

LEAN AND PROCESS EXCELLENCE

at Kingston General



Kingston General Hospital, Kingston, Ontario.

Hospitals are not only using lean tools; they are also adopting the management methods and organizational culture aspects of the Toyota Production System. Hospitals are using lean to improve processes and help to provide better care for patients while also making a commitment to their employees' job security and development. Lean is bringing benefits for all involved:

- Patients (improved quality and reduced waiting time);
- Employees (reduced waste and increased fulfillment); and
- The hospital itself (growth and financial savings).

The beginning: Lean in the laboratory. In the fall of 2005, the laboratory at Kingston General Hospital, in southeastern Ontario, was facing a potential crisis. The hospital's vice president of program support, Peter O'Brien, says, "We were

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in very turbulent waters and everyone in the raft was rowing like crazy towards a waterfall.”

They were facing the same reality as many hospitals: increased demand and limited capacity. In two years or less, they would be overwhelmed, and traditional approaches were not going to be enough. Building a larger lab would have cost millions of dollars, and it might be abandoned within 10 years under the hospital’s overall capital plan. In O’Brien’s words, “It appeared that there was no way out.”

In November of 2005, Administrative Director of Laboratory Services Norma Layno attended a conference and heard a speaker who gave her new hope. She heard how lean methods from other industries were now being applied in hospital laboratories with excellent results. Layno invited the speaker to take a ride with her back to the hospital.



Finding mobile equipment once meant searching from room to room. Now each piece has a designated storage site, and both the equipment and its home are clearly labeled.

In 2006, the lab underwent a major turnaround. Six staff members from around the hospital were assigned full-time for four months to lead the redesign of laboratory processes using lean tools and principles. As a result of the project, a more continuous flow of specimens meant that turnaround times were minimized and physicians received test results more quickly. The layout of the lab was modified to improve workflow. Telltale signs of 5S, such as clearly labeled workstations, helped reduce waste and frustration for employees. A kanban system in the stockroom and two-bin systems at the workbenches ensured supplies were always available, preventing delays. Standardized work provided consistency, and leadership audits were developed to aid in sustainability. In a lab that was bursting at the seams, they managed to free up 1300 ft² (121 m²) of space that could be used to validate new equipment. The lab increased capacity by 30%, and turnaround time for test results was

decreased by an average of 25%. Customer service improved and the need for expansion was avoided. Most importantly, the lab was reenergized and, as O’Brien says, “We lost that desperate feeling.”

Kingston General could have stopped at that point, declaring that they were “lean” and settling back into comfortable tradition. Instead, a member of the hospital’s joint planning office (someone who had participated on the steering committee for the lab initiative), proposed that these same methods could be applied to a multimillion-dollar renovation underway elsewhere in the hospital.

A second front: Central processing and supply. Each year, Kingston General Hospital’s central processing and supply (CPS) department cleans, assembles, and sterilizes approximately 200,000 trays of surgical instruments, bed-

pans, basins, and IV pumps. This department was already in the design stages of a \$9 million renovation to provide upgrades to the equipment and infrastructure.

Derek Wallis, CPS

Supervisor, was not convinced that they needed any help, as he had high quality levels and hard-working staff, and he believed they were doing the best they possibly could: If they only had some new equipment and some more space, they would be fine.

A few months later, Wallis had a different perspective: “I came out of this feeling like I was totally naive before—ignorant that this kind of system even existed. When you look at

the disorganized state of things, you might think we could tidy things up, but how’s that going to really help us in the big picture? We learned if you just do these small improvements all over the place, it adds up to a lot of efficiency.”

While the CPS project was initially focused on developing a layout for the planned renovation, the team realized they could also improve the way they were doing things in the interim.

Improvements in CPS started with standardized work. “We had 30 people doing the same job 30 different ways,” says Maria Martins, CPS coordinator. Standardized work gave Wallis an entirely new perspective on supervision. He says, “Because I knew everyone did it differently, I didn’t really have any way to gage. Are they efficient? Are they doing it well? Are they too slow? Are they too fast? Are they missing things? Now I can immediately know exactly where they are in the process, and that benefits me and also the staff. If they go



Before and after: Obsolete and unnecessary items were cleared from the storeroom in Central Processing.

on break and someone steps in, they know exactly where they are in the process. There's no, 'I'll wait till after break to start a cart, because no one else will know where I am.'"

