Process-improvement methods mean best-practice performance

By Rick Panning

At Fairview Health Services — an eight-hospital site integrated health system — our customers’ perception that our responsiveness was not what it should have been was somewhat accurate. In the fall of 2002, we benchmarked Fairview Southdale laboratory, the system’s second largest, which performs 800,000 billable tests per year. Compared to its peers, Southdale was below par. Turnaround time (TAT) was long and inconsistent. We needed to complete more tests per hour and reduce internal costs for each.

We needed to make a dramatic change. For our revitalization, traditional incremental improvements would not be enough in terms of results achieved and speed of change. We had read that Tennessee and Florida labs were experiencing good results with Lean. We consulted those labs, decided that this was the process-improvement methodology for us, and began our first Lean project began in Spring 2003.

Lean uses a systematic methodology and statistical tools to identify and root out sources of waste. Lean focuses on those steps in a process that add value — any activity that changes the fit, form, or function of the raw material to meet customer requirements. That the customer should define all value is another important concept for all process improvement. For example, centrifuging a blood sample adds value by changing the form of the sample so an analyzer can process it. Carrying that sample across the lab to the analyzer adds no value. Customers will pay for centrifuging but will see little benefit in paying to have samples carried around a lab.

With a Lean consultant’s guidance and recommendation, we formed a six-person team to lead our efforts with the commitment to dedicate them 100% to the project. We picked our best people for this initiative — those it would hurt most to do without — and pulled them out of the day-to-day workforce.

The first few weeks, we assessed our current state. We videotaped product (i.e., the specimen) flow from the initial order through labeling, processing, and results reporting. We then studied those videotapes to break down the activity in excruciating detail. When were specimens being transported? Inspected? Sitting in storage? At what times were we adding value to them? We videotaped and conducted a similar analysis with our lab operators. What tools and supplies were they using? Where did they go to get them? What steps did they take to do their work, and how long was each step taking?

The films showed a specimen processor trek over and over again from receiving to chemistry, which was in our lab’s hinterlands. He would walk to coagulation and then to hematology, which was nowhere nearby. We had to ask: “Is this a good use of a lab professional’s time? Cannot there be a better way?” The videotapes also revealed the amount of idle time our operators spent after putting specimens on instruments. They would wait for the instrument to finish because — what else could they do? — they had been assigned to the chemistry analyzer.

Seeing data in chart form confirmed that we were not using our time very efficiently. During morning specimen collection, for example, a tube of blood spent 89% of its time in storage and 5% of its time being transported. Only 5% of the time — with customers anxiously awaiting results — was devoted to actual collection and processing. Mapping our operators’ walk paths made our inefficiency even more obvious. Even within a specific technical department, the layout of technology and tools meant that much unnecessary walking took place.

Charting the average workload for each piece of equipment showed us that four analyzers were handling nearly 90% of the volume. We could significantly reduce our travel time by placing these analyzers together.

Staffing levels did not match work volume — too many people or not enough — during various times of the day. Tests were performed differently by different lab professionals; we formally analyzed which way was best. We had poor inventory control. Why did we have more than 40 different phlebotomy trays since never more than 10 phlebotomists drew blood at one time? The same supplies were stocked in multiple areas, ordered by multiple people. Workstations were disorganized.

The first few minutes of every lab pro’s shift were spent locating and reorganizing his equipment to match his workflow. Our closets were overflowing with lab coats, binders, and old records that should have been archived or discarded.
Cleaning up our act

This systematic analysis uncovered weaknesses, yet pointed the way to solutions. Our first order of business was to clean house — an important, logical first step in formal Lean methodology, 5S: Sort, Set in order, Scrub, Standardize, Sustain. All cabinet doors were removed; stuffing supplies behind a door invites clutter. Our Lean reorganization through discarding expired or unnecessary supplies freed up 450 square feet of space. We dedicated it for a storeroom and agreed on permanent locations for each supply item. Each has a laminated Kanban card placed at an appropriate point in the current inventory that specifies the item number and re-order quantity, and flags us at the re-order point; we now have enough inventory until replacement supplies arrive.

Standardizing our equipment extended to those phlebotomy trays; we went from 46 unique layouts to one pediatric tray and seven identical adult trays. With the Lean example, phlebotomists got to negotiate over a cart versus a tray, as well as the type and layout of the tray — but once they agreed, all trays had to be the same. That was non-negotiable.

After the 5S process, we readied for more substantive changes in two main categories to create formally defined standard work: arranging an optimal layout for our instrumentation and defining an optimal way to work with those instruments.

The first major change was creating a unified core work cell. Previously, six workstations were housed in two separate rooms; all these instruments now sat together in one. To minimize walking, our highest-volume chemistry and hematology analyzers are now closest to the pneumatic tube and the lab’s front entrance. We put back-up equipment nearby (for floor models) or on a cart behind each analyzer. When a problem develops, we can swap instruments and keep working while the problem is fixed.

