



# INTEGRA

*Episode: Efficient Liquid Handling Critical in Responding to Surge Events*

**Paul (Host):**

Hello, and welcome to the Rapid Microbiology Podcast. And I'm your host, Paul Carton. Today, we're discussing the power rapid instruments have in enabling public health laboratories deal with outbreaks quickly and effectively.

If the last 20 years have taught us anything, it's that outbreaks are difficult to contain. There is tremendous pressure on public health laboratories to rapidly return testing and sequencing results so that the infected can be immediately isolated, and health agencies can employ methods to curb the spread of more dangerous variants.

Unfortunately, not every lab has the ability to adequately respond to a pandemic-level event. Some laboratories have been quick to adopt new technologies to build capacity, such as rapid test methods or automation, while others are finding it difficult in keeping up with method and instrumentation advances that would increase their throughput.

To help us gain insight into how rapid methods are making a difference in the modern lab, we have with us today two experts in the field of public health.

Let me introduce Denise Bolton from the New Hampshire Public Health Laboratories in the US. Hi, Denise.

**Denise Bolton:**

Hi, Paul.

**Host:**

And we have Carol Loring. She is Field Application Specialist from Integra Biosciences. Hi, Carol.

**Carol Loring:**

Hi, Paul.

**Host:**

Denise, I was just looking through your biography online there, and it says as part of your work in Public Health Laboratories, you had to deal with an anthrax incident involving a drumming circle. Can you use that as an example to describe the work you do at Public Health Laboratories?

**Denise:**

Sure. In public health, we sometimes have to respond to new and emerging infections and/or events that happen. And this was a public health event that happened-where a person was infected with anthrax in a drumming circle. And we had to backtrack and figure out how, and then look at the setting to find out whether the house still had anthrax spores in it and if it still posed a threat to public health. So in my role at the Public Health Labs, I was involved in rapid method testing for anthrax, so basically PCR testing.

**Host:**

And did they find out how? Anthrax is one of the most toxic substances known on earth. Were they passing around a peace pipe or was it off their fingertips?

**Denise:**

It was thought to be off the fingertips, a rare case of gastrointestinal anthrax, which could have been from fingers on the drums. And then they shared food and stuff like that.

**Host:**

And Carol, just some background with you. You spent a lot of time in Africa, I believe, working for influenza surveillance, and you specialize in respiratory diseases. Just a question for you. When SARS-CoV-2 was identified in Wuhan late December, it being a respiratory virus, what was your next step? Did you pretty much know that you had to scratch off all your plans in the diary?

**Carol:**

Yeah, that's pretty accurate, Paul. I was paying attention to the news media when they started reporting about a respiratory virus in Wuhan and hearing about it and how it was spread. And of course, at that time I was working in public health and our epidemiologists were holding meetings about it.

We were doing a certain level of preparation for it, but we really never imagined that it would... Or at least, I didn't imagine that it would become the global pandemic that it did. Everybody in public health, both program managers and epidemiologists as well as Public Health Laboratory staff, worked many, many long hours for many, many months once it spread out of Wuhan.

**Host:**

I think we all figured it would fizzle out and wouldn't be as a global pandemic as it turned out to be. I think we all heard it was something that was affecting immunocompromised people on the far side of the world. We just didn't know it would rapidly spread as it did.

So Denise, it's hard to imagine how labs would've been able to handle COVID-19 testing requirements without electronic and automated pipetting. Can you describe how your lab in New Hampshire managed COVID-19 in the early days of the pandemic before rapid methods and high throughput instruments became available to your lab?

**Denise:**

Sure. All of the sample processing that we did was manual, which was quite a challenge. We had several different extraction platforms, but none of them were high throughput. So we were hobbling along, piecing together eight samples here and 24 samples there until we could make up a full PCR run. We quickly became overrun with samples and we couldn't keep up with testing needs.

