Problems, solutions at core of UTI, *C. diff* modules

Valerie Neff Newitt

April 2021—Urinary tract infections and *Clostridioides (Clostridium) difficile* testing are the topics of two of the modules released recently in the CAP Test Ordering Program.

The Laboratory Workup for Urinary Tract Infections module became available online in January, and *C. difficile* Testing in October 2020 (www.cap.org/member-resources/test-ordering-program). The program is free to CAP members.

Dr. Procop

"Urine cultures have been fraught with problems ever since the very first urine culture was sent," says Gary W. Procop, MD, MS, a member of the CAP Quality Practices Committee, developer of the program. "In uncomplicated urinary tract infections, you don't even need a culture, and we state that in the module. We are not saying, 'Do more testing.' We are saying, 'Only test when it is needed.'"

The Test Ordering Program is composed of brief publications, written by pathologists for pathologists, that synthesize recent literature and practice guidelines, says Stacy Beal, MD, associate medical director of the core laboratory at UF Health Shands Hospital and associate professor in the Department of Pathology, Immunology, and Laboratory Medicine, University of Florida College of Medicine. Dr. Beal, a member of the Quality Practices Committee, is the author of the UTI module and coauthor of the *C. diff* module. "In a very concise way, the modules outline common problems in the utilization of tests and, importantly, offer multiple solutions," she says.

"Every health care system is concerned with delivering high-quality care while lowering costs. That's the tightrope we walk," says Dr. Procop, director of the molecular microbiology, mycology, parasitology, and virology laboratories at the Cleveland Clinic and professor of pathology, Cleveland Clinic Lerner College of Medicine.

"Doing these modules and being involved in these types of activities highlights additional value pathologists can bring to our health care systems and increases our brand and visibility," he says.

In testing for UTIs, the presence of an organism doesn't always mean there's an infection, Dr. Beal says. "Therefore, it's important to test only people who have signs and symptoms of an infection. Urine cultures are not straightforward. They require multiple plates, and when multiple organisms are present, they need to be teased out."

Dr. Beal says she became aware of problems with UTI testing when she was rounding in her microbiology lab and saw technologists surrounded by culture plates. "It was clear the volume of UTI testing was huge. It seems as if all patients have a urinalysis or urine culture. I wanted to write on this topic because it has a wide reach, and even a small change could have a big impact."

Among the objectives of the UTI testing module is to define which UTI assay or combination of assays is most useful to clinicians.

One of the problems leading to overuse is what Dr. Beal saw in her hospital: Names given to lab tests in the electronic health record were confusing, "and this alone probably led to improper test utilization," she says.

“For example, we had ‘urinalysis with micro,’ and it wasn’t clear if ‘micro’ meant microbiology or microscopy.” (It meant microscopy.) “So then it’s ‘urinalysis with microscopy,’ but that implies there’s urinalysis without microscopy, and there isn’t. All of our urinalysis is accompanied by microscopy.” Clearer, more straightforward names were assigned and placed in a logical sequential order. “This required great collaboration with our IT team,” Dr. Beal says.

Another problem became clear to Dr. Beal and her colleagues: Their reflex algorithm was outdated. “It had things like blood and cloudy appearance, which should not trigger a reflex urine culture from a urinalysis. So we changed it to only increased white blood cells, leukocyte esterase, or nitrites. When we made this change, we tried to get as many clinicians involved as possible, and I think they enjoyed being asked. They felt they’d had input into the behind-the-scenes operation of patient care, which they don’t normally have much access to.”

Dr. Procop, too, recalls problems he encountered. Years ago he asked colleagues, “Do we refrigerate our urine?” Yes, he was told. “But the reality was that after the urine was collected, it sat on a counter for 30 minutes before being refrigerated. Then somebody picked it up with a cart that was unrefrigerated and walked around and picked up other specimens. An hour later, they got to the laboratory and numerous specimens got dumped at the accessioning window, all of which were unrefrigerated. Eventually someone accessioned the urine and put it in the refrigerator. All that time, organisms had been growing. So even though I got the answer, ‘Yes, we refrigerate our urine,’ we weren’t refrigerating these specimens correctly.”

Dr. Procop says the Cleveland Clinic now requires the use of urine preservative to keep bacteria from multiplying during transit to the laboratory. “That’s important in large medical centers where you’re getting cultures from a lot of satellite family health centers and the like.” To others he says, “You need to use urine preservative right after the urine is taken, to preserve the true concentration of bacteria in that urine. Otherwise you’ll be treating things that are not the cause of a urinary tract infection.”

The UTI module lists six possible interventions to improve the use of UTI diagnostic tests:

- Develop education with physicians in your institution aimed at providing a diagnosis based on clinical features when possible.
- If testing is warranted, define proper initial and reflex protocols, such as performing urine microscopy with or without urinalysis with reflex to culture for most patients, with some exceptions.
- Examine how UTI orders appear to providers in your physician order-entry screen.
- Do not allow test of cure.
- Ensure cultures are set up within an appropriate time frame, depending on the presence of chemical preservatives or refrigeration.
- Do not work up more than three organisms unless the collection was strictly sterile or one potential pathogen predominates.

“It’s been our goal to have a variety of different types of interventions from which each lab can choose,” Dr. Beal says.

Dr. Procop advises those who are at the start of an improvement project pegged to any of the program's modules to begin with baseline data and then determine which intervention would work best. "Talk to your colleagues. Push the interventions forward in a team-based way," he says. "You might need informatics help or help from finance. You're definitely going to need a clinical partner. After an intervention has run awhile, re-measure to see if it had any effect."

