

Analytics reframes decisions from bench to C-suite

Anne Paxton

July 2021—From takeout margaritas to the embrace of remote work, the pandemic upended convention, leaving behind permanent changes that were nowhere on the radar in 2019. In the world of pathology informatics, the new online COVID-19 data dashboards at the Cleveland Clinic illustrate how much the pandemic has raised the profile of data analytics in managing the laboratory.

Supplying rapid summaries of COVID testing metrics like test orders, positivity rates, and turnaround times through live data from the Sunquest laboratory information system, updated every 30 minutes, the clinic's dashboards have filled an urgent need. But through analytics and dazzling, interactive visualization tools mostly new to the laboratory, the dashboards have also taken on a new role, giving clinicians and Cleveland Clinic executives novel, compelling windows on laboratory data and insights into the laboratory's value to the enterprise.

"We wanted to do something more rigorous and intentional than just bolt dashboards onto the laboratory information system," says Walter Henricks, MD, laboratory director at the Cleveland Clinic and vice chair of its Pathology and Laboratory Medicine Institute. Interactive tools from visualization software—in the institute's case, from Tableau Software, which focuses on business intelligence—helped make that happen.

The Pathology and Laboratory Medicine Institute had formed its data analytics program the year before the pandemic, and business analysts and information technology staff were on board, but when the COVID-19 pandemic hit, there was still not a fully functional, cohesive analytics team. "We were in the very beginning stages of putting the analytics team together," says Ashleigh Muenzenmeyer, MSLA, SC(ASCP), the institute's director of analytics.



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Analytics is an area within informatics that supports laboratory operations, quality, and decision-making, Dr. Henricks notes. He draws a distinction between transactional information processing and analytical information processing. "A typical LIS and electronic health record are geared toward supporting processes and doing things right: accessioning specimens, interfacing with instruments, reporting results. Analytics, on the other hand, looks at the information to analyze it, draw conclusions, and represent it to provide a basis for decision-making."

To perform the full spectrum of analytics work, the institute looked beyond the initial team, adding more laboratory professionals and analysts with expertise in visualization software who could quickly devise interactive dashboards. At Cleveland Clinic, it happened that the enterprise finance team had been using Tableau Software for a few years. "So we also tapped those people to assist us in designing and implementing" Tableau for the laboratory, Muenzenmeyer says.

This ramping up of the analytics team amid COVID-19 gave the program its chance to shine.

The institute conducts a process called ETL, which stands for Extract, Transform, Load. "So we extract the data out of the Sunquest LIS, then we load it into a data warehouse, and then we create different objects in that data warehouse that we ultimately use to connect up to Tableau and show these visualizations," Muenzenmeyer

explains.

Tableau defines a dashboard as “a collection of different views, allowing you to compare a variety of data simultaneously.” But that description doesn’t fully convey the sleekness and agility of the visualizations. A representative institute dashboard, showing test volume and positivity, demonstrates how a high-impact visual representation of regularly updated data relating to COVID testing can be produced by varying the prism of “flags” that filter the data ([see dashboard](#)).

In this example, two line graphs track the number of total COVID-19 tests and the positive tests by day. The viewer can interact with the page by clicking on “Caregiver Flag,” to make the graph show whether the test code is for Cleveland Clinic caregivers (yes or no); or on “Symptomatic Flag,” to show whether the patient reports symptoms; or on “PreOp Flag,” to show whether the tests were performed prior to surgery/procedure. There are several other options.

Another dashboard features rapid updates of data on COVID testing volumes, turnaround times, positivity rates, and more, with the viewer able to filter the figures by provider, patient type, rotation, ordering location, or ordering physician. Where were tests being ordered from across the health system? What areas were sending in COVID tests to the main campus? Those are sample questions the dashboards can answer.

“We came up with a suite of products that went beyond LIS reporting capabilities and out-of-the-box tools,” Dr. Henricks says. “One of the visualizations we have on our volume dashboards is a sort of comprehensive dashboard showing an overall health system level that allows you to put various filters on it to look at different populations. We also have dashboards that show our reference lab services broken down by service line, so you could look at the extended care population’s positivity rate and drill down to get even more granular on a client basis.”

The turnaround time dashboard gives instant feedback on variables that could potentially be affecting whether the laboratory is meeting targets it has set, Muenzenmeyer says. “We can start asking questions about where we have differences in the performance between different patient classifications—our inpatients versus outside clients.” In this dashboard, “we took not just the overall TAT but we broke it down into histograms for all parts of the process. So we have ‘collect to receive,’ ‘receive to result,’ and ‘collect to result.’”

“All of these different filters can be used in the histogram bins to help analyze if there’s a certain process here that they could drill into for improvements,” she says. Other visualizations show failure trending. “So you could see if failures are coming from a certain location on the hospital floor, the idea being that we can allow people to focus on areas to improve without having to sift through every data point.”



Dr. Henricks

Order codes are a feature that has evolved as the dashboards have been refined. For example, the team started with one order code for COVID tests but soon realized it needed separate codes for rapid tests and immediate tests. With those, “we were able to translate those order codes into actionable filters on our tools to help people make decisions,” Dr. Henricks says.

Changing the order codes was complicated, Muenzenmeyer recalls. “We did have to go back into our database and review our coding to make sure we had appropriate flagging mechanisms for the new order codes. That was challenging. Not just the order codes, but the way these tests get resulted with different English texts posed initial challenges for us. But once we got the hang of our database flagging mechanisms, it was just a matter of keeping up with the operational and IT changes.”

Similar dashboards have become standard for other laboratory projects at the institute. “That was always part of the vision Dr. Henricks and I had in mind,” Muenzenmeyer says. “We took every failure and every lesson learned during COVID and translated them into standards that we now apply to all of our lab metrics and projects and required analytical tools. So we have several dashboards for all of our groups in clinical pathology and anatomic pathology to help drive decision-making and ultimately add value.”

