionable suggestions for improvement.

Engagement Activities: Diverse local engagement initiatives have been undertaken by APHL and other public health laboratory professionals, spanning career fairs, classroom presentations, conferences and specialized events including “Women in STEM” days. These platforms provide direct interaction opportunities, facilitating the dissemination of information regarding public health laboratory careers.

Motivations for Involvement: Several driving forces underpin the involvement in outreach activities. These include the critical need to address workforce shortages, increase awareness of public health laboratory science careers to students from all majors and mitigate the challenges of high turnover rates.

Evaluation of Success: Success metrics encompass multifaceted parameters, including event attendance rates, attendee engagement levels with informational materials, inquiries about job opportunities and submitted applications for Public Health Laboratory Internships or Fellowships.

Suggestions for Improvement: Participants propose actionable recommendations to enhance recruitment outcomes, including clearer advertisements describing job roles, transparent communication regarding pay and benefits, strategic resolution of funding constraints, optimization of booth placement at events for maximum visibility and robust tracking mechanisms for student outreach.

Discovery of Internship Program: Insights from current public health laboratory interns show the path to



Kenlie Fite and Public Health Laboratory Ambassador Cullan Kirwan attend the University of Colorado-Denver career fair

discovering the [internship program](#) includes personal mentors, professors and online searches. Mentorship plays a significant role in guiding interns toward this opportunity.

Interns recommend engagement with students through interactive sessions and workshops that promote inclusion and diversity within the public health laboratory science field. Leveraging social media platforms to disseminate information effectively and advocating for inclusivity by welcoming students from various academic backgrounds, irrespective of their current field of study, recognizes the transformative



Dana Baker, Michelle McCarthy and DeCarlo Lyles (Louisiana Department of Health-Baton Rouge Public Health Laboratory) attend the Southern University Career Fair.

potential of the experience. Interns recommend targeting universities with robust research, public health and science programs by actively participating in career events and highlighting the impactful work of public health laboratory scientists. A key suggestion was engaging with university professors and laboratory mentors to facilitate introductions and foster student interest in the program through personalized outreach efforts.

APHL has been actively engaged in targeted outreach through [Handshake](#), a job marketplace facilitating connections between employers and college students or graduates from partnering institutions. Handshake is used to advertise fellowship and internship jobs, register for virtual or in-person career fairs and host recruiting events.

Recommendations provided by Handshake for enhancing recruitment strategies include creating touchpoints to maintain consistent engagement with candidates, regularly updating and reposting job listings across all participating schools to improve visibility and emphasizing the benefits of the role and potential future opportunities to attract interest. Hosting events where candidates can interact with the company before applying fosters a sense of connection and engagement.

Recognizing the preferences of early career talent, such as professional development opportunities, student loan assistance, and work-life balance, can further enhance recruitment efforts.

The focused efforts in local engagement and mentorship highlight the importance of various communication channels, varied recruitment strategies, and active involvement with academic institutions in defining career paths and nurturing a robust talent pool for public health laboratory science careers. These initiatives strengthen the workforce in this vital sector, laying the groundwork for a more inclusive and impactful future in public health laboratory science. ■

Cultivating Positive Environments for an Evolving Workforce

By Dana Powell Baker, EdD, MBA, MS, MLS(ASCP)^{CM}, manager, Academic Partnerships

Public health laboratory fellowship and internship programs offer those interested in an early-career experience the opportunity to gain practical knowledge and skills in a public health laboratory setting. These programs are geared towards providing experiences beyond the classroom and serve as a recruitment tool for the public health laboratory workforce. As we recruit individuals to apply for fellowship and internship placement opportunities, we must consider the impact of work environments on shaping the future of the public health laboratory workforce. Creating positive, healthy work environments is essential to ensure rewarding experiences leading to organizational benefits such as attracting and retaining top talent.

Creating a Positive Experience

McKernan¹ provided the following four ways to create a positive internship experience:

- **Provide clear expectations and goals.** Start things with the proper foundation, so interns understand what is expected of them. This includes their schedules, project details and tasks they are expected to perform.
- **Provide opportunities for growth and development.** Learning new skills and exposure to different aspects of the work can increase self-efficacy and engagement.
- **Provide regular feedback.** Providing constructive feedback will help them improve their work performance and work toward achieving their goals.
- **Foster a positive work environment.** This is a fantastic way to cultivate connectedness for fellows and interns in the work setting. A welcoming environment and enhanced opportunities to connect with staff (e.g., team-building activities) can influence their sense of belonging.

Maintaining a Positive Work Environment

To ensure that experiences remain positive, it is crucial to recognize the signs of toxicity. These signs may include unclear or ineffective communication and non-constructive feedback. Additionally, lack of recognition for accomplishments and not being valued are signs of toxic cultures. In the *Journal of Environmental Studies and Sciences*, Parsons and Scarlett² emphasized the importance of providing institutional support, safety and a sense of well-being. Their suggestions for preventing a toxic experience include:

- Ensure a safe, fair and instructive environment.
- Provide clear guidance and constructive feedback on their performance.
- Be prepared to collaborate with the academic institution (e.g., establish an MOU, establish an affiliation agreement and schedule internship hours).
- Demonstrate and model a **culture of diversity, equity, inclusion and accessibility** in professional interactions.

In an article published in *Psychology Today*, Kristen Fuller³ described a toxic environment as any place where the work, the atmosphere, the people or any combination of those things can cause severe disruptions in other aspects of their lives. A toxic work culture can have severe consequences on mental and physical well-being as well as quality of life. Recent studies have shown that the stress caused by a toxic culture or environment can have long-lasting effects such as elevated stress levels, lowered self-esteem, inability to focus effectively or perform tasks, and poor retention.⁴ To mitigate this, it has been suggested that interns and fellows be supported through best practices, such as fostering an inclusive culture and providing a sense of belonging to promote a positive learning experience.⁵

Summary

By effectively communicating, reinforcing values and establishing clear expectations on the front end, we can work together to continue providing a positive experience for public health laboratory fellows and interns. Doing so will help create an optimal environment where we can foster a culture of well-being while ensuring that everyone benefits from a fulfilling experience. ■

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