Lab with Ebola experience: COVID more complicated

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August 2020—If there's one thing scarier to experience than COVID-19, it's Ebola. Or so you might think.

"Ebola was easier," says Beverly Dickson, MD, medical director of the clinical laboratory at Texas Health Presbyterian Hospital Dallas.

Not that she herself has experienced shortness of breath or body aches. Rather, she's contrasting her experiences at a hospital that has treated patients with Ebola and patients with COVID-19. How those events stack up from the laboratory's point of view may yield helpful insights for others in this time of pandemic.

Dr. Dickson: "Now instead of writing a protocol or process and then implementing it, we write a process or a protocol and then we watch."

Texas Health Dallas in 2014 diagnosed and treated three patients with Ebola virus disease—a man who had recently arrived from Liberia (and who went on to die from the disease) and two Texas Health Dallas nurses involved in his care (who survived). It was the first time that a case of Ebola had been diagnosed in the United States.

Dr. Dickson and her team ran, and still run, the tertiary care laboratory in the 800+-bed hospital. The clinical lab has a main core laboratory, which is across the hall from the microbiology/molecular laboratory. "Like a lot of hospitals, the core laboratory does the bulk of the testing for the hospital and is a very large single room with lots of modular furniture and lots of instrumentation," she says. "The microbiology lab is a much smaller space but has several rooms that are closed off from the rest of the lab for molecular and AFB/fungal testing. We have a negative-pressure room with a biosafety hood, and technologists who are accustomed to working with airborne isolation."

As with COVID-19, the fear around Ebola was intense and widespread. "The only thing everybody knew about Ebola was that you get it and you die," says Dr. Dickson, who spoke with CAP TODAY in May. "That's one of the worst things about COVID now—all of the information that floats around on the internet and everywhere else. People talk to other people, and sometimes get the wrong idea about things."

With both Ebola and COVID-19, Dr. Dickson and her team were able to strategically communicate in a way that minimized internal gossip and confusion. “Phone calls normally come to the lab, and client services answers the phone, or the central processing area answers the phone. But during Ebola and also with COVID, the group communicating information is a much tighter, smaller select group,” she says, “so that the information that goes out is always current and the best information at that point in time.

“One thing about COVID and Ebola is, things change every day,” she continues, “and sometimes a couple of times a day in a couple of hours. So it’s impossible for everybody in the whole laboratory to know what’s going on every moment of every day, and it’s confusing for them to keep getting new information. Having a core group who are the go-to people for questions and concerns is pretty important to the communication part, because communication with the other areas, whether it be pre-op or radiology or ED, needs to be correct all the time.”

Having a tight team at a supervisory level meet daily has an additional benefit, Dr. Dickson says: “When you use a really small team, that team becomes very engaged with the small teams in the different areas of the hospital. So the ICU team and the lab team now know each other very well and work well together.”

Looking back at her experience with Ebola, Dr. Dickson also thinks it was helpful to regularly offer her laboratory staff a chance to ask her questions directly. “Everybody would gather around and we would talk,” she remembers. For instance, a team member might ask, “Will the decontamination that’s set up in the instruments kill Ebola?” This gave Dr. Dickson the chance to discuss the differences between enveloped and non-enveloped viruses and the substance the instruments used for decontamination, and provide scientific answers to staff concerns.

Or, with the COVID-19 pandemic, the phlebotomy staff members might express concern about their own safety. One has to be transparent, provide information that is known, but sometimes Dr. Dickson’s answer was or is, “I don’t know. I don’t know if anybody knows.” But, she says, these kinds of conversations go “a long way to letting them know that, A, you’re thinking about their safety, and B, you thought through the process. It stops the rumor mill.”

Another lesson from Texas Health Dallas’ Ebola experience that has come in handy during the time of COVID-19 involves the way the laboratory creates and implements protocols. Many protocols followed the arrival of Ebola, and those protocols evolved as the CDC issued new information, as do COVID protocols and processes.

With Ebola patients the daily timing of testing was controlled to mitigate exposures of staff to Ebola specimens. Administrative controls minimized the number of workers exposed to Ebola samples. If a person under investigation for Ebola came to the emergency department, the nurses were provided with a written set of instructions so that “there was no question in their mind what tests they were allowed to order and what types of tubes needed to be drawn,” Dr. Dickson says. “That way, they could take care of everything at one time and would not have to put on high-level PPE over and over and go back and forth and in and out of the room.” Once the nurses had bleach-wiped and bagged a specimen multiple times in series, laboratory staff would bring a biosafe transport container to the ED and have the nurses drop the specimen into the container, without lab staff having to enter the hot or warm zones.

“As far as the specimens that did not go on the robotic line, those specimens—mostly green-top heparinized tubes and EDTA tubes—could be opened in the core laboratory under a biosafety hood if needed,” Dr. Dickson recalls. “But most of our testing was done on the [robotic] line, so we were semi-protected from open tube exposure.” At the beginning, they put the tubes on the line and let the line de-cap them and spin them. “That process seemed safer,” she says, “but a centrifuge accident could have been a huge problem.” Once they got rotor caps in the core laboratory, they started spinning them all off-line and in a capped centrifuge. “We’d never really had a use for a capped centrifuge in the core lab until Ebola. So we were basically able to do whatever testing could be performed by the instruments on the line, which were duplicate Abbott Architects, both the chemistry and the immunochemistry sides.”

“Then CBC-wise, we had a Sysmex, and we provided clinicians with the CBC results but no differential slide was prepared,” she continues. “We didn’t allow the Sysmex to make a slide, since that process was thought to possibly

cause aerosolization. There is a fan inside the Sysmex that dries the instrument prepared slide, so we kept test results limited to just a straight wet CBC. Coag testing we couldn't really do, because we had an open tube system, but we had an i-Stat that we used to do a PT if it was necessary."