When we implemented two Integra ASSIST PLUS automated pipetting robots for sample processing and two Thermo Fisher, KingFisher instruments for high throughput nucleic acid extraction, it made a world of difference for our lab. Our staff felt less burned out, and it helped us to streamline operations and keep up with the testing need.

At the beginning of the pandemic, testing was only available at the Public Health Labs. All the testing was laboratory-based. It wasn't until later that private labs had access to the testing methods. It was months into the pandemic before physician office lab based testing and at-home rapid testing methods became available. Those both added capacity for wider population testing and that relieves some burden on traditional lab-based testing.

**Host:**

Yeah. I would say burnout from increased workload is definitely one of the symptoms of a global pandemic.

**Denise:**

Definitely.

**Host:**

And it took a long time for a high-standard rapid antigen test to be developed, properly managed and finally accepted as a method for identifying the infected. Thankfully, for high throughput labs, automated pipetting and extraction was something that could be immediately implemented due to being already on the market for some time.

Carol, when lab technicians are using their hands to perform the same chore over and over again, such as pipetting for PCR, as Denise has mentioned there, they can experience repetitive strain injuries that prevent them from doing their job, and may disrupt the services that a lab provides. As a field application specialist for Integra, are Integra's rapid instruments designed to be user-friendly to avoid this pitfall?

**Carol:**

This is a really important topic, Paul. Almost all laboratories use pipettes to deliver precise volumes of liquids. And manual pipetting is fast, it's easy to do. You can just grab a pipette and move that liquid wherever you need it. But when you're a lab scientist, and you spend years and years at the bench over your career, every lab scientist who works at the bench, will eventually develop a repetitive strain injury in their hands or their wrists or their shoulders or even the back of their neck.

This is pretty much guaranteed. It's not a, "might" develop repetitive strain, but a "will" develop repetitive strain. This problem is amplified during periods of high testing, like an outbreak or the pandemic. Just the sheer physical toll on laboratory staff can cause absences due to pain and injury. It increases expenses to the organization due to lost work hours or higher insurance claims, and it can even cause scientists to leave the laboratory altogether.

This is one thing that Integra is really aware of and we really strive to do, to improve our products. We work hard to engineer the pipettes to minimize harm to the user. Our manual pipettes are extremely light, this reduces arm and shoulder fatigue. Our volume adjustments can be accomplished with a three-dial mechanism. This is different than many pipettes that require twisting of the plunger to change the volume setting.

This design of our mechanism eliminates the wrist-twisting motion. And because our pipettes and tips are designed as a system that work together, the pressure required to load tips and eject tips is

minimal. So the user doesn't have to perform that hammering motion to load tips, and they don't have to work hard to eject the tip.

If a user is tired of doing manual pipetting, and they want to eliminate that plunger pressure altogether, they can switch to an electronic pipette. Integra electronic pipettes are designed ergonomically with a run button right on the front of the pipette body where your thumb rests naturally.

So no stretching or reaching of the thumb is required to perform an aspiration or a dispense. And then our Viaflo and Adjustable Tip Spacing Voyager electronic pipettes are able to store predefined programs. The user simply touches the run button each time they need to perform a step of the program. The Voyager pipette is a multichannel pipette that has adjustable tip spacing.

This pipette can handle transfers from tubes to plates, and this means that work can be performed with a multichannel pipette. Using a multichannel pipette reduces the workload of the lab scientist by orders of magnitude.

The light touch of the controls on these pipettes minimize risk of repetitive strain injury. And lab scientists may not notice the accumulation of repetitive strain injury on a day-to-day basis, but when a surge in testing occurs, such as the COVID pandemic, these issues really become much more evident.

**Host:**

The automation really plays a big role there. Not only does it prevent repetitive strain injury, it reduces the chance of lab staff coming in contact with a live virus and it also reduces the chance of false results due to contamination from handling the samples.

**Carol:**

Yeah, that's right. The automation takes the pipette out of the user's hand. So it reduces the risk of injury to the lab scientist, but it also reduces the risk of an error in pipetting.