The modules include appendices aimed at impact. "They give you the formula for exactly what information to plug in to be able to do calculations to prove your effort has had an impact. You will have true pre- and post-intervention data," Dr. Procop says, noting this is what pathologists should use to prove effectiveness. "This builds credibility, which is so important for the next time you want to do a project."

Dr. Beal says putting the UTI module to work offers a range of benefits. "The med techs you work with will appreciate that you are advocating for a better use of their time," she says. "Pathologists, in general, love to learn. This is a quick way to learn something new and, with a little effort, see a big improvement. At a minimum, glancing through the document might help lab directors feel more at ease. Oftentimes they have issues they don't realize other laboratories also have.

"The truth is we share many of the same frustrations, and now we can share the solutions as well."

A positive *C. diff* test, particularly by nucleic acid amplification, does not always equate to disease. "Therefore, it is imperative that only the most appropriate patients are tested," Dr. Beal says. "Labeling patients as *C. diff* positive when they don't have an infection caused by *C. diff* has many downstream consequences. And because *C. diff* is considered a hospital-acquired infection, an increased rate of infection has financial consequences for the health care system."

C. diff was considered appropriate for a module for those reasons and another: There are numerous testing options, each with advantages and disadvantages. "Among the tests, there are various combinations that can be used to make various algorithms," Dr. Beal says. "We describe the different methods, from the gold standard of cytotoxic culture to PCR panels that include *C. diff* as one of several analytes. Understanding how each test works and which one might be best for your own situation is a great reason to read this module."

Of the various assays used to detect *C. difficile*, Dr. Procop says: "We did not want to get into that quagmire of trying to pick which one is best when there are benefits and drawbacks to all. But there are some things about *C. difficile* testing that people do not debate, such as avoiding tests of cure or performing tests on formed stool or on a child less than a year old who can be colonized without disease. We know positive tests do not need to be repeated within seven days. The authors of the module highlighted these and other areas of agreement that are universal to all types of *C. diff* testing methods."

Dr. Beal says her own lab grappled with some of the problems associated with *C. diff* testing. "We noticed that there was *C. diff* screening in asymptomatic patients, improper collection of *C. diff* samples, *C. diff* test orders on formed stool, repeat *C. diff* testing, *C. diff* tests on patients receiving tube feeds or laxatives and who clearly had a different reason for developing diarrhea, and *C. diff* testing as a test of cure to see if it was resolved, which was not very accurate," Dr. Beal says.

To combat repeat or inappropriate testing, Dr. Beal says, "We created a pop-up alert if a patient had a recent *C. diff* test. And in the order-entry screen, we have ordering providers answer questions to make sure this is the most appropriate test. It's only three questions. If they answer them in a way that would deem the test inappropriate, an alert flags the order as 'likely inappropriate.'"

Dr. Procop says repetitive *C. difficile* test ordering is a common problem that's easy to explain. "Back in the day, we didn't have sensitive tests. So if a doctor thought a patient had *C. diff* and got a negative result from a test, they'd just order another one. We basically trained people to order multiple tests. Then along came PCR, which is highly sensitive. Now we don't want doctors to order a second test; we want them to believe the first result because it's so highly sensitive. But people have been stuck in that old-fashioned mindset of 'three *C. diffs*.'"

Repetitive testing leads to unnecessary treatment and expense, he notes.

“Let’s say you have 100 people with diarrhea and you’re worried they have *C. diff* disease. When you perform a highly sensitive test on their specimen, then you find out who is positive and who is negative with a great degree of certainty. Now, what happens if you retest the group that you already proved was negative? Regardless of the test, when you start testing a low-prevalence population, most of the positives you get will be false-positives.”

“Thoughtless ordering,” Dr. Procop says, is when there are no appropriate clinical signs and symptoms or when a *C. diff* test is in an admission order. “‘Patient has diarrhea? Just do a *C. diff*’—that’s a thoughtless reaction. The patient may come in after two days of regular stooling, get a little constipated, receive a laxative, and then have diarrhea. That diarrhea is from the laxative, not from *C. diff*. But if that admission order is sitting out there, the test may be run. That’s a huge issue.”

At Cleveland Clinic, infectious diseases and infection prevention providers agreed that a repeat positive is never needed. “So if you get a positive result, you’re done. And if you try to order another one, you’ll be blocked,” Dr. Procop says. “If you get a negative, you can’t order another *C. diff* test for seven days unless there’s a change in the signs and symptoms. We put in electronic interventions to stop unnecessary test ordering, and these have had a substantial impact.”

Electronic interventions that limit orders based on timing are among the several possible interventions the *C. diff* module suggests. Other suggested electronic interventions limit tests of cure, and another consists of questions built into the order-entry screen for physicians or included in a nursing protocol.

Still other interventions are to review clinical ordering patterns or to provide selective feedback relative to peers, or to review standing orders, panels, reflex testing workflows, and diagnostic aids that contain *C. diff* tests to ensure they’re appropriately designed and used.

Another new module, Testing for Carcinoid Syndrome, was released in March. Others are on thyroid disorders, tickborne disease testing, urine myoglobin, vitamin D, and more. There are 16 modules in all. A 17th module, on testing for pheochromocytoma and paraganglioma, is due out soon.

“The committee aims to release about four to five per year,” Dr. Beal says. “And we have a system in place to monitor the ones we’ve already done to make sure they’re updated. These are not static; they’re living documents.”

Says Dr. Procop: “When we take the oath as physicians, we commit to improving patient care. We can do that through our skill set at the microscope or by improving test use. It’s our duty.”

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