In *C. diff* and cardiac care, lab steps up decision support

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July 2016—What's the one way to win friends and influence people? If you're Eugenio H. Zabaleta, PhD, the answer is simple: Reduce the number of stool samples nurses have to collect.

A few years ago, Dr. Zabaleta, clinical chemist at OhioHealth Mans-field Hospital, introduced a clinical testing algorithm for *C. difficile* that cut the number of stool samples by almost 50 percent. "And the nurses are *loooving* me for it," he says happily. "The joke is, when nursing and lab work together, there is literally less crap for everybody."

Dr. Zabaleta on the day he surrendered the pager used in the first two months that the new troponin order protocol was in place.

Indeed, the informal aim of the many projects Dr. Zabaleta has carried out at the hospital since 2010 in an attempt to reduce readmissions and improve outcomes could be characterized as less, um, hassle for everybody.

At the Executive War College in April and in an interview last month with CAP TODAY, he talked about four of the projects and the barriers he encountered.

First, a bit of background: Dr. Zabaleta occupies a special, consultant-like role at the hospital, one that straddles the clinical side and the laboratory side. "The physicians think I am a spy, and the laboratory thinks I am a traitor,"

he jokes. “But it’s actually great because I can see problems from both sides.” That said, “everything I do, I need to sell, and I need to prove that the money we spend on it is worth it.”

That includes stepping up the alerts for troponin I, a project inspired by an experience with a particular patient. The patient, a 72-year-old woman with stage three chronic kidney disease, congestive heart failure, exacerbation of chronic obstructive pulmonary disease, and essential hypertension, visited her doctor’s office with all the symptoms of acute coronary syndrome. After the doctor performed an electrocardiogram, the patient was found to have an ST-elevation myocardial infarction and was admitted to the hospital.

The next day, her troponin rose. “Because of all those comorbidities, we knew that she would always have extremely abnormal results without having an acute event. We treated her, and the following day the troponin went down.” Again, on day three, it rose. “Well, nobody saw that troponin until 38 hours later. So a second acute myocardial infarction happened, and nobody realized it”—not even the patient because of the intensive management of her pain and because she hadn’t been talking enough to notice shortness of breath.

When the hospital physician asked why the laboratory hadn’t called, the answer was, “‘Well, in the ED, for example, everything that is abnormal we would call. If we applied that to this patient, we would call every single troponin on this particular patient.’ But that is not what the physician wanted,” Dr. Zabaleta says. “The physicians want to be called only when the troponin rises for the first time. But techs cannot be looking all the time. Imagine early in the morning, when they have 200 samples, if they would be analyzing patterns of troponin over time. Impossible. Right?”

Right. That’s why Dr. Zabaleta implemented clinical decision support software to identify the troponins that should be called. “Once we identify an increase, we send it to our LIS, the LIS notifies the tech to call the floor nurse, and at the same time we put it in the EHR,” he says. “We created different alerts in the EHR, with a code that drives the alerts to nursing along with an interpretation.”

When it came time to analyze the impact of the new algorithm, Dr. Zabaleta wanted to make sure he was comparing apples to apples. Since acute myocardial infarction incidence in his area varies throughout the year (“because of people shoveling snow and all of that”), he chose to compare data from December 2009 to February 2010 (pre-implementation data) with data from December 2010 to February 2011 (post-implementation data). In his Executive War College presentation, he reported the data of the group that was impacted most—patients with multiple comorbidities.

When such a patient presents in the emergency department, he or she might be found to have an infiltrate in the lungs, for example. “The physician would say, ‘Okay, it’s pneumonia,’ and admit the patient to the hospital directly, without cardiology seeing him or her and with no acute coronary syndrome diagnosis.” When he analyzed the data from this group, he found 14 percent of the patients were never changed to acute coronary syndrome. “Such as an 18-year-old woman who hanged herself and on top of that was overdosing with cocaine. So she wasn’t having an MI; she was having a cardiac arrest,” Dr. Zabaleta says. Two others went into cardiac arrest because of sepsis, not because of coronary artery disease. “So in 86 percent of the cases, there was a change, and 47 percent of them happened within six hours. If you know the biology of troponin, that is what it takes for it to go up. Another 10 percent should have been put on cardiac alert. So in these patients, through reducing length of stay, we are saving—in a very conservative way of calculating—$300,000 a year in Medicare money.”

