Choosing Lab Automation and
ONE LABORATORY'S EXPERIENC

Editor's note: *The following article is based on a transcript of a presentation given by Ms. Nelson at the AACC Annual Meeting held in Orlando, Florida, in July 2005.*

The process a laboratory director must go through in selecting a laboratory automation solution can be a bit daunting. This is my experience. My name is Marilyn Nelson and I'm the director of laboratory services at Ingalls Memorial Hospital in Harvey, Illinois. Ingalls Hospital, about 25 miles south of Chicago, is a community hospital with a large laboratory. We are a stand-alone laboratory, that is, not part of any affiliation, and we have three satellite facilities and a good-sized outreach program with about 120 outreach clients. We employ 97 full-time employees (FTEs) and of course, being a hospital laboratory, we have 24/7 operations. Our annual volume of clinical chemistry tests is about 1.5 million, and immunochemistries are approximately 70,000.

Our issues

Before bringing automation to our laboratory, we had to look at several issues. We had multiple instruments and workstations that needed to be consolidated, and we had problems meeting our early morning turnaround time requirements. In our organization, the physicians had indicated to us that if we could have a certain menu of tests done by 8:00 AM and results available on the charts, they would actually do their rounds at our hospital sooner and discharge patients earlier. So improving patient access and throughput was a priority for our organization.

We had problems meeting our STAT turnaround time goals. Our goal was to have all STAT testing done within one hour from order until results were available to the physicians. As for specimen-processing issues, much of the work came down in batches. Our staff was spending a lot of time collecting and receiving the specimens in the laboratory and babysitting centrifuges, which created a bottleneck for us. We did some batch testing and processing as well. There were several tests that we did only on certain days of the week. In addition, we performed the majority of our testing only on the day shift.

One critical problem for me was staff morale. An employee survey conducted the previous year indicated that our staff felt overworked, that there were not enough of them for the volume of testing we were doing.

Vendor selection process

We looked at our processes and instruments for multiple reasons. Some of our contracts were expiring, so certain instruments were due to be replaced. It's not that we were unhappy with the current vendors, Dade and DPC, but we decided that if we were going to go through an objective process, we needed to invite all vendors to bid on our business.

We also wanted to have staff input, so we formed selection teams for immunochemistries, chemistries and front-end automation. We told each team that there would be two finalists and asked them to give us their favorite and a second choice (one whom they could live with). The decision to narrow our candidates to two finalists allowed me to negotiate with the vendors.

The selection criteria were

- ✔ Technology
- ✔ Breadth of menu
- ✔ Flexibility to use multiple tube sizes (on account of our many outreach clients)
- ✔ Cost.

We were looking to consolidate, to eliminate some of our unnecessary workstations. We were also looking at ease of use, for example, maintenance: how much, when it had to be done and how difficult it was to perform. Then there were the instrument footprint and the automation to consider: some options involved major construction costs. Since I had not budgeted for them, we needed to minimize such expenses. We do our core chemistry and immunochemistry testing in the main part of our laboratory; microbiology and some of the other small labs are located elsewhere. We had modular cabinetry and countertops, which would minimize our need to do much reconstruction work in the lab.

Our choice

We decided to implement the workcell concept and our staff chose the Dade StreamLAB® as our front-end automation processor. We have placed the StreamLAB, which is connected to two Dade RxL chemistry systems and two DPC IMMULITE® 2000 immunoassay systems, close to the specimen-processing area.

Improvements

One of the early benefits of the StreamLAB is the improvement in our processes and workflow. Consultants from each of the vendors had looked at how we were operating and many of them came to the same conclusion. So we changed our flow, allowing us to have continuous throughput. Now our technologists do not come in the morning to gather the specimens that have arrived during the night. Rather, we load the StreamLAB 24/7, allowing it to deliver specimens to the instruments as the specimens arrive.

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I have been able to accomplish some FTE reduction, which my administration had wanted. We ran a rather lean operation as it was, but I had to give one-half of an FTE this year and another FTE next year. That was somewhat easy for me to accomplish because there were some unfilled positions that I was able to utilize.

We relieved the bottleneck in the specimen-processing area because our staff, as long as the tubes arrive barcoded, can now put them right onto the StreamLAB, which collects and receives the specimens and sends them back to the analyzers as required.

We have reduced errors. The primary error we were seeing was one that involved many of our clinical lab associates, who are my front-end processing staff: they would inadvertently omit the specimen collection and receiving process, placing specimens right onto the chemistry analyzers. They would not realize their error until they called the next log and saw that the system had run no tests on the specimens. This problem has been eliminated. Now the StreamLAB collects and receives the specimens, allowing them to go right to the instrument, eliminating many delays in that area.

Staff morale has improved, first of all because the perception of workload has changed. Our med techs no longer come in to find racks of work to do in the morning. With the continuous throughput, they never feel overwhelmed. Secondly, they feel very pleased to have participated in the process. They were involved in determining what our problems were and in selecting the instruments. We have good buy-in, and the staff has received a lot of attention because of the new process. We have even had the CEO come to visit our laboratory, we have been featured in the laboratory section of our hospital newsletter, and now other laboratories are coming to visit ours to see how automation has solved a lot of our problems.

We are also using StreamLAB to receive specimens other than those that are directly fed through the line to the chemistry analyzers. Our LIS vendor, Soft, worked with Dade and DPC so that StreamLAB can collect and receive our lavender tops and our blue tops for hematology and coagulation. Right now, we take the blue tops and spin them offline, but eventually our plan is to be able to use the centrifuge on the StreamLAB. We have already done testing to indicate we could get the platelet-poor plasma and not have our clinic lab associates once again babysitting centrifuges.

One of the future applications we are working on is autoverification of testing. We perform very little of that at the moment. We are also looking into a solution for specimen tracking and storage. We are currently developing this capability.

We have improved our early morning and STAT turnaround times. But I would like to point out that this has happened in phases. We have learned that instrumentation and automation alone cannot provide the benefits the lab is trying to realize; it is necessary to look at processes as well. We started out with only 49 percent of our work being verified by 8:00 AM. We were already completing about 80 percent of our work by 8:30 AM, but that was not our target. After the first six weeks of implementing automation, we had improved by about 13 percent to 62 percent verified by 8:00 AM, which we were proud of because previously we couldn't move that target much at all. But it still was not what we had hoped for or what we had seen from some of the information we had received from the vendors.

To find out what the problem was, we actually sat and watched our staff for 24 hours. We found out it was processes that were not changing: some of the staff were resistant to change. So we had to insist that the new processes be put in place. Within two more weeks, we found that 85 percent of our work was verified by 8:00 AM.

For our STATs, 67 percent of our work was verified within an hour, but after the first six weeks of implementing automation, we moved that statistic up to 79 percent. Once again, the same process changes and the same adherence to the new work processes allowed us to hit 90 percent, which is our new goal. We have had this in place now for only two months since we went live, so we feel pretty proud that we have been able to accomplish within two months what we had not been able to accomplish in years.

Conclusions

In summary, first of all, the staff needs to be involved—in identifying the problems, in coming up with the solutions—to ensure their buy-in and participation in accepting the change. We all know that change is never easy to accept. We have verified that automation and consolidation of workstations do result in increased efficiency and accuracy. We also know that there is not one solution that fits all labs. One of the things that we had heard for a community hospital is that automation might be overkill, but I certainly think that the results speak for themselves. And most importantly, we have noticed that automation alone is not going to solve our problems; it is just part of the solution. Process changes are more important than automation, and by adhering to those process changes, we can ensure that the automation will achieve the results for which we had hoped.