An academic medical center is practicing “wasteology” to pare time, expense, and hassle from its OR processes. Using lean thinking, the center is streamlining its operations to get more cases done and improve service to patients, physicians, and staff.

The University of Washington Medical Center (UWMC) in Seattle has applied lean thinking and rapid process improvement (RPI) over the past 2 years in its 14-room main OR and 11-room outpatient surgery center.

A few of the innovations:
• a “block doc,” an attending anesthesiologist with a resident and RN dedicated to starting nerve blocks in the preop holding area
• an OR script that maps each team member’s activities for cases
• a green card signaling when a patient in the holding area is ready to go to the OR
• A time-saving anesthesia drug distribution process.

UWMC has made an investment in lean thinking, lending resources and executive support. Some 200 people are involved. The project manager, Mike Alotis, MHA, recruited after 14 years as director of radiology, teaches lean thinking and facilitates the projects. To get up to speed on lean, he and about 10 others attended a 5-day workshop for a fee of about $2,000 each.

“We try to use lean principles in everything we do,” Alotis says.

Lean drives UWMC’s Surgical Improvement Project (SIP) chartered in January 2005 with executive sponsorship. Five SIP teams were chartered to analyze the surgical process and make recommendations for improvement. Each team reported monthly to an oversight committee of medical center leaders, surgeons, nurses, and managers.

Physicians must be active participants, Alotis notes.

“If you don’t have them, you might as well not do it, especially in the OR.”

Tackling nonoperative time

One recommendation was to charter an RPI team to reduce nonoperative time (NOT), defined as the time from closing the incision on one patient to incision on the next patient. The essence of RPI is a week-long workshop that brings key team members together for a rapid QI cycle that strives not for perfection on the far horizon but 50% improvement today.

“A 50% improvement is a lot easier to come by than sitting around for months trying to make something perfect because it’s not going to be perfect anyway,” Alotis says. “It’s also crucial to involve individuals who are the stakeholders who will have ownership of the improvements.”

A successful RPI workshop takes about 6 weeks of planning by the facilitator to do an assessment and gather data that gives the team a foundation to work from. Teamwork training is also essential. Alotis says, “We go through quite a bit on how people relate to each other, including responsiveness and assertiveness, to help people understand that everyone on the team is different and has different strengths.”

A team from thoracic surgery volunteered for the NOT RPI. The aim was to free enough time to add more cases, increase billable hours, and save wear and tear on the OR team.

The team had 6 members: a surgeon, anesthesiologist, scrub nurse, circulating
nurse, anesthesia technician, and hospital assistant. Their expectations were to:

- reduce NOT per case by 20%
- implement standard work methods and work balance
- engage staff in the turnover process.

By mid-2006, the thoracic project had:

- reduced NOT by 13%, or an average of about 14 minutes per case
- reduced turnover time by 50%
- reduced the average distance traveled by the OR team per case by 46%, from 2.4 to 1.3 miles (illustration).

The result: More thoracic cases are being completed within the regular workday.

As other specialties adopted lean strategies, the main OR as a whole saw NOT decline by 12% to 15% and turnover time reduced by 19% as of October 2006.

Because lean is a way of life, teams keep working to improve their record.

Walking in someone else’s shoes

A key step in RPI is flow-charting the process, called “value streaming” in lean.

First, each person takes time to walk in another team member’s shoes in an exercise called the “process walk.” This gives a clearer picture of the process than simply brainstorming in a conference room.

For the NOT RPI, 1 of the 2 thoracic teams scheduled a week with no clinical activities. During that week, the team spent 1 day following the second team through their turnover activities. Each member followed a person with a different role to bring a fresh perspective.

“The surgeon followed the scrub nurse and was blown away by everything she had to do between cases,” Alotis says.

The team then mapped the process on a wall using sticky notes. From this, they drew a process map for OR 12—and learned a typical thoracic case had 66 steps in the turnover process.

They also looked at “work balance” during the turnover process to see how many minutes each team member spent getting ready for the next case. The analysis showed the circulator, scrub, and anesthesia provider doing most of the work between cases. By redistributing some of the work and using parallel processing during the last hour of the first cases, they dramatically reduced NOT.

The “wasteology” of NOT

The team then began looking at where they could eliminate waste—defined in lean as “any activity that does not add value to the final product.”

The process walk found wasted movement:

- The anesthesia technician made 7 trips in and out of OR 12.
- The circulating RN made several trips looking for equipment.
- Time was spent assessing which lines were which.
- Time was taken searching for information in the patient record.

Next they plotted out the NOT activities. They divided a conference table in half with red tape. On one side, they placed all steps that currently took place before the end of a case and on the other, steps that happened after the case.

Examples of waste identified:

- anesthesia provider not seeing the next patient until the previous case is completed
- waiting for the resident prior to induction
- waiting for the attending surgeon
- searching for equipment and patient data
- time applying monitoring devices to patient
- patient x-rays not available.

