USC Consulting Group

Delivering Laboratory Excellence

Driving Speed, Reliability and Cost Reductions for Laboratory Operations at Children's of Alabama.

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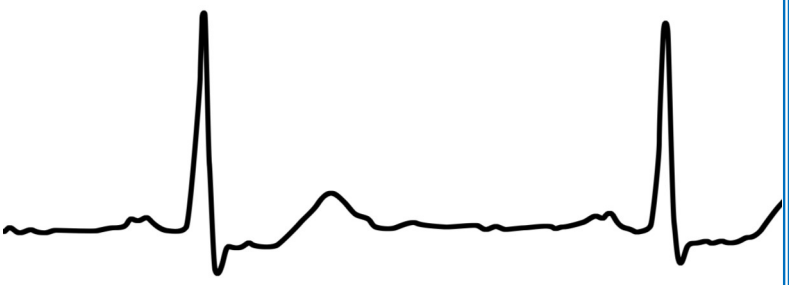
Vital Statistics

Children's of Alabama®

Based in Birmingham, Children's of Alabama (COA) is the third-largest private, not-for-profit pediatric medical facility in the U.S.

The hospital treats every possible childhood affliction, from asthma, burns, and cerebral palsy to sickle-cell disease, spina bifida and weight management. They treat all children without regard for their ability to pay.

For the past four years, *US News & World Reports* has ranked Children's of Alabama among the best pediatric programs in the country.



Children's of Alabama

- **332 Beds**
- **48 NICU Bassinets**
- **36 Specialty and Surgical Divisions**
- **500 Medical Staffers**
- **4,300 Employees**

2012 Statistics

- **14,000 Inpatient Visits**
- **634,000 Outpatient Visits**
- **21,600 Surgeries**

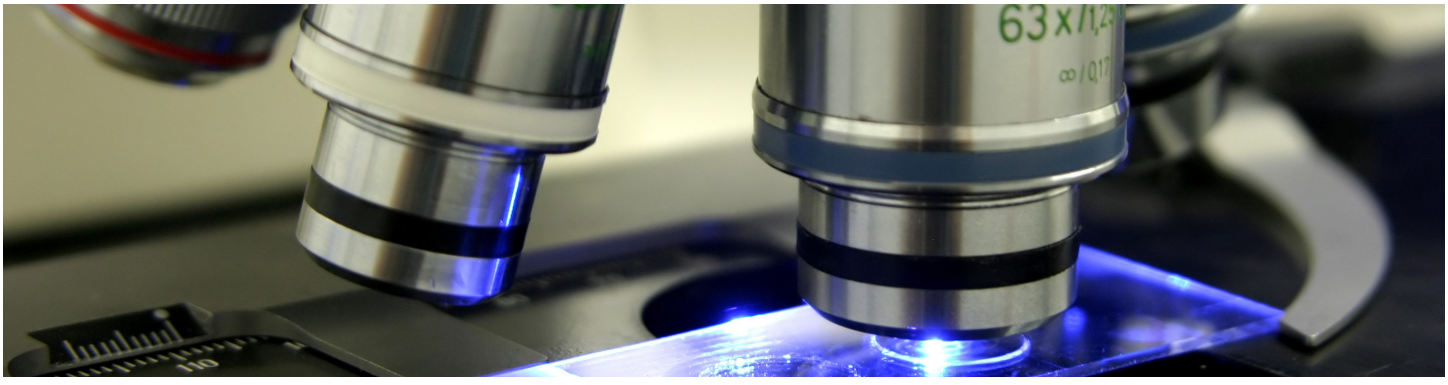
The Challenge

The hospital was in the midst of a major transition— It was adding a 750,000-square-foot expansion to accommodate broader patient services, including, for the first time in its history, cardiovascular surgeries and solid organ transplant surgeries.

This meant adding a cardiovascular (CV) ICU, capacity for three CV operating rooms, interventional radiology, a CV step-down unit, 135 more beds, and additional capacity for other surgical specialties, including pediatric liver and kidney transplants.

As welcome as these changes were, they would put much greater demand on the laboratory, which provides test results physicians can use to determine treatment strategies. The need for accuracy is a given, but speed is particularly critical in a children's medical setting because of the rapidity with which their health circumstances can change. The expected increase in test volume would clearly affect test result turnaround times (TATs).

