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# Bold move by one lab drops troponin TAT

**Karen Titus**

At Newton-Wellesley (Mass.) Hospital, the word "laboratory" doesn't even appear on the Emergency Department's process map. But the lab is there in practice, a little like Adam Smith's so-called invisible hand, regulating the flow of patients (and capital) through the ED.

The ED's leaders put the map together as they sought to move patients through the department more quickly. The average turnaround time, so to speak, for patients—from the time they enter the department to the time they leave—has been 211 minutes, or 3.5 hours. The goal? 170 minutes.

Labs, of course, are familiar with turnaround times, and their own TATs trickle down to those throughout the hospital. "One of the holdups in this whole process, for the ER, is waiting for results, calling the lab, saying, 'Where is the result? What's taking so long?'" says Michael Misialek, MD, assistant chair and medical director of the hospital's chemistry laboratory, and clinical instructor, Tufts University School of Medicine. The TAT tension escalates with the highest-level triage patients, including those awaiting the results of a troponin test.

Cardiac troponin represents the agony and ecstasy of modern emergency room diagnostics. While other tests are useful in suspected myocardial infarction cases—EKGs, along with CPKs and other enzymes—troponin runs the ranch. "Really, the decision of how and where that patient gets treated is determined by just one simple test," says Dr. Misialek. If it's normal, the patient may be discharged. If it's in the gray zone, the patient will likely be admitted but be assigned to a regular-floor bed. If it's elevated, the patient will go to the CCU or, in the case of Newton-Wellesley, be transferred for a cardiac catheterization at one of the Partners HealthCare system's downtown hospitals.

None of this can happen until the clinicians get the results. Far too often, as Dr. Misialek has discovered afresh, that doesn't happen quickly enough. But much to everyone's surprise, he and his laboratory colleagues have also discovered a way to cut those troponin TATs in half.

It all grew out of discussions he had late last year with his chemistry supervisor, Diane Mullen, MT(ASCP), and the ED's chair, Mark Lemons, MD. Dr. Lemons and his ED colleagues, process map in hand, were breaking down every step of the patient's journey through the emergency room. When he asked his lab colleagues how they could help move patients more quickly, they immediately thought of troponin, a test that inherently takes longer to run than many others. Looking for inefficiencies, they delved deeper with

a preanalytical, root-cause analysis and found—nothing. “It’s pretty streamlined as it is,” Dr. Misialek says. The specimen would arrive in the lab, be flagged as a stat specimen, put on the instrument, and run immediately. The delay appeared to be caused by an immutable step: instrument time.

And then the heavens broke open: Did the lab need to repeat every critical value? “You might need to get troponins on some of your readers,” Dr. Misialek jokes with CAPTODAY, before launching into an explanation of the bold move his laboratory made.

The repeats were in fact causing a bottleneck with troponins. Repeating critical values before they’re reported to clinicians is a time-honored tradition; most of the time, it doesn’t slow things down because of the swiftness of automated lab testing. “You get a high potassium, and it can be run again very quickly,” says Dr. Misialek.

Not so for troponin, with its longer run—and therefore rerun—time. While the negatives and normals were auto validated and reported fairly quickly, the critical values—arguably the most important tests—were held in review. As a result, Dr. Misialek says, the average TAT for an elevated troponin, from order receipt to making a verbal call to the ED, was 80 minutes. The frequent outliers would often take longer than an hour and a half.

He and his colleagues, curious and intent, reviewed some six months of data on elevated troponins, comparing the initial results with the repeats. Dr. Misialek says they found extremely good accuracy—around five percent variability—between the two.

Armed with this knowledge, Dr. Misialek says he felt confident about taking the next step: Letting the ED know about elevated troponin results before the test could be repeated. Ready for that troponin test yet?

Once this option was on the table, logistics took over. Mullen recalls that she, Dr. Misialek, and Dr. Lemons spent about a week and a half hashing out what the new troponin etiquette would look like. Did the ED want the first result only? Both? Did they want a phone call each time?

The ED was more than happy to receive the initial result, Mullen says. “Even if it changed, if it was a critical of 4.0, and it went to 4.5 [on the repeat], it was still positive. They could start working on the patient,” she says. “To him, small changes didn’t matter, clinically.”

Next, the lab had to plumb the depths of its own policies and procedures, as well as turn back the tide of human behavior.

Mullen recalls how her technical specialist, Mary McLean, MT(ASCP), first reacted to the proposal. “She said, ‘It’s a change. And people don’t like change,’ ” Mullen says.

