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ARUP Laboratories Transforms Workflow and Shortens Turnaround Times

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In 1984, when ARUP Laboratories was created by the University of Utah School of Medicine's Department of Pathology, it was given two directives. One was close to home: ARUP was charged with providing clinical lab services to the University of Utah Hospital and Clinics. But in addition, ARUP's founders directed the lab to become a leading national reference laboratory as well, specializing in the cutting-edge testing services that define quality healthcare and support patient outcomes.

Today, ARUP is a worldwide leader in laboratory research and development. It offers a comprehensive menu of over 3,000 tests and test combinations, from routine screening tests to esoteric molecular and genetic assays. In addition, the lab, which performs 99 percent of its testing on-site, has earned a reputation for some of the fastest turnaround times in the industry.

ARUP Laboratories' success can be traced to a constellation of strategic and tactical decisions over the years, each supporting its overarching commitment to assay quality and client services. Within two of its labs—Hematology and Immunology—those decisions include implementing clinical diagnostics solutions from Siemens.

Hematology workflow streamlined

ARUP's hematology lab services are offered primarily to the University of Utah system, including its four hospitals, where fast turnaround times are vital to patient care. The platelet counts of bone marrow patients, for example, can drop precipitously within a few short hours, endangering the patients' lives. It is critical that hematology results on such patients are reported to attending physicians as quickly as possible after scheduled blood draws.

So when the hospital physicians asked the lab to collaborate on reaching new goals for hematology turnaround times, ARUP examined both its workflow processes and instrumentation.

It began by reviewing two years' worth of test results, focusing on the 20,000 repeats performed during that period. The lab found that its technicians didn't always consider the cumulative impact of review times. "They thought, 'it only takes me 10 seconds to review a result,'" says Omar Muñoz, Lead Technologist, ARUP. But with tests arriving in batches of 30 or more, samples further down in the queue could be held up for as long as 15 to 30 minutes—long enough to possibly affect patients' clinical outcomes.

Furthermore, the review processes the lab had in place at the time were not necessarily improving the quality of the test results.

So the lab implemented new rules, based on guidelines from the Society for Laboratory of Hematology, to reduce the number of repeats: technicians now focus on reviewing panic results, where swift human intervention can make a difference in quality of care.

Number of test reviews reduced

Around the same time it implemented its new rules, ARUP also replaced its legacy diagnostics technology with two Siemens ADVIA® 2120i Hematology Systems, which supported further improvements in lab efficiency by enabling the lab to eliminate its reviews of 1+ flags.

The ADVIA 2120i Hematology System also improved enumeration of nucleated red blood cells. This, in turn, reduced

the need for technicians to perform manual reviews of its red blood cell count results, and improved the lab's support of the hospital's pediatric physicians who want to be alerted if neonatal patients show elevated levels of nucleated red blood cells.

In cases where reviews are required, the new system improves workflow efficiency as well, because the lab technicians can use the system's middleware, CentraLink™ Data Management System, to verify results. Lab technicians no longer have to navigate between the test instruments and the Laboratory Information System (LIS) to verify results.

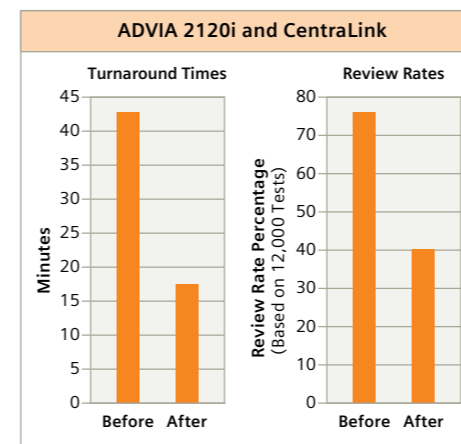
Muñoz credits additional workflow improvements to the lab's ADVIA 2120i Hematology System with Autoslide, an automated slide-maker stainer, which is integrated with one of its ADVIA 2120i systems to automate smearing and staining.

“When we select lab technology, we expect it to improve our services—including reduce turnaround time, improve quality, and automate processes. We are satisfied today that we are meeting that commitment.”

Karen Villnave, Technical Group Manager for Immunology Group II, ARUP



ADVIA 2120i Hematology System in action.