The existing laboratory space was cramped even for its current workload and staff, so expansion plans incorporated a new laboratory facility to meet the growing demand and allow space for additional services in a location convenient to those using the laboratory and blood bank.



The Challenge (continued)

Mary Ann Floyd, Divisional Director for several operational departments at COA, oversees the Department of Pathology and Laboratory Medicine, whose 115-person staff handles laboratory testing services for the hospital.

She recognized the opportunity this transition phase presented for making important strides in redesigning laboratory operations for greater efficiency and cost savings that would also improve patient care.

"We knew in advance we would have to be really sharp, that we'd have to improve turnaround times to be able to handle all these additional services," Ms. Floyd explained. "And we wanted to do it with as little staff increase as possible to control expenses. We wanted to have improved practices firmly in place before we moved into our new space, as well as design the new facility for optimal efficiency. We simply couldn't carry established inefficiencies into a new laboratory and expect different results."

With these goals in mind, she pulled together a team of three leaders from her group to attend a seminar on Lean practices and explore improvement options. The experience became an epiphany that fueled a whole new approach to basic laboratory operations, a migration from COA's traditionally separate hematology and chemistry labs set-up to a more contemporary core lab, and the actual design of the new facility.

"We'd have to improve turnaround times to be able to handle all these additional services...to control expenses."
- Mary Ann Floyd, Children's of Alabama

The Challenge (continued)

The laboratory leadership group agreed improved test turnaround times were essential and could be accomplished only with a better work process flow. Before they could begin this evolution, they first had to take full measure of what was actually occurring in near-real time to ferret out opportunities to remove roadblocks hampering those efforts. But the taxing day-to-day claims on staff and management time, and some obvious early reluctance among personnel to embrace an altered work environment, made this task difficult. To help speed the process, the team pushed to engage some outside help to make the changes they knew were necessary.

Earlier discharges and faster treatments lead to cost savings for the organization. The COA team considered several options for reaching their desired TATs.

One option to reduce TATs by half was to add personnel in collections and in testing, which would have cost approximately $85,000 annually in salaries and benefits, and did not include additional equipment. Based on a study done prior to the USCCG engagement, Ms. Floyd made a presentation to the COA leadership team demonstrating how batching specimens was increasing the CBC TAT. This study showed that “first-in, first-out” (FIFO) could reduce TATs to the desired goal without increasing staff.

Finding The Right Resource

The COA management team had vetted several business performance improvement firms very early in the transition phase, so, when laboratory services pressed for an external resource, they tapped USC Consulting Group (USCCG), one of the original companies in the mix.

"One of the things that made USCCG attractive was their offer to do an initial analysis at no charge and we were impressed with the insights they presented," Ms. Floyd reported. "But another pivotal factor was that they offered us the flexibility to end the contract at any time we weren't happy with what was going on, and there was no pressure to move beyond the initial contract. Their willingness to work with us was impressive."

With 45-plus years of experience in business performance improvement across numerous industries, USCCG recognizes the uncertainties that clients may experience prior to engaging the firm and work to allay those concerns as much as possible. The firm believes that each client merits a truly customized approach to its unique situation.

"We believe in listening, learning, and understanding the strengths and weaknesses of each individual client within their own circumstances," said Lanny Rubin, USCCG Project Manager. "Our zero-based philosophy eschews preconceptions and tired it-worked-there-so-it-will-work-here approaches. We want to ensure that every client gets what they need and deserve. COA was no different."

"When USCCG helped us implement FIFO we reached the desired TATs, reduced staff, recaptured our USCCG expense, and avoided the increases in expenses. Sustained over time, these savings become significant." - Mary Ann Floyd.

Getting Down to Work

By focusing strictly on the development of a core laboratory, which meant combining the hematology and chemistry labs, USCCG's initial analysis showed:

- Significant variability in individual test type TATs.
- Marked performance gaps between average and best-demonstrated performance.
- A need to improve understanding of capacity – what can be done vs. what is being done.
- A lack of common understanding of optimal performance, the laboratory's actual performance level, and what was eroding capacity.
- An opportunity to narrow the range of variation times by identifying the root causes.
- A need for management tools with better visibility.
- Opportunities to better balance resources application based on demand patterns.
- A need for preparing laboratory personnel and the existing physical layout for a smooth transition to the new facility.
- A demand for developing and implementing a Laboratory Management Operating System.