It's not that laboratory personnel are blindly resistant to anything new. Good laboratory practices are built on tight attention to detail, thoroughly vetted routines, and an almost religious devotion to accuracy. Asking devotees to change their faith isn't easy. "We were taking them out of their comfort zone," Dr. Misialek concedes. "A lot of laboratory personnel are accustomed to looking at numbers down to the decimal point. If something needs to be within a 10 percent range, and it's 11 percent, it causes a lot of angst."

Beyond that, repeating critical values has become somewhat of a sacred cow. The practice may have started for good reasons, says Dr. Misialek, but those reasons might be past their sell-by date. "When we asked people, 'Why do you repeat criticals?' no one could give an answer," says Dr. Misialek. The most common response was one that's anathema to innovation: We've always done it that way.

Dr. Misialek suspects the practice dates back to a time when automated assays were less reliable. Now, he says, technology has improved to where it's practically beyond reproach. "We're so involved with QA, QC, running controls three times a day. We track this stuff. The precision is linear." Repeating troponin critical values may be as superfluous as calling someone on a landline to make sure the smartphone text message arrived. "What are the chances of a troponin that's off the charts repeating as normal?" he says. "Even if it came back 20 percent different, it's still going to be off the charts. And we're not doing the patient any good by waiting that extra time." Over time, the list of "critical" tests has grown. So has the complexity of reporting. "We now have entire procedure manuals dedicated to the algorithm for reporting a critical value," Dr. Misialek says. "It's almost like it's taken on a life of its own. I've had people tell me they need a PhD just to read the manual."

What makes a critical value result any different from any other result, he asks. Why not repeat all lab results? Rethinking troponin in his lab "is maybe an attempt to draw the reins back in on critical value reporting," he says.

Doing so also allows the laboratory to focus on another critical value—bed management, as hospital executives are calling it. "That's all you hear about in hospital administration," Dr. Misialek says. "Getting people into beds, getting people out of beds." It sounds like a French farce, but with consequences.

"The lab plays a huge role in bed management," Dr. Misialek says. "But we don't realize it until our clinical colleagues come down and say, 'I've been waiting forever for these troponins. It's been a problem forever. Is there something we can do about it?' "

Yes, as it turns out. Since the beginning of the year, Dr. Misialek's laboratory has been doing it. Dr. Misialek says the literature is mum on the topic of not repeating critical values. He and his colleagues did their own study and found good correlation between initial and repeat results. (It remains extremely good, Dr. Misialek says, at just under five percent variability.) "We felt confident," he says. Dr. Lemons understood, and took on, the possible risks of being handed a false elevated result.

The payoff has been worth it. Dr. Misialek says one key ED measure, the elapsed time between the physician seeing the patient and deciding on treatment, dropped from approximately 75 minutes to 63 minutes. “Twelve minutes is significant when you’re dealing with patients who might be having an MI,” says Dr. Misialek. “This is exciting.”

Reporting the initial critical value has not been an official change in a policy or procedure, since the lab still repeats the critical value. Nonetheless, McLean, the technical specialist, developed a competency sheet and conducted an exercise with a test patient to help techs adjust to the new practice.

Technically, the laboratory staff faced a couple of challenges. Says Mullen, “You have to know your middleware.” That’s where the lab holds the critical values in review before their being repeated. Moving the results to the LIS requires a validation, so the middleware had to be “tricked” into rerunning the test after the lab reported the first value. The laboratory calls the ED with the initial result, then documents that the call was made. “We’ve added a step for now—writing down on a piece of paper what the critical was, and who we called,” Mullen says.

It’s all very Cole Porter, listening to Dr. Misialek talk about “report the repeat” and “result the result.” For him, fine-tuning the internal tracking is one more example of how ingrained the habit of repeating critical values has become. “We had to reverse the way the instrument ‘thought,’ ” he says. In essence, repeating, not reporting, is hard-wired into technology as well as people.

The techs are adjusting, Mullen says. One tech admits she’s still uneasy, and has to fight the urge to wait for a repeat. Another professes to “love” the change because it solves a frequent dilemma facing the night shift—how to respond when ED calls in the middle of the night asking for the troponin results. The techs would often give them the preliminary results, with the caveat that a repeat was still in the works. Now, Mullen says, techs no longer feel that policy and patient care are tugging them in opposite directions.

Most techs, she says, have been fine with the change. Then again, they are still repeating the critical values. If the lab decides to forgo this step—and it very well could, once it reaches the six-month mark—then the story might be different.