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Our core lab instruments handle 90% of our billable work volume. Our new circular layout means that a single operator can walk a circuit, keeping all of them running. Open space behind workstations allows a specimen processor to walk around the core and deliver specimens without getting in the operator’s way.

We specified permanent locations for each piece of equipment, associated tools, and supplies. In a Lean process called “shadowing,” we used colored tape to mark locations for the stapler, pipettes, tubes, markers, and so forth, which eliminates hunting for items left elsewhere by the previous shift. Instantly, it is apparent that a particular item is missing.

Another major process change was switching from batch processing to single-piece flow. Under our old system when phlebotomists drew 15 patients, they dumped 15 samples at once onto the specimen processor’s desk. Now, they draw one at a time, sending that sample to the lab through the pneumatic tube station on the patient-care unit; orders and labels now come to phlebotomists through the pneumatic tube. Here, some traveling between patient care units and the lab was eliminated.

Because phlebotomists tube each sample as soon as it is drawn, work flows steadily to our lab, making less stress for operators and reducing the risk of error. To accommodate this constant workflow, we decentralized to small, high-speed centrifuges throughout the core lab work cell. Our analytical testing process is also one-piece flow, first in/first out.

We took suggestions from the Lean team and staff to decide on the best, most efficient way to perform each test. Formalized job-guidance documents define our standard work and specify the sequence of steps as well as the key actions an operator must take to ensure high quality. We trained and tested employees on their competency in following these standards.

Communicating the need for change

We began preparing staff for changes months before the project began, with meetings to explain the lab’s financial situation and its current level of service. We reviewed data to help them understand that productivity, internal costs, and levels of service were simply not good enough — not because of their performance but because our processes were not performing well. To ensure cooperation, there would be no layoffs as a result of Lean; any reductions would be through attrition. Staff may not have welcomed Lean changes but at least understood why they were coming. During the project, the lab director and Lean team significantly increased the amount and frequency of communication.

By the end of our first Lean initiative over a 14-week period, our gains were quickly and clearly apparent. Before Lean, we completed 40% of hemoglobin tests in less than 30 minutes (from collection to result); we were now completing 91%. We went from 12% and 5% on-target completion for potassium and PTT tests to closely meeting our goal of 95% completed within 30 minutes from the point of collection.

Improvement in consistency was almost as important as timesavings. Before Lean, our variability meant customers never knew what to expect, so they typically ordered every test STAT, hoping their orders would be pushed to the head of
the line. STATs, however, only produce more bottlenecks and interruptions. As our consistency improved, STAT orders fell significantly. Meanwhile, our cost per test dropped by 31%, from $9 to $6.24. And remember, Fairview’s Southdale core lab performs 800,000 billable tests per year.

At the initiative’s beginning, phlebotomists were completing on average three to four draws per hour, while the Lean analysis suggested that they could do 11 to 12. By project’s end, they were up to 10.5 draws per hour over 24 hours. Meanwhile, technologist productivity rose from 4.75 completed tests per hour to 7.40 tests per hour — a 56% improvement. Instead of trailing industry benchmarks, we are now the best practice in productivity for our peer group. Feedback from our customers was equally gratifying. One physician actually wrote a letter to our lab director, stating how impressed he was with our improved TAT. Feedback from our caregiver colleagues was quite positive.

These productivity gains allowed reduction of core lab head count by 20% through attrition, transfer to other areas of the lab, and our ability to dedicate team members to other Fairview Lean initiatives. We measure employee satisfaction every January with a Gallup Q12 survey. By January following this project, in conjunction with other changes occurring in the lab, Southdale’s staff showed a satisfaction gain of almost half a point — very significant on a five-point scale.

Finally, we recovered floor space for the new storeroom. And we freed up $16,100 from our standing inventory to pay for operating costs. The staff and cost reductions from this first Lean initiative yielded an annual savings of almost $400,000 in the lab’s core area.

Our performance monitoring continues. We import and use the data from our LIS to monitor our TAT, so we quickly know if we are failing to meet our target TAT for a given test. If we are, we look into the causes. Our TAT reporting has changed. We now report our percentage of compliance with our goal, rather than average TAT. We also share positive feedback with our staff and watch for opportunities to make further improvements. We have seen both better financial results and patient care.

Today, we have conducted Lean initiatives in six of our eight hospital core labs; two remain to be completed the first half of 2006. In 2002, we knew very little about how to “do” Lean. Having gone from merely considering Lean to a system-wide implementation, we found it helpful to have a consultant assist on the first project. Once that project was successfully completed, a core of people had learned Lean by “doing” it. Four of those people have led or participated in our other initiatives.

And while we knew after our first project what kinds of changes to make and had generated written guidelines for our standard work, we found that lessons from one location might not be applicable to other sites. Each location is different in terms of its culture, its process, and how the support services work.

We have also found it beneficial to populate our teams with at least one non-laboratory professional. One advantage is a set of non-laboratory “eyes” that can see things in an unbiased light. After all, Lean is a completely different way of looking at things, a culture of ongoing improvement, and “seeing with new eyes.” The other is to spread personal experience and confidence in Lean to other areas of our hospitals.

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