

AST and safety at core of microbiology checklist changes

Valerie Neff Newitt

October 2021—By Jan. 1, 2024, laboratories must use current breakpoints to interpret antimicrobial minimum inhibitory concentration and disk diffusion test results, according to a new requirement in the latest edition of the CAP Accreditation Programs microbiology checklist, released Sept. 22.

The same requirement calls for laboratories to implement new breakpoints within three years of the official publication date of the updated breakpoint.

“That is going to be a challenge and real work for a lot of laboratories,” Sheldon Campbell, MD, PhD, a member of the CAP Checklists Committee, says of the new requirement (MIC.11385 Current Antimicrobial Susceptibility Test Interpretation Breakpoints). His advice to laboratories: “Start thinking now about how you are going to accomplish that.”



Dr. Campbell

The new requirement is one of several changes to the 2021 microbiology checklist. Those changes were made for three main reasons, the first having to do with clarity.

“We looked at things labs are struggling with and tried to make the requirements clearer and more accessible to users,” says Dr. Campbell, professor of laboratory medicine at Yale School of Medicine and director of laboratories at the VA Connecticut Healthcare System.

The safety of clinical laboratory personnel is the second reason. In prior versions of the microbiology checklist, the safety requirements were in each of the subdiscipline sections. Those requirements have been updated and moved to a dedicated section on safety. “We removed redundant items from each microbiology section and instead combined them where appropriate,” says Christina Wojewoda, MD, chair of the CAP Microbiology Committee and associate professor and director of microbiology, University of Vermont Medical Center.

The third reason is to improve patient care, particularly around antimicrobial susceptibility testing.

“There’s a fair amount of misunderstanding in the laboratory community about susceptibility testing—how to interpret the laboratory results and provide real meaning for clinicians,” says Carol A. Rauch, MD, PhD, a member of the CAP Microbiology Committee and CDC Antibiotic Resistance Laboratory Network technical laboratory liaison.



Dr. Rauch

“There’s a constant background of organisms evolving to develop new resistance,” she continues. “The community as a whole has to keep up with new guidelines, new test methods, new ways of interpreting those results. The interpretations are focused on criteria we call breakpoints, which identify resistance or not, and where we make those cutoffs has been a moving target—with a lot of movement—over recent years. We need to get everybody onto the same page.”

Dr. Wojewoda says a checklist requirement on the use of updated breakpoints to interpret susceptibility testing is something the members of the Microbiology Committee have thought about as a committee for several years. “We finally got it across the finish line this year,” she says. “A lot of deliberation went into that, especially the phased rollout plan where we are giving labs a date to aim toward. We know this could be a burden for some laboratories, but it’s the best for patient safety and care.”

Dr. Wojewoda notes the three years of “wobble room” laboratories will have to reach compliance: “We are giving labs until January 2024 to get their assays validated to use the most current breakpoints.” After that, she says, new validations will be needed indefinitely as new breakpoints continue to emerge.

Says Dr. Rauch: “This will sound daunting to labs that didn’t even know there was a problem with breakpoints. However, the Microbiology Committee does plan to provide support in the form of webinars, podcasts, documents, slide sets, et cetera. We’ve been gathering those materials so that laboratories are not left on their own.”

Dr. Campbell says some manufacturers of automated systems can be slow to update their breakpoints, so this puts more work on the laboratory to get those breakpoints updated. “Hopefully, this will put a little pressure on manufacturers to move faster.”

A related and revised requirement in the checklist edition released last month is MIC.11380 Antimicrobial Susceptibility Test Interpretation Criteria. It says there must be written criteria for determining and interpreting minimal inhibitory concentration or zone diameter sizes as susceptible, intermediate, resistant, nonsusceptible, or susceptible dose-dependent, and the criteria must be reviewed annually.

“To improve performance of susceptibility testing and provide actionable reports to our clinicians,” Dr. Rauch says, “this requirement focuses on the lab knowing what breakpoints it is using. It sounds obvious, but it’s actually a tricky question that may involve contacting the manufacturer of a commercial device.” This dialog may be an “eye-opening experience” for many labs, she says, because they may assume the manufacturer of an FDA-cleared device is using updated breakpoints. “But that is not necessarily true. For example, breakpoints sometimes have lowered, and an organism with a certain minimum inhibitory concentration, once considered susceptible, now may be called intermediate or resistant. That has direct patient clinical care consequences, as well as possible public health consequences. We must make sure laboratories are using up-to-date information to classify the bacteria.”

The revised requirement says a laboratory must select criteria, apply them appropriately, and reference them in its procedures, Dr. Campbell says. “In addition, the laboratory must talk to a manufacturer to find out what breakpoints are applied, then review criteria annually, because that is the time frame in which resistance changes.”

In the bacteriology section of the checklist is a new requirement on susceptibility testing. MIC.21855 Antimicrobial Resistance Markers by Molecular Analysis—Clinical Validity requires the detection of genotypic antimicrobial resistance markers—for example, *vanA*, *mecA*, *bla_{KPC}*—to be linked or attributed to a corresponding organism in the final laboratory report when molecular analysis is performed directly on patient specimens, such as urine or bronchoalveolar lavage fluid. This can be accomplished through molecular detection of the corresponding organism or concurrent culture.

The problem, Dr. Campbell says, is “when you detect a gene for an antimicrobial resistance marker, all you detect is the gene. You don’t know the context of it or what organism it is in. This checklist item requires specific tests so that when antimicrobial decisions are going to be made, that gene will be linked to an organism.”