**Host:**

Denise was saying earlier when she was manually processing samples, it's hard to imagine a lab doing that, the amount of samples you would've had to have done during COVID-19 as a Public Health Laboratory. It was practically impossible, I would imagine.

So let's take a look at the recent outbreak of monkeypox. Denise, from your experience in the Public Health Lab, what challenges were there in handling the virus?

**Denise:**

Well, Public Health Labs faced several challenges with this outbreak. There are two clades of monkeypox. One is the Congo Basin clade, and that happens to be a select agent. And that requires a lot of regulatory oversight. Fortunately, all of the cases in this outbreak were caused by the West African clade, but it's still a dangerous virus.

We had to ramp up testing while minimizing risks to our employees to prevent lab-acquired infections. Fortunately, for us in New Hampshire, we were never really inundated with specimens. But I know some Public Health Labs in the bigger states really had to ramp up testing. And fortunately, they could take advantage of some of the automation that they brought on to deal with the COVID-19 pandemic.

**Host:**

This question is open to both of you. What message would you want to share with our audience about responding to outbreaks with rapid testing and instrumentation?

**Carol:**

My message is that lab scientists must prepare for an outbreak or pandemic well before one occurs. We know that the public health network, which is made up of both private and public labs, works on this every day. They train staff to ensure competency, they plan and drill for large events, they bring on new and rapid tests for emerging pathogens, they maintain electronic messaging systems so results are rapidly transferred to epidemiologists.

But in my experience, especially with the recent COVID pandemic, I learned that another important but undervalued way in which labs can be better prepared for a surge in testing, whether a pandemic or other event, is to ensure that lab supervisors and managers are allowed the time and resources required to keep up to date with advances in testing technology and instrumentation.

I think this really needs to be part of their routine duties. This would mean funding travel to conferences or trade shows where lab staff can talk with vendors about their products, they can see what instruments are available, they can learn about new testing technologies and bring those ideas back to the lab. Lab staff should be inviting vendors into their facility to provide a demo of a new test or an instrument so they can learn about its capabilities.

Industry provides online webinars and training events. Lab staff can visit partner labs to see what they're doing. It's just to allow them the opportunity to have some idea where they can turn to before the need for scaling up testing arises.

I found when I was working in the lab at the start of the COVID pandemic, I really didn't have the knowledge of what resources were out there that I could turn to.

This is something I've looked back upon and thought this is something I really could have done better and been better prepared. I think that once laboratories obtain instrumentation for increasing their throughput, they also need to ensure that staff are trained on it and that they use it regularly to maintain competency. Because a liquid handler that is never used and gathers dust won't be any good to anyone when a ramp-up in testing is needed.

**Denise:**

Yeah, I agree with Carol. I can speak from experience about how the wheels of state government churn very slowly. If you're trying to secure funding and procure new equipment, it can be a really cumbersome process. When you're in an emergency situation like an outbreak or a pandemic and the demand for testing is ramping up quickly, there's really no time to research new equipment or technologies.

Also, what we found is that the global pandemic puts a strain on the resources that everyone needs all at once. For instance, we were trying to get an instrument for high throughput testing, and there weren't any available. And even when the instrument became available, there weren't any reagents. They couldn't keep up with that. So we're fortunate in that the equipment that we implemented during the COVID-19 pandemic will be there to help us respond to future emerging and infectious disease outbreaks or pandemics.

**Host:**

I found during the pandemic, the webinars were in such high demand, and they were so useful in bringing the information and discussion to lab managers who couldn't travel and bringing the information to their desktop. And they could get involved in the discussion, which proved to be very useful for lab managers to upscale their equipment in the lab. Thank you, Denise and Carol for joining me today.

**Denise:**

You're welcome, Paul.

**Carol:**

Thank you.

**Host:**

It's clear from speaking with you both on the topic of rapid methods that lab managers and supervisors must approach rapid instruments like any new scientific discovery in their field. They need to learn and keep abreast of new developments, so when they need or want to build capacity, they can adapt quickly and confidently. And thank you to the listener. Until next time.

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