Although the dollar savings came from this group of patients not seen by an admitting or consulting cardiologist, “the other group was the one that surprised us most,” Dr. Zabaleta says. Of the patients seen by a cardiologist, the laboratory and cardiology saw the clinical impact of the troponin alerts on select patients. “We did not impact this group as a group, but we did it in specific patients,” he says.

Shortly after the troponin I alert program was launched, Dr. Zabaleta turned his attention to another heart-related initiative. As part of a larger hospital readmission reduction program, he looked for ways to reduce readmissions among patients with heart failure. The hospital had created an initiative called Heart Success, in which nurse practitioners or nurses would follow up with patients outside the hospital.

But patients weren't agreeing to be recruited for the program. Dr. Zabaleta suspected it was because they weren't being asked about the program until just before discharge. "Imagine you're a patient, you want to get out of there, and five minutes before, they say, 'Oh, can we talk to you about our program that will keep you out of the hospital? But I need two hours.' What are you going to say? 'Get out of here! I am leaving!'"

So as usual, he turned to the data and realized that the patients who were eligible to participate in the Heart Success program could be identified—and therefore recruited—earlier in their hospital stay. Recalling a study that offered a risk stratification strategy using BNP and troponin (Horwich TB, et al. Circulation. 2003;108[7]:833–838), he asked the Heart Success nurses and nurse practitioners if they would like to know which patients were at most risk of readmission. They agreed enthusiastically.

"So for a while, I did the calculations by hand, and I sent out emails at eight in the morning, 12, 4 PM, and 8 PM," he recalls. "Now we are doing it automatically. It doesn't matter if you do it manually or you are doing it with a computer; what matters is the right information reaching the right people at the right time so they can act." Unfortunately, after a few months, two of the Heart Success staff members left, and the program stalled. "I can communicate, but if there is nobody to receive it, I cannot do anything," he says.

A third project saw the introduction of a clinical testing algorithm for *C. difficile*—the same algorithm that resulted in Dr. Zabaleta's popularity with the nurses. The algorithm was predicated on a protocol that only unformed stool should be tested unless ileus is suspected, that repeat testing should be discouraged, and that tests of cure should not be performed. In the CPOE-EHR, Dr. Zabaleta made sure to link to the 2010 *C. difficile* clinical practice guidelines from the Society for Healthcare Epidemiology of America and the Infectious Diseases Society of America—"just in case clinicians complain and say, 'Who does this guy think he is?'" he says. "Well, it's not what I am saying; it's evidence based."

Per the algorithm, if a physician orders a *C. difficile* test for a patient, the nurse first performs a specimen evaluation test to determine if the collected stool is actually liquid. "If it's solid, like if you shake it and it rattles, that is not diarrhea," Dr. Zabaleta points out good-naturedly. "In that case, the *C. difficile* test would be automatically eliminated. If the sample looks iffy, they will send it to the lab." If the lab determines it's not diarrhea, it rejects it and sends a report that testing was not performed because there's no clinical indication. "Why are we sending a report? Because per the Joint Commission, each time you cancel a test, you need to document it, and you need to call the physician. However, if we send the result, we are canceling a test without canceling it, and everybody knows about it. It's in the medical record. So we are avoiding a lot of phone calls.

"And that is a wonderful thing," he adds, "because we have a lot of nursing home business, and our microbiology laboratory was previously overwhelmed by phone calls. Since we've made it automatic, we don't need to call. Since we don't need to call, we don't need to hire more people in micro," which is especially helpful when there is a medical technologist shortage in the area.

The algorithm is designed to also avoid repeat testing. "We did this with the same clinical physician support that I used for the first and second project," Dr. Zabaleta says.

"We are looking to make sure that no test was performed within seven days. If we find one, instead of canceling the repeat test, we send the previous result—because sometimes a physician will order a test again if they cannot find the first result—with a note that no repeat testing should be performed within seven days. So we're giving them the result again without performing a test. We are not charging the patient for anything, so we are not committing fraud. But if the clinical decision support finds that the test is not a repeat test, it gets greenlighted, and the true test is ordered, the one that has the CPT code."