The COVID-19 dashboards are geared to a larger goal as well, one that Dr. Henricks sums up as “connecting the dots.”

“The question is: How does pathology and laboratory medicine provide value and document value in the health care system, beyond just the obvious role of reporting our results?” he says. “How do our activities affect other outcomes in health care and health care organizations, whether they be clinical outcomes like infection rates or other quality measures that we report to the government, or economic and financial outcomes?”

He uses the phrase “connecting the dots” to talk about the linking of laboratory data with other data sources in the organization to demonstrate, document, and find opportunities for how laboratory work affects clinical and financial outcomes that aren’t specifically laboratory numbers.

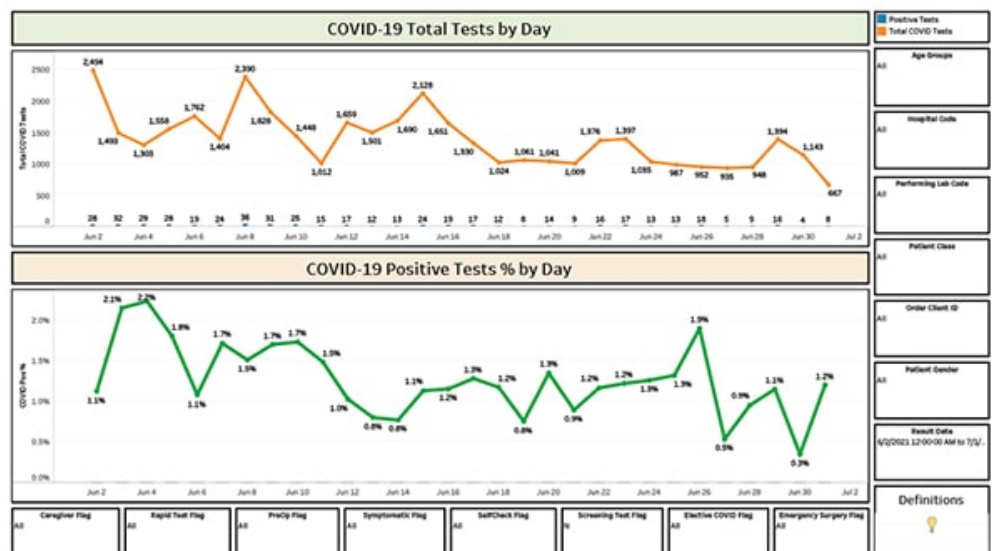
“The analytics unit has the express purpose of improving how we use our data, report our data, and visualize our data,” Dr. Henricks says. But a larger purpose is to allow pathology and laboratory medicine data to add value to the entire system. “We built an organization to improve our data analysis and visualization capabilities. It is laboratory centric, but we are very closely aligned with our enterprise analytics group and we’ve been able to integrate our analytic capabilities with theirs.”

One sign of that alignment is that the Cleveland Clinic’s executive team has been drawn to the COVID dashboards, which laboratory staff know because of the messages they get when the dashboard updates are interrupted for even a short while. “I can tell you that if we had any issue with the dashboards not being up and functional, I received phone calls and emails from across the enterprise within 30 minutes,” Muenzenmeyer says. “It’s clear they are being used to make decisions both internal to the institute on our leadership calls and at the enterprise executive level.”

“Our C-suite looks directly at some of our dashboards,” Dr. Henricks says. “They like the information they get from the laboratory, and they like the way we present it. That in itself shows the value we provide.”

In Muenzenmeyer’s view, the health care industry in general is not yet up to speed with respect to analytics, including the capability to visualize data. “During COVID, it became obvious that analytics is its own business function, like finance or IT, that requires specific skill sets and tools. And health care organizations need to make a greater investment in analytics after not being able to produce things quickly enough during the pandemic. That’s not only to help decision-making based on asking questions about what happened yesterday or why. It’s about moving up the maturity curve in analytics and being able to predict what will happen and to adjust business plans accordingly.”

Deploying these more sophisticated information tools requires expertise and commitment, which means resources and money, notes Dr. Henricks, who says that partnering with institutionwide analytic efforts might be one way that laboratories could get help in obtaining those resources.



The infection prevention group at Cleveland Clinic recently requested a seven-day rolling average of COVID positives, so rolling averages were incorporated into the institute’s dashboards. “Why did they want it? That’s the metric we turn in to the CDC that they are looking at to inform masking and protocols. The infection prevention people may want it to decide which populations we test and when we should pull the triggers for pre-procedure tests.”

Typically, Muenzenmeyer adds, the laboratory is seen as the first group to ask since the data are already curated and held in its systems. It’s also important, Dr. Henricks says, that the team was able to turn around a fairly sophisticated request in less than a day for significant decision-making about infectious disease.

Muenzenmeyer is enthusiastic about the experience and skills the analytics team has gained from the pandemic. “Now we have a solid understanding of best practices and standards in place that allow us to develop things quickly, and we have more expertise. We know how to handle different types of data. If we get a request for a moving average again, we’ll be able to show some of our new team members this dashboard as an example. So we’re using everything we’ve learned from this pandemic to keep improving our data projects.”

As the pandemic winds down or just shifts in shape, Dr. Henricks thinks the COVID dashboards will continue to be useful and says other laboratories considering an investment in analytics are well advised to make the move. “This capability we’ve built is going to be tremendously valuable and this is really the crucible in which it was developed,” Dr. Henricks says. “We’re extending all the things we’ve learned to apply these tools throughout our laboratory and other elements of our operation. And we’re testing and looking for other opportunities to use analytics as we go.”

Anne Paxton is a writer and attorney in Seattle.