Illustrated posters were placed at each workstation to summarize key steps for quick reference. All workstations underwent 5S, ensuring similar workstations were consistent, and everyone had the parts and tools required to do the job.

They were also able to improve level loading of the work, the lean principle of "heijunka." Instead of stressful, massive deliveries of items every few hours, the porters would now drop off dirty items and pick up clean replacements in smaller amounts throughout the day. Management at CPS originally believed they needed to add more staff in the evenings because they often had a backlog of work. Instead, they realized that the majority of their demand is during the day and, rather than add staff in the evening, they had to do the opposite: move staff off the evenings and into the day shift so the work could be completed when it arrived.

Martins says, "We were just in awe of how quickly things moved. I've been working in this department for 20 years, so I have seen some changes, but nothing like this." In the course of only a few months, processing time for an instrument tray fell 54%. This effectively eliminated expedited "STAT" processing, since the expectation for STAT trays was a four-hour turnaround and now every tray is processed in under four hours. Further, the reduction in turnaround time

Having standardized processes has also reduced training time for new hires by 50%, from 12 weeks down to six weeks. A 16% improvement in labor productivity came out of the initial project, and this was enough to add a dedicated continuous improvement rotation to the staff schedule for working on improvements or ongoing lean study. When another local hospital had a system failure and needed to temporarily shut down its own central sterilization department, Kingston's CPS was able to accommodate all of the other hospital's volume without adding any staff, something Wallis says would have been absolutely impossible before.

Cultural transformation in progress. During the CPS project, one of the team members found hospital president and CEO Joe de Mora walking through the hospital, grabbed him by the arm, and took him to see what was happening. O'Brien recalls, "Joe later told me about the team's excitement as they spoke to him. He called it a cultural transformation."

Two things were quickly decided: First, another project needed to immediately follow in order to continue the momentum. Second, the executive team needed to better understand lean and decide on a long-term strategy before deploying lean enterprise-wide.

A project in the OR was initiated in the summer of 2007, based on observations in the OR that were made during the CPS project and a desire by leadership to apply lean improvements in a direct patient-care area. A short assess-

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means that fewer instrument sets need to be purchased (at \$6000 to \$10,000 each), because a set used in the morning can easily be ready for use again later that day.

In a department desperate for space, 740 ft² (69 m²) of space were freed up. Cart space required for consumables stored within the department was reduced by 75%, and thousands of excess or unusable items were removed from nursing units.

ment identified more than 160 improvement opportunities between the point at which patients arrive at the hospital and when they leave post-operative recovery. An initial project was designed to focus on fundamental elements that would provide a foundation for further improvement: material/equipment management and room turnover.

During a traditional room turnover, expectations for each individual were unclear and varied greatly. This often

caused confusion and frustration, as some tasks might be duplicated while important elements could be forgotten. Clear roles and responsibilities were defined. Quick reference cards summarizing key elements of this standardized work, customized by employee role, were made that could be attached behind name badges. As a result, time for a basic room turnover was reduced by 44% and, extending the value stream connection with CPS, the time from case end to delivery of instruments in CPS was reduced by 50%.



Shown are one day's worth of returns to the pharmacy prior to implementing lean practices. More than a third of all medications sent out each day used to come back unused.

Simple elements of visual management reduced waste in the OR. Defining a clear home for each piece of mobile equipment ensured that it could be found when needed, rather than requiring nurses or techs to search from room to room. Supplies used in each OR were standardized, and a system was developed to ensure proper quantities would always be available, while eliminating overstock.

If anesthesia supplies are missing during a procedure, the consequences could be severe, so all anesthesia carts and machines were standardized. Because some of the supplies or instruments go by many names, laminated photographs of all items were labeled with proper names and

mentals training, which included examining elements of a lean culture compared to their organizational culture. To shift toward a lean culture, management actions at the very highest levels would need to change accordingly.

A new Performance Excellence (PEX) department was established to formally drive the deployment of lean, Six Sigma, and "Service Excellence" throughout the organization. This department has three full-time staff members who will lead the hospital's future projects. At the same time, O'Brien's title changed to "vice president of performance excellence and program support."

In O'Brien's words, "The purpose is to begin the transition from PEX being a project-based initiative in a single department into a hospital-wide standardized approach to process and service excellence that will become a cornerstone of KGH organizational culture. We ultimately expect to have staff in all departments and programs continuously seek the 'one best way' of providing service and care through involvement and training in PEX."