Getting Down to Work (continued)

The first step in addressing these issues was to develop a value stream map and process task analysis of each step of every process, from collecting samples on the hospital floor to delivering them to the laboratory, from moving samples through the testing processes to delivering results to physicians. Test processes were followed closely to determine what equipment was used, how many steps and how much time each particular task in the process required for completion, whether materials and equipment placement hindered efficiency, and how much "down time" existed, when nothing was happening within the test process.

Value Stream Mapping & Process Task Analysis Chart

HEMATOLOGY

Major Equipment	Test	Value Added			Matl Handling			Inspection			Transactions			TOTAL		
		Steps	Sec	Min	Steps	Sec	Min	Steps	Sec	Min	Steps	Sec	Min	Steps	Sec	Min
Advia	CBC - Flags / Abnorm.	6	900	15.0	6	190	3.2	1	120	2.0	5	660	11.0	18	1870	31.2
Advia	CBC - Flags / No Abnorm.	5	660	11.0	4	130	2.2	1	120	2.0	3	450	7.5	13	1360	22.7
Advia	CBC - No Flags	5	660	11.0	4	130	2.2	0	0	0.0	1	240	4.0	10	1030	17.2
COAG	PTT - D Dimer-Fibrinogens (anti Xa)	15	4680	78.0	1	600	10.0	2	150	2.5	2	360	6.0	20	5790	96.5
COAG	PTT - D Dimer-Fibrinogens	3	900	15.0	0	0	0.0	1	300	5.0	1	180	3.0	5	1380	23.0
Cyto Spin	Cell Count WBC =0	4	780	13.0	1	30	0.5	0	0	0.0	2	300	5.0	7	1110	18.5
Cyto spin	Cell Count WBC >0	8	1940	32.3	3	100	1.7	0	0	0.0	4	780	13.0	15	2820	47.0
Sed Rate	Sed Rate	1	240	4.0	3	220	3.7	0	0	0.0	2	150	2.5	6	610	10.2
HPLC	Hemoglobin	9	2820	47.0	3	150	2.5	2	1500	25.0	6	1320	22.0	20	5790	96.5
Stainer	Bone Marrow	9	4160	69.3	6	1725	28.8	0	0	0.0	5	1290	21.5	20	7175	119.6
	UA - Pregnancy	4	600	10.0	2	90	1.5	1	30	0.5	2	150	2.5	9	870	14.5
	UA - Microscopic	6	790	13.2	2	240	4.0	0	0	0.0	2	210	3.5	10	1240	20.7
	UA - No Microscopic	5	430	7.2	2	240	4.0	0	0	0.0	1	180	3.0	8	850	14.2
	Mono Spot	2	360	6.0	2	90	1.5	1	30	0.5	1	90	1.5	6	570	9.5
	FDP	6	1070	17.8	2	60	1.0	0	0	0.0	1	120	2.0	9	1250	20.8
	Mycoplasm	6	640	10.7	1	30	0.5	1	45	0.8	1	10	0.2	9	725	12.1
	Serology	4	780	13.0	1	30	0.5	0	0	0.0	2	150	2.5	7	960	16.0
	Sickle Screen	3	1260	21.0	2	40	0.7	0	0	0.0	1	120	2.0	6	1420	23.7
	Stool WBC	3	170	2.8	2	40	0.7	0	0	0.0	1	180	3.0	6	390	6.5
PFA 1000	Platelet Function	5	1870	31.2	5	305	5.1	1	240	4.0	2	420	7.0	13	2835	47.3
Stainer / Micro	Thick/Thin/Malaria Smear	6	40800	680.0	4	3300	55.0	2	3000	50.0	4	1680	28.0	16	48780	813.0
	Reducing Substance - Urine	10	675	11.3	1	5	0.1	2	120	2.0	1	120	2.0	14	920	15.3
	G6PD Screen	19	6770	112.8	1	120	2.0	0	0	0.0	2	1260	21.0	22	8150	135.8

Getting Down to Work (continued)

This made the entire process transparent, allowing the team to:

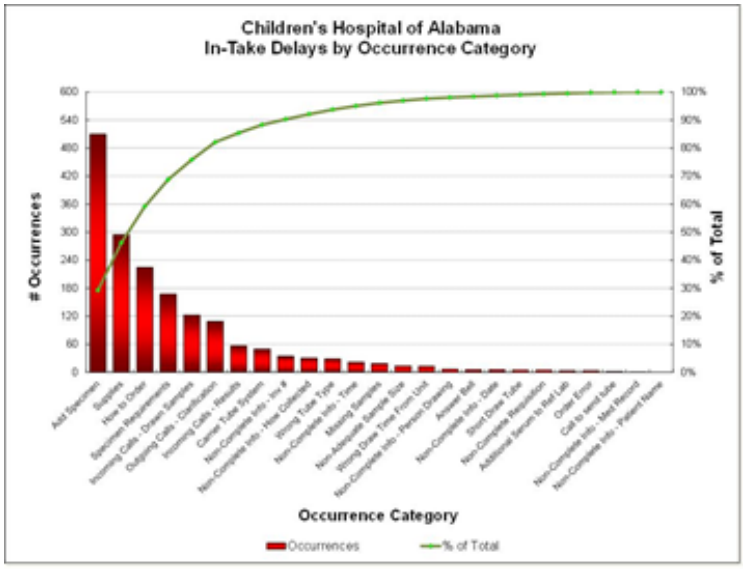
- Understand why TATs varied
- Establish current vs. optimal performance levels
- Eliminate or minimize the wastes causing performance gaps
- Reduce costs via tighter oversight of materials and equipment use
- Set things right by:
  - Putting equipment and people in the most efficient place and space.
  - Getting things done at the right time (TAT meets communicated expectations by test type and requesting entity).
  - Using the right resources for the job.
- Improve the laboratory's ability to respond to changing demand conditions.
- Formalize management disciplines related to performance, follow-up, and review.
- Strengthen the culture to sustain performance and seek the next improvement opportunity.
- Determine the specific technical Operational Intelligence Solution
- Develop elements of a Laboratory Management Operating System from which laboratory services are delivered and continually improved.
- Evaluate future-state work flow needs and requirements compared to available tools and emerging technologies.

Getting Down to Work (continued)

"The group at COA knew inherently what they had but there was no formalized, quantitative information source that empowered them to take full advantage to shift people and resources to the work. We brought the combination of focus and horsepower, as well as structure, to systematically identify and quantify the impact of delays and anything else that caused waste in the operations, and then put together an approach to minimize or completely eliminate those obstacles." - Lanny Rubin, USCCG.

By implementing Pareto analyses of multiple processes, it was simpler to determine where the greatest level of delays occurred consistently and eradicate the causes of those delays. It's a top-down approach that spurs greater success early in the project and demonstrates how much improvement can be achieved once problem areas are identified. Since complete blood count (CBC) testing, both routine and stat (priority), constituted roughly a quarter of the hematology laboratory's workload, this process became the initial focus for TAT improvement.

Using such tools as an observation audit -- which tracks when an employee is working or not working, away from his station or sidetracked by ancillary duties like answering a phone or searching for materials -- fostered better time management. Implementing testing capacity models differentiated among how much time samples spent on a testing machine, in a technician's hands, or sitting idle during the test cycle, and demonstrated where slow-downs occurred.