Turnaround times reduced from 43 to 17 minutes

The capabilities of the ADVIA 2120i system and CentraLink, along with the lab's process improvements, have enabled significant improvements in ARUP's key performance measures for its Hematology Lab. Before, the lab reviewed 76 percent of the 12,000 tests it runs each month. Today, it reviews only around 40 percent. The Hematology Lab's average turnaround time is now 17 minutes, compared to 43 minutes before.

And the Hematology Lab has achieved these gains despite an increase in test volume of around 20 percent since it implemented the ADVIA 2120i systems.

Immunology lab improves service

ARUP's Immunology Lab represents the other side of ARUP's business model. In addition to supporting the university, it offers testing services nationally to hospitals, commercial laboratories, military and government facilities, and public and private clinics. For this reason, the lab's performance is critical to ARUP's national reputation.

And like the Hematology Lab, ARUP's Immunology Lab also relies on Siemens technology: several years ago, it implemented three ADVIA Centaur® XP Immunoassay Systems for its serologic hepatitis/retrovirus testing, which it selected on the basis of test menu, volume, reliability, cost of ownership, and test accuracy, along with dependability and middleware.

Test	Decrease in Turnaround Times (%)
Hepatitis Acute Panel Tests	43%
Hepatitis Chronic Panel Tests	23%
Hepatitis B Surface Antigen (HBsAg) Test	36%
HBsAg Confirmation Tests	20%
Switch from Manual HIV to Automated Assay	35%

Today, it runs about 35,000 tests per month on its ADVIA Centaur XP systems. It also leverages the systems' middleware, CentraLink, in several ways. Lab technicians use it to append comments to test results, which helps reduce the risk of transcription-type errors when results are processed for reporting to clients. The lab also uses CentraLink to perform weekly Quality Control (QC) checks, during which trends are monitored and outliers are investigated.

Turnaround times reduced; staff productivity increased

While the CentraLink technology has helped ARUP reduce the risk of errors and improve its QC reporting, the ADVIA Centaur XP systems have enabled the lab to drive improvements in turnaround time, reagent efficiency, and staff productivity. Since it switched to the ADVIA Centaur XP system, for example, ARUP has decreased turnaround times for its hepatitis B surface antigen (HBsAg)—the lab's highest volume test—by 36 percent. Average turnaround times on the lab's HBsAg confirmation test have been reduced by 20 percent.

Because the ADVIA Centaur XP system allowed ARUP to replace its manual HIV test with an automated assay, the lab reduced turnaround times for that test by 35 percent.

The lab's hepatitis A IgM test had previously been performed on a semi-automated platform. Now the lab runs the test on its ADVIA Centaur XP systems, which allows it to more fully automate three panels, hepatitis acute, hepatitis chronic, and hepatitis A. This, in turn, enabled the lab to reduce turnaround times on those three panels by 43 percent, 23 percent, and 50 percent, respectively.

Another way the lab has improved its operations is reagent efficiency: the lab is experiencing fewer failed runs, which has reduced the number of unnecessary repeats.

The ADVIA Centaur XP system requires less wash buffer and water than the lab's previous immunoassay instrument. Before, ARUP went through 4 to 5 liters of wash buffer or more per day for its serologic hepatitis and retrovirus testing. Today it only needs 1.5–2 liters. This makes the solution less costly, and more environmentally friendly because the lab doesn't need as much wash buffer shipped to it. The lab also doesn't have to replenish wash buffer as often, or worry as often about running out.

There has also been an impact on staff productivity. As ARUP consolidates more tests onto its ADVIA Centaur XP systems, it is able to modify how it allocates its staff, since the tests it runs on the ADVIA Centaur XP system don't require as much interpretation.



ADVIA Centaur XP Immunoassay System being used at ARUP.

“When we select lab technology, we expect it to improve our services—including reduce turnaround time, improve quality, and automate as many processes as possible—because we know that physicians rely on our services to deliver high-quality patient care,” concludes Karen Villnave, Technical Group Manager for Immunology Group II, ARUP. **“It is central to the commitment we make to our physicians, and we are satisfied today that we are meeting that commitment.”**

*The outcomes achieved by the Siemens' customer described herein were achieved in the customer's unique setting. Since there is no "typical" laboratory and many variables exist, there can be no guarantee that others will achieve the same results.