Mullen notices a slight adjustment of her own. She says she sought feedback from her techs knowing she’d be interviewed by CAPTODAY. “I should go around asking each shift how they feel, but it doesn’t always happen,” she says.

Dr. Misialek admits to a light bulb going off over his head as well. Although the troponin change was spearheaded by the ED, it didn’t need to be. “We shouldn’t have to wait for our clinician friends to come to us with what they see as a problem,” he says. “We should identify a problem ahead of time, before it affects patients.” He and his laboratory colleagues are now eyeing other areas of the hospital. Troponins, after all, arrive in the lab from the CCU, other floors, and even outpatient settings.

Whatever the hesitations might have been in the lab—"This is pretty unorthodox," Dr. Misialek admits—none sprang forth from the ED. (Dr. Lemons has already identified liver function test as another possible target, and Dr. Misialek says the lab will look at it later this year.) For them, the change has been more a matter of making things right. "It's second nature for them to act on whatever results they have in front of them," Dr. Misialek says. "If they get a chest x-ray that shows a mass, that's a critical value—but they don't repeat the chest x-ray."

Dr. Misialek says his ED colleagues were, in fact, surprised to learn that the laboratory was sitting on elevated results. That, in turn, was rather eye-opening for Dr. Misialek and some of his fellow pathologists. "We were looking at everything but the basics," he says. "The answer was staring us right in the face."

**Karen Titus is CAP TODAY contributing editor and co-managing editor.**

# Troponin test results

*(Random audit, 10 cases)*

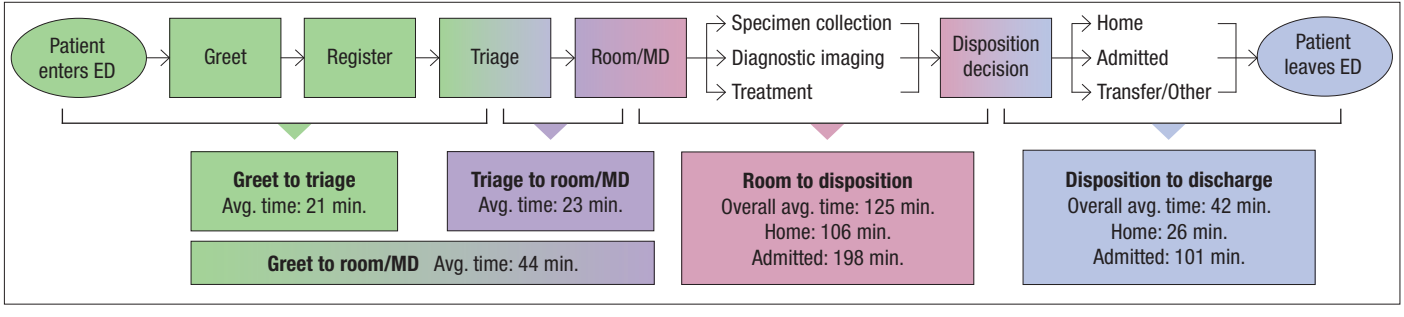
| | Troponin (ng/mL) | Repeat | Lab TAT (min.) |
|---|---|---|---|
| Before | 1.32 | 1.19 | 90 |
| | 1.03 | 1.03 | 60 |
| | 0.93 | 0.978 | 84 |
| | 1.12 | 1.12 | 99 |
| | 1.58 | 1.58 | 60 |
| | 1.63 | 1.64 | 91 |
| | 14.59 | 14.59 | 81 |
| | 4.3 | 4.3 | 115 |
| | 5.87 | 5.837 | 57 |
| | 1.04 | 1.04 | 72 |
| Average | | | 80.9 |

| | Troponin (ng/mL) | Repeat | Lab TAT (min.) |
|---|---|---|---|
| After | 5.151 | 5.794 | 33 |
| | 25.716 | 27.576 | 34 |
| | 4.62 | 4.1 | 40 |
| | 2.759 | 2.502 | 37 |
| | 0.952 | 0.976 | 44 |
| | 8.82 | 7.892 | 38 |
| | 0.84 | 0.81 | 34 |
| | 12.5 | 11.9 | 61 |
| | 2.45 | 2.72 | 38 |
| | 4.75 | 5.067 | 35 |
| Average | | | 39.4 |

# High-level ED process map

Newton-Wellesley Hospital

## Current state LOS: 211 minutes




## Goal LOS: <170 minutes by Sept. 30, 2010