All those new protocols gave the laboratory team ample opportunity to consider the best way to implement them. "Now instead of writing a protocol or process and then implementing it, we write a process or a protocol and then we watch," Dr. Dickson explains. "We observe somebody doing the job because we found out that what looks good on paper [might not] look good at all when you're observing. You realize that something might not be as safe as you thought it was."

They believe in direct process observation, she says. While the Ebola patients were being treated, teams in the hospital's microbiology and core laboratories handled the testing. "When they did that, they always had a buddy who watched them don and then later doff [PPE]. They also always had a buddy who watched them while they were doing anything with the specimen tubes, so that someone was always there to say, 'Oops, I don't think you want to do that,' so they didn't lose focus."

Dr. Dickson used the power of observation recently. At the beginning of the COVID-19 pandemic, she found herself thinking, "We don't really know who has COVID and who has flu." She wanted to make sure the technologists in the core laboratory who perform flu testing were doing it safely, so they wouldn't accidentally infect themselves with SARS-CoV-2.

"So we went into the laboratory to observe someone doing the routine flu testing"—a skilled technologist—"and noticed a few things we didn't think were quite right, and then had the hematology supervisor change the protocol and re-educate everybody about what the safer process would be," she says. "It's almost like you have to put people in the physical context of what they're going to be doing for you to really understand—put them in the physical space they're going to be working in and watch them walk from here to there, and observe what they touch and what they do in a routine fashion. Without seeing someone perform the process, you can leave steps out of your risk assessment that could be important."

For example, when loading a cartridge for respiratory PCR testing in the biosafety cabinet, microdroplets can be dispersed on the gloves of the testing personnel, though the droplets may not be grossly visible. These microdroplets can then be transferred from the glove to the instrument during loading of the cartridge when adding specimen/patient information to the instrument screen or onto the computer terminal. Gloves need to be changed prior to touching anything outside of the biosafety cabinet. "This is especially important for molecular testing to mitigate nucleic acid contamination," Dr. Dickson says. "It is even more important when the disease is an emerging virus that is not fully understood in terms of transmission and infectious efficiency." Glove change post cartridge load was added to the flu PCR testing protocol in the core laboratory.

Dr. Dickson is a stalwart believer in the importance of carrying out drills fully, not just partially. "The hospital does disaster drills, and the lab is of course involved," she says. "A lot of times, the part in the lab is not fully vetted. It's not like they go through the entire process of taking the tube and putting it on the line or putting it in the centrifuge." She watched staff process the tubes during an infectious disease drill. "And you would think people hadn't done this before. It's something that needs to be drilled down—in other words, an actual process all the way to centrifuging the tubes and putting them where you would put them during some type of disaster or infectious disease outbreak, because people forget things."

One COVID-19-related challenge for which Ebola did not prepare Dr. Dickson or her team: supply chain problems. "With Ebola, it was a fairly small global area that was affected, so globally the supply chain wasn't affected," she says. "But during this pandemic disease [COVID-19], supply chain has been the biggest problem."

The laboratory was initially unable to obtain cartridges for its Cepheid or its BioFire instruments. Without cartridges, the laboratory was forced to send tests to reference laboratories, which were so inundated with demand that turnaround times soared to as many as eight days. "I would say that that was the hardest part at the beginning of all this—you couldn't get test results back in a time frame that allowed rapid clinical decisions," Dr.

Dickson says.

The laboratory tried to remedy the problem by adding instrumentation, but “we couldn’t get that either,” she says. “In fact, we still have instrumentation that we ordered that we never received,” such as additional Cepheid modules. Also impossible to get for a while: viral transport media. “We just looked at the CDC recipe, ordered what we needed to make it, and made it ourselves.”

They haven’t run out of nasopharyngeal swabs, “but we have had close calls,” Dr. Dickson says. In response, she and her team have brainstormed alternatives, just in case. “We could do a nasal wash if we had to, and of course everybody hates that,” she says. “We could do sputum if we had to, but we wouldn’t be doing induced sputum because nobody wants to induce it because of the aerosolization.” As of mid-July, she tells CAP TODAY, nasal swabs, oropharyngeal swabs, and even saliva were in the process of being validated.

In preparation for the fall respiratory season, “we’re ordering supplies even though we don’t necessarily need them right now,” she says. “I’m assuming COVID will still be circulating, and we’ll be doing a lot more respiratory testing than usual, just because the doctors are trying to determine whether people have COVID or flu or RSV. So we’re stockpiling supplies to prepare for that, and purchasing some new instrumentation also.”

Until then, why does she say she’d rather deal with Ebola than COVID-19?

“Ebola was easier because it was just our hospital,” she says. In her view, the size and varying testing abilities of the entities that make up the Texas Health Resources system make dealing with COVID-19 more complicated. “Whenever you have all of that different variability between laboratories, training, and instrumentation, trying to get everybody on the same page, doing the same thing, is a lot more complicated, and in some cases not even reasonable.” She says she isn’t comfortable having someone who is not trained for biosafety perform the COVID testing. “I understand that we have some point-of-care instrumentation, which is basically CLIA waived, which means that anybody can do it. But as a lab director, and especially after Ebola, personnel who have never had any biosafety training don’t have the same feeling about what’s going to cause contamination and what’s not, what’s safe and what’s not safe. I don’t feel comfortable having people who have a high school education doing respiratory testing with an emerging virus.”

That said, soon all of this may no longer be her problem: “I think I’m at that age where I’m getting [ready] to retire. I’ve had my pandemics and epidemics, and I’m good.”

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