Approximately 40 staff members have had extensive hands-on training and practical application, including time on a dedicated PEX team. More than 400 staff members have had some level of PEX training and involvement in initiatives undertaken in their departments. In February of 2008, more than 50 directors and managers from across Kingston General and some of its sister sites attended full-day training sessions that focused on lean fundamentals, change management, and key elements of managing in a lean environment.

Multiple assessments have been performed around the hospital to identify opportunities for additional projects, as the ongoing process for project selection and prioritization continues to be refined. A clear sign that momentum is building is that the challenge now is in prioritizing all of the requests from people saying, "I want to go next!" Beyond the clinical services and direct patient care processes, support organizations such as Maintenance, Finance, Volunteer Services, and the Laundry are lobbying for lean projects.

To try to accelerate the process, simultaneous projects were recently undertaken in both the pharmacy and diagnostic imaging services. The pharmacy was expecting a significant increase in volume due to expansion of the unit dose drug distribution system to pediatrics, neonatology,

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attached to every cart to aid in stocking. Complaints related to missing anesthesia items have been eliminated. Dr. John Cain, chief of anesthesiology, thanked the team for all that was accomplished, and made a plea to the rest of the leadership that they must find a way to continue driving these kinds of improvements.

Going enterprise-wide. During the course of the OR project, efforts to institute an enterprise-wide deployment strategy were initiated. The entire executive team attended lean funda-

and acute mental health inpatient units. They were also concerned about the significant number of unit dose medications returned from the inpatient units (approximately one-third) to the pharmacy. The initial project has reduced returns by 20%—by reducing the amount of "as required" medications dispensed—and identifying ways to absorb the new demand with a less-costly renovation of existing space.

Imaging services was frequently on the receiving end of heated calls blaming them for patients being delayed in the

emergency department, for OR case cancellations, and for preventing in-patients from being discharged promptly. What they discovered was somewhat surprising to many. The primary opportunities for improvement had very little

Everything surrounds the patient. We just have to keep bringing everybody back to that.” Beyond that, she believes it provides an unusual developmental opportunity for staff members.

Department	Measure	Improvement
Laboratory	Floor Space Freed	1300 ft ²
	Capacity	30%
	Turnaround Time	25%
Central Processing and Supply	Instrument Tray Processing Time	54%
	Floor Space Freed	740 ft ²
	Labor Productivity	16%
	Training Time for New Employees	50%
Operating Rooms	Room Turnover Time	44%
	Elapsed Time from Case End to Delivery of Instruments to CPS	50%
Pharmacy	Returned Medications	20%

Summary of improvements resulting from implementation of lean practices.

to do with the technologists and scanning processes and more to do with the practices of the radiologists. Improvements already underway include improving standardization of the radiologist coding and reading processes, as well as improving everyone’s awareness of key departmental performance measures. Additional improvements have focused on an assortment of issues including patient transport, use of portable scans, and reception.

“It creates a better manager and director. Lean makes you look good,” says Karen Pearson, director of diagnostic imaging services, and one of Kingston General’s most enthusiastic lean champions. “It has probably been the most exciting event in my management career. This truly has changed how I think and work.” For Pearson, the keys are simple: “The focus is on the customer.

Along the journey, Kingston General has continued to learn. Keeping with the idea of continuous improvement, each project still closes with a review of lessons that should be applied to the next project. A few of the key points include:

- The absolute necessity for local management to own the projects and improvements,
- The value of dedicating staff time to solving the problems that no one has time to solve,
- Diverse teams including unbiased outsiders are necessary to truly question tradition, and,
- Although a lot of what has been done seems like common sense, managing change is incredibly difficult.

The Laboratory and Central Processing Services have both continued to be inspirations to the organization, following their initial projects with a myriad of continuous improvements. These range from smaller formal projects to the simple “daily

kaizen” stemming from reinvigorated employee suggestions. In CPS, Wallis has a slightly different attitude that is beginning to reflect the organization’s overall cultural change. He still says “we are great” but he now follows it with “and we can be so much better.” And two years after they first started, the laboratory that was foreseeing impending doom has maintained its performance gains and found the ability to continue to strive for improvement.

With sustained success and new lean initiatives, Kingston General Hospital will continue to be motivated by its PEx motto: “Everything we do takes us closer to achieving unquestionable quality and best practice outcomes.” With that mindset, Kingston General Hospital will continue to use lean principles to make improvements that benefit the patients, the employees, and the long-term outlook for the hospital itself. **改善**

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