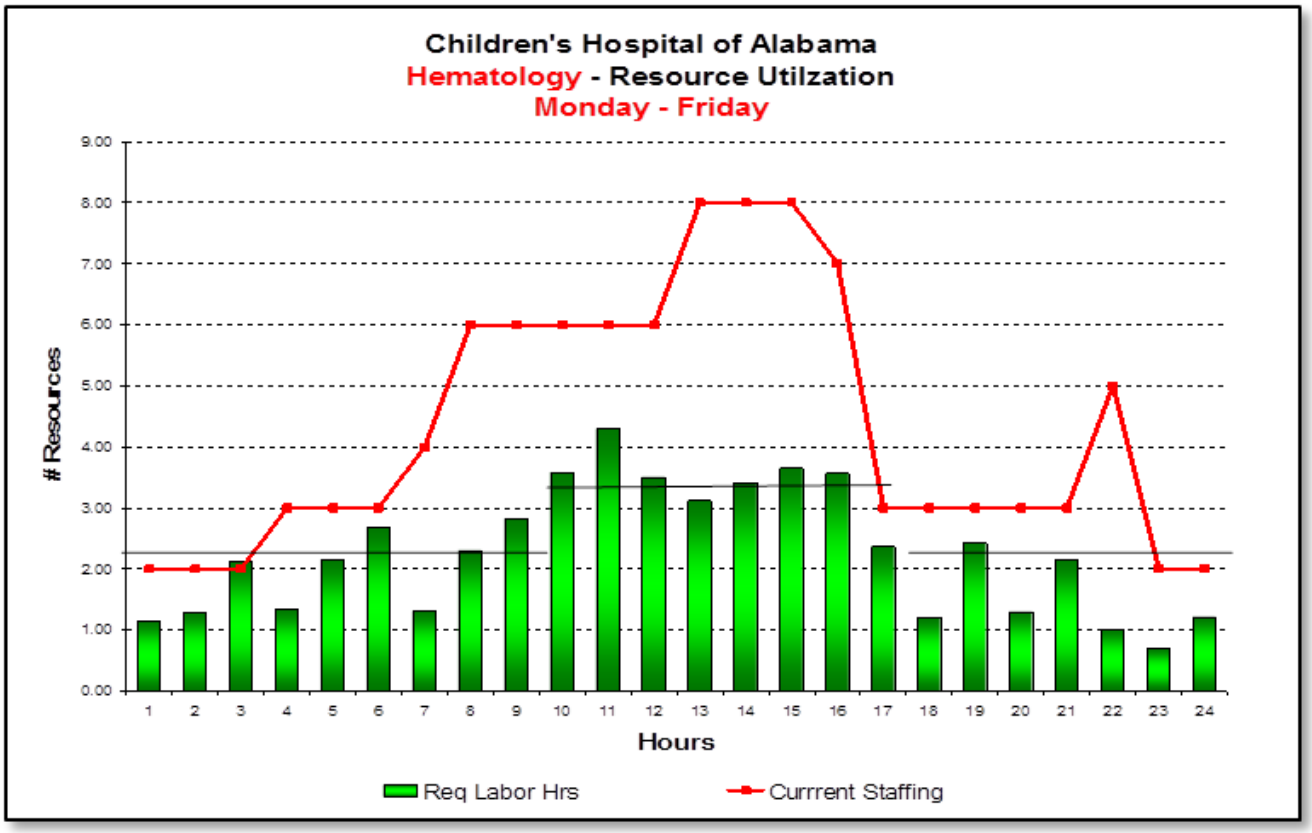
Pareto Analysis to Focus on Waste & Delays

Getting Down to Work (continued)

The Pareto analysis of actual work flow illustrated the mismatch between staff availability and high volume test demand periods, which resulted in a number of changes.

According to Mr. Rubin, "This evaluation included where equipment was placed and how well it was utilized. It also helped us determine the level of need for cross-training laboratory technicians and technologists to fill productivity gaps, apply more flexibility to workforce scheduling, and eliminate as many hand-off delays as possible."

Hematology Resource Utilization Chart



Getting Down to Work (continued)

But the most important change resulted when the laboratory switched from batching specimen collections to a "first-in, first-out" (FIFO) system. Prior to the change, samples were collected on the hospital floor in groups and all delivered to the laboratory at the same time, essentially damming up the process flow. With FIFO, each sample was sent immediately to the laboratory to create a more consistently continuous work flow.

The improvement team also revamped the specimen delivery system – a series of pneumatic tubes running from treatment floors to lab—by reorienting intake placements to more convenient locations outside hospital room doors. (The system has since been replaced with RFID tracking.) This facilitated the transition to FIFO from batching by making it easier to drop a sample to the laboratory as soon as it was taken.

When 5S (sort, set in order, shine, standardize, sustain) was incorporated in the laboratory, many processes were shortened simply by virtue of a more orderly work environment. Equipment and supplies were placed for higher efficiency and the equipment was well maintained. Over time, the habit of keeping things in order became more engrained and required less monitoring.