Linking the resistance mechanism to the organism will make it possible for clinicians to understand how best to treat patients, Dr. Wojewoda says. “We’re asking the labs to culture the specimen so they can do susceptibility testing on that organism to ensure the resistance mechanism is associated with that organism. However, it’s important for labs to understand that the requirement does not include screening tests. It is for specimen-based testing for patient care only.”

Clinicians need to know this information to make good therapeutic decisions, Dr. Rauch says, “and to manage that situation from a public health perspective.

“I don’t necessarily mean large public health situations, but even just infection prevention within a hospital. We are bumping up the performance of laboratory testing to make it as clinically relevant and actionable as possible. That’s the intent,” she says.

In the same section is MIC.21950 Inconsistent Antimicrobial Results, which requires a written policy to address unusual or inconsistent antimicrobial testing results and now also requires action be taken to address them. Those actions may include consulting with a medical laboratory director, repeating antimicrobial susceptibility testing by the same or a different method, confirming isolate identification, or referring the isolate to a public health laboratory for confirmation. While results are being confirmed, a lab must consider whether it should inform the treating clinician that the AST results are under investigation.

Says Dr. Campbell: “We have a fairly good understanding of the usual resistance pattern of a lot of organisms. When there’s an exception to that pattern, it tells you there’s something new and interesting and possibly horrible in the resistance world, or, more commonly, that you’ve misidentified the organism, you’ve got a mix, or any one of several technical issues.”



Dr. Wojewoda

Dr. Wojewoda says the requirement is intended to make sure that the susceptibility testing results laboratories get by whatever method they use correspond with the organism they think they have. “I teach my residents that there is no *Klebsiella* susceptible to ampicillin. If you believe your organism is a *Klebsiella* and your susceptibility test system says it is susceptible to ampicillin, you need to make sure the bug you’re dealing with truly is a *Klebsiella*, or you need to change that susceptible result to resistant because we know that patients clinically will fail treatment if they’re treated with ampicillin.”

Dr. Rauch notes that support systems such as expert computer algorithms and software can help to flag results that might be “weird, new, or implausible.”

“We’re asking laboratories to think about ways they can identify things that might require confirmatory testing,” she says, “and to find any results that are erroneous or represent something new and significant as a resistance marker that they would need to communicate to a lot of people.”

Also in the bacteriology section is MIC.21240 Media QC—Purchased/Acquired, which has been revised to say that laboratories that supply uninoculated media to referring laboratories are responsible for the quality control of the media and must provide records or certification of media QC with every shipment.

“Somebody has to be responsible for quality control when materials are transferred,” Dr. Campbell says. “In the past a supplier might have expected the receiving lab to take that role. But this makes it explicit: The supplying lab must be responsible, and quality control records must be available to the receiving lab.” Among the evidence of

compliance are records of reports of media problems/defects provided to manufacturers or referral labs supplying the media.

MIC.11035 Inspection of Media Shipments previously required that a lab maintain records showing it examined each shipment of purchased or otherwise acquired media for breakage, contamination, appearance, and evidence of freezing or overheating. It now requires, in addition, that any such problems be recorded and reported to the manufacturer. "We've closed a circle," Dr. Campbell says. "It's not enough to just examine the media. Your procedures and your records must define what you do when you find something."

Requirements in the new dedicated section on safety apply to all areas of the microbiology laboratory, Dr. Wojewoda says. "We made it more global, and we've given inspectors ways to go about inspecting laboratory safety across the entire microbiology lab."

Among the guiding directives for inspectors is one that instructs them to check a laboratory's infectious waste disposal policy. Another calls for observing use of personal protective equipment. "PPE has always been important, but COVID has made us even more aware of its importance," Dr. Campbell says.

MIC.19035 Safe Specimen Processing requires written policies and procedures for the safe handling and processing of specimens and now has been revised to say: "including those suspected to contain highly infectious pathogens."

"We are reminded once again that there is a whole range of pathogens out there," Dr. Campbell says. "Some are old hazards and some are new. We wanted to point out that labs need specific policies and procedures for a sample that is even suspected of having a highly contagious pathogen."

Though a note with examples of such pathogens now includes SARS-CoV-2, Dr. Campbell says this requirement was driven by past experience with Ebola and the high risk that handling Ebola specimens presented to laboratory workers. "This requirement doesn't order labs to handle specimens a specific way. It just says they must create a written plan of their own design."

In the laboratory general checklist, the section titled "Blood culture specimen collection for referral only" applies to laboratories that perform only blood culture collection using media provided and quality controlled by another laboratory and not other types of microbiology testing requiring the microbiology checklist. It also says the microbiology checklist must be used to inspect laboratories that order blood culture media directly from the manufacturer or supplier and/or labs that perform any level of blood culture testing.

"There are some labs that just collect blood cultures, then send them on to another lab to be incubated and for a full workup if needed. In the past these labs were getting the full microbiology checklist, and that was overkill for them," Dr. Wojewoda explains. The four requirements in this section are the same as before, but their placement within the laboratory general checklist has changed, affecting these laboratories in particular. For other laboratories that perform additional microbiology testing, the requirements continue to be in the microbiology checklist.

Dr. Campbell says this new section uses checklist customization. "Some labs are collecting blood cultures and sending them off; that's all the microbiology they do. So this pulls out those items for those labs. It's much more streamlined for them."

"What we've done with these revisions," Dr. Wojewoda says in summary, "is improve practice, especially in the realm of antimicrobial susceptibility testing where we've asked more of labs in terms of keeping up with changing practices; improve laboratory safety, with increased emphasis on dangerous microbes; and streamline and clarify checklist requirements, which in the end makes compliance easier for labs."□

Valerie Neff Newitt is a writer in Audubon, Pa.