Dr. Zabaleta then took things a step further by structuring the protocol so that when any hospital-acquired infection test results (not just those for *C. difficile*) were sent, automatic alerts go to the nurse and to infection control. "For the nurse, the nice thing is that when they click on the alert, they have not only the result but also the specific type of isolation they need to put the patient on, if it is droplet or contact precaution or whatever," he

says.

The results showed a 52.5 percent reduction in *C. difficile* testing and an average length-of-stay reduction of 4.5 days for patients with *C. difficile* infection.

There was another benefit too. “A lot of nursing homes that receive our patients will ask for three consecutive negative results after the patient has a *C. difficile* infection result,” he says. “Most people have one bowel movement per day, so we were keeping patients three extra days just to go to the bathroom and putting them at risk of other hospital-acquired infections. So we did a lot of education with the nursing homes to say, ‘We will not perform tests of cure because the guideline doesn’t support it. You can receive the patient because he’s cured. We don’t need to perform a test to tell you that.’ All of this resulted in almost $10,000 less per patient, with a total extrapolated savings of $1.1 million a year.” The laboratory cost for *C. difficile* testing decreased 23 percent, from $5,468.17 per month to $3,972.66 per month.

Finally, in 2015, Dr. Zabaleta set out to change OhioHealth Mansfield’s troponin order process, a project prompted in part by the discovery that ED physicians were ordering troponin in “almost everybody,” he says.

He and two senior cardiologists began hammering out a new process in which the emergency department orders only the initial troponin and the admitting physician, a hospitalist in the observation unit, orders a HEART, or “history, ECG, age, risk, and troponin” value score. “You now have a pretest probability to know if the patient needs further troponins,” he says. “Basically, what you are doing is grabbing the laboratory result and marrying it with the clinical setting and risk stratification.”

They proposed the new process to support the observation unit. “And the medical executives told us, ‘Are you crazy? You’ve shown us that we sometimes miss people, and now this will be even worse.’ They told me, ‘We will allow you and the cardiologists to do this new process, but you need to give us a safety net.’”

So Dr. Zabaleta structured the new ordering protocol like this: The clinician sees the patient in the ED and orders a laboratory troponin. The laboratory sends the result. The patient is transferred to the observation unit. The laboratory notes that only one troponin has been ordered and alerts the admitting physician either that an additional troponin is needed or is not needed.

“They weren’t happy with that,” he says. “They said, ‘Okay, but what happens if the doctor ignores the alert? We need an escalation.’” Dr. Zabaleta then modified the protocol so that if the doctor didn’t respond to the alert within two hours, Dr. Zabaleta himself would be alerted via pager and would call the physician.

In the two months Dr. Zabaleta carried that pager, 2,123 patients were transferred from the ED, and he received 603 alerts. “So I didn’t sleep for two months,” he says with a laugh. “When I commit to a project, I commit. And that is what earned me a lot of respect from the physicians, because I have walked in their shoes.” Of those 603 alerts, 319 did not need a further troponin test, and 284 did. As a direct result of this new process, cardiac marker testing decreased by 28.1 percent in August and September 2015 and to date remains down by 27.4 percent.

“That is improved utilization,” he says. “Thirty-two of them were having an acute cardiac event that would have been missed or delayed without that phone call.” He points out that he did not have to make 603 calls, however. On 76 occasions, the physician placed the order between the time that Dr. Zabaleta received the alert and the time he logged on to the computer—no more than seven minutes, he notes.

“If the physician had a bad night and they were running all over the place, sometimes they just couldn’t address it,” he says. “It’s not that they were ignoring the alert, but that they sometimes just couldn’t deal with it. So I was a safety net.” Dr. Zabaleta has since surrendered his pager and the alerts go instead to the charge nurse.

None of Dr. Zabaleta’s projects would have been possible, he says, without the support of laboratory administration, the lab medical director, the VP of medical affairs, the hospital’s senior administration, and the IT department. And disparate as they are, each of the projects was predicated on the same assumption: By

leveraging the electronic health record, laboratorians become a more central part of the health care team.

“We can do more than just spit out results,” he says, “especially now that we are moving from fee-for-service to a value-based proposition. In the new health care delivery model, we need to redefine our value, and this is one way to do it. It’s time to help the physicians order everything they need to order at the front end.”
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