Getting Down to Work (continued)

Lab Workstation before 5S Implementation

Lab Workstation after 5S Implementation

All these steps combined to reduce CBC TAT from 60 to 30 minutes over the course of only ten weeks. As in most cases when specific processes are under scrutiny, the first weeks saw substantial improvement; the challenge was in maintaining that performance for the long-term.

Ms. Floyd recounted, “We had been using a routine TAT of one hour for routine CBCs, and we were frequently called for results before we had them. That meant we had to stop, answer the phone, try to find the status of results, take a message, call the doctor back. When we were successful in reducing our CBC TAT to 30 minutes, we experienced a ripple effect: The number of calls to the laboratory became fewer, which reduced our interruptions, which made it easier for us to get our work out sooner. This also allowed us to increase volume using the same amount of staff.”

In just three months, the laboratory lowered CBC TATs from nearly an hour to less than 30 minutes. This was accomplished and sustained by implementing such Lean techniques as:

1) First-in-first-out specimen management
2) Equipment co-location
3) Staff cross-training

The Value of Communication

Ms. Floyd and Laboratory Administrative Director Gisele Baskin were strong proponents of open communication at all levels throughout the transition.

USCCG's team met daily with various members of the COA team and met weekly with the entire laboratory management group to focus on and assign action items requiring timely implementation. Ms. Floyd reported that USCCG played the task master role to keep everyone's attention on the action items that had to be completed within specific time frames.

COA's HR department held a series of mini-seminars that helped laboratory management devise ways to get their message across to laboratory staffers. They also enlisted the help of the laboratory education coordinator to continually clarify and reiterate information about the processes through numerous communications techniques.

"If I noticed a few people had time to meet," Ms. Floyd said, "I'd pull them into the conference room for a quick presentation to help them understand the ***why*** of what we were doing. Most of the time they had no concept of the reasoning behind the changes, so these became a powerful tool for delivering that kind of information."

Ms. Baskin emphasized the value USCCG added when staff exhibited resistance to many of the proposed changes. "It's like hearing something over and over from your mother. You just ignore it. It made a big difference to hear it from someone outside, to hear that other people were doing these things successfully at other places."

"It made a big difference to hear… from someone outside, to hear that other people were doing these things successfully at other places."
- Gisele Baskin, Children's of Alabama.

The Value of Communication (continued)

One member of the USCCG team worked the third shift, from 11 pm to 7 am, for several weeks, during which time he visited the hospital floors with phlebotomists collecting samples. He used this opportunity to establish a rapport with the nurses, who shared perceptions of laboratory operations that may never have surfaced under other circumstances. He provided daily insightful reports based on these exchanges and his observations of how the staff interacted and managed their time.

"We really benefitted from this," Ms. Floyd said. "The nurses would tell him things they wouldn't tell the laboratory staff. The reports were detailed and very helpful. We made a number of valuable adaptations based on them."

The team established opportunity logs to give staff an avenue for interjecting their own perspectives on ways to improve operations and better manage time and people. The introduction of a supervisor's checklist allowed regular review of laboratory operations in real time and brought a much-needed agility to responding to shifts in demand.

"I use the supervisor's checklist every day so that I know what's happened on previous shifts, whether we needed to replace staff for those who couldn't make it in for whatever reason, or simply re-evaluate the number of people for a less demanding time frame. We review it weekly at staff meetings to identify ways we can continue to improve and adjust, "Ms. Baskin said.

The Outcomes

Approximately 80% of the laboratory employees who worked hematology or chemistry have been cross-trained to work in the core laboratory to fill performance gaps.*

Key Metrics

- ⇒ Routine CBC TATs were reduced by over 50% in the first quarter and have sustained to over 40% below the initial baseline value.
- ⇒ Routine Urine Pregnancy testing TATs were lowered by 32%.
- ⇒ Routine FOB (fecal occult blood test) TATs saw a 17.5% reduction.
- ⇒ The cost of the engagement was recouped by reducing three FTEs.

**This includes employees on second and third shifts, many of which already had skills in both hematology and chemistry. Cross-training remains a focus and is a must in the training of new hires and participation in school programs for clinical rotations, as well as the implementation and training for additional testing or new analyzers.*

According to Ms. Floyd, "USCCG helped us educate, make recommendations and, together with our leadership team, progress to using Lean principles and develop a design for a core laboratory. After USCCG left, renovations were made according to this design to allow us to operate as a core laboratory prior to our move to the expansion facility. As a result, the transition to our new facility was nearly seamless." She also cited the unwavering support demonstrated by COA administrative leaders in recognizing the importance of these projects.