Where are the opportunities?

After mapping activities, they looked for opportunities to create a leaner process and developed an implementation plan.
Lean thinking at the University of Washington

Activities were mapped out on sticky notes. Each color represents a different team member.

Before: A process map shows the typical thoracic case had 66 steps in the turnover process, and team members walked a total of 2.4 miles.

After: During the RPI project, the number of steps and distance walked were reduced by 46%.

Standardized procedures were developed so hospital assistants would become part of the whole case process.

Standard places for all equipment were determined.
### Summary of project to reduce nonoperative time

<table>
<thead>
<tr>
<th></th>
<th>Current</th>
<th>After</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of steps</td>
<td>66</td>
<td>10 (External) 47 (Internal)</td>
<td>15% reduction</td>
</tr>
<tr>
<td>Total process time</td>
<td>1:30 all cases</td>
<td>Trial 1: 50 (0 delay) Trial 2: 63 (30 delay) Trial 3: 55 (25 delay) Trial 4: 58 (28 delay)</td>
<td>50% achievable</td>
</tr>
<tr>
<td>Distance</td>
<td>12,626 ft 2.4 miles</td>
<td>1.3 miles</td>
<td>46% reduction</td>
</tr>
</tbody>
</table>

Note: Trials were timings of nonoperative time.  
Source: University of Washington Medical Center.

Some opportunities:
- Develop parallel processing to perform some tasks in tandem that are ordinarily performed in a series.
- Finish lines and nerve blocks in the holding area before the previous case is completed.
- Collect and organize extra items for the next case during the current case.
- Standardize the process for attaching the patient to monitors.
- Standardize the process for extubation of patients.
- Find a home for patient charts and forms.
- Make hospital assistants part of the entire case process.

**Implementing improvements**

From the opportunities came innovations, which the OR is implementing:
- The new “block doc” concept, with a savings of up to 30 minutes between cases (sidebar).
- A “top 10” list spurs competition between teams to save on turnover time (sidebar).
- As part of parallel processing, before the case ends, the scrub person places soiled...
instruments in the case cart and takes the cart back to sterile processing. (In certain situations, the scrub does not leave early in case the surgeon may need to reopen the patient.)

- Whenever possible, the circulating nurse goes to see the next patient before the case is over. Circulating functions for the rest of the case are assumed by another RN (team leader or the nurse who gives breaks).
- To expedite getting anesthesia drugs for the next case, locked anesthesia carts are now placed outside each 2 ORs with drug trays for all of the day’s cases for those rooms. Previously, anesthesia techs, nurses, or anesthesiologists lined up at the pharmacy to get drugs for each case, which could take 10 minutes. A narcotic lock box is being developed so an anesthesia provider can have all drugs at the beginning of the day, which will also save time between cases.
- An OR script outlines each team member’s role for the first case of the day, with activities to accomplish the day before surgery, by 6:45 am, 7:05 am, 7:20 am, and so forth until the 8:00 am start time.
- A green card outside the patient’s bay in the holding area indicates the patient is ready to go to the OR. The green card must be visible before the anesthesiologist starts sedation.

Measures and audits
A monthly report tracks the progress of the Surgical Improvement Project, tracking metrics such as:
- nonoperative time
- average turnover time
- percentage of turnovers below 30 minutes
- percentage of patients arriving in main preop area by 6:45 am, anesthesia providers in preop area by 6:45 am, patients in room by 7:20 am, surgeons in room by 7:30 am, anesthesia ready by 7:45 am, and on-time case starts.

“The real philosophy behind the spirit of improvement is to use our minds first and not our money, though sometimes you have to use the money, too,” Alotis says. “You have to challenge current thinking and not just look to the top leaders but leaders at every level. The people who are the experts are the frontline nurses, techs, and physicians.”

Sample tools for lean and RPI are in the OR Manager Toolbox at www.ormanager.com.

Lean principles

What is Lean?
Lean production, pioneered by Toyota, is based on the principle that small, incremental changes routinely applied and sustained over a long period result in significant improvements.

What is rapid process improvement?
RPI is an approach for bringing together a team that is knowledgeable about a process to learn tools and techniques to:
- search for and eliminate waste
- reduce time throughout an entire process
- reduce cost
- apply the improvements in the workplace and refine and sustain them.

Principles of Lean
In their 1996 book, *Lean Thinking*, James P. Womack and Daniel T. Jones defined a set of 5 basic principles that characterize a lean enterprise:
1. Specify value from the standpoint of the end customer by product family.
2. Identify all the steps in the value stream for each product family, eliminating every step and every action and every practice that does not create value.
3. Make the remaining value-creating steps occur in a tight and integrated sequence so the product will flow smoothly toward the customer.
4. As flow is introduced, let customers pull value from the next upstream activity.
5. As these steps lead to greater transparency, enabling managers and teams to eliminate further waste, pursue perfection through continuous improvement.


‘Block doc