"We considered our improvement in TAT for CBCs to be a very important gain from this engagement," she added.

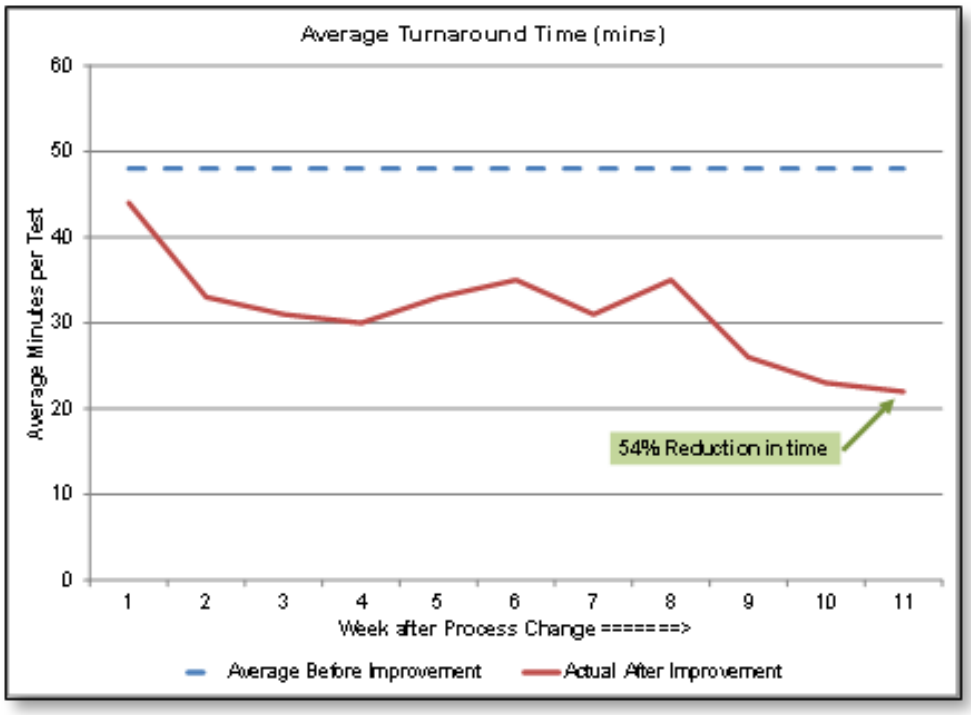
The Outcomes (continued)

The Medical Director's Report stressed the value of the improved TATs:

"[CBC] is one of the most common blood tests performed… [and] is a test with a lot of uses. Often clinical decisions are based at least in part on the results of tests such as the CBC. When it takes a long time to run tests, decisions are made at a slower pace, patients spend more time in examining rooms or waiting rooms. Everything slows down.

"For a family waiting for a test result, getting an answer 30 minutes earlier means less frustration, less fatigue. Shorter turnaround time means more timely response to a serious illness. And, if the CBC is normal, it means an earlier discharge home."

In her review of the engagement, Ms. Baskin said, "Decreasing our turnaround times allows us to provide better patient care. Our physicians have been very happy with those and the fact that they can make treatment decisions so much earlier. That's number one for me."



Sustainability

Positive change is always more easily achieved in those circumstances when management eyes are focused on areas of concern. But once the focus shifts, maintaining that level of proficiency long-term, as well as encouraging continued improvement efforts, is more challenging. At COA, the improved outcomes have been sustained and other improvements have been generated. Ms. Floyd and Ms. Baskin are committed to ensuring their permanence.

"We continue to use the tools USCCG introduced, like the opportunity log, supervisor's checklist, time efficiency audits and testing capacity models, to aid in real-time evaluation of our key indicators." Ms. Floyd reported. "These, along with the concepts of Lean, have become so engrained with our staff that we seldom need to revisit the basic principles.

"We continue to monitor TAT for CBCs and other tests and we have sustained this gain well. Our average CBC TAT in the previous month was under 28 minutes and STAT TAT for CBC in the same month was under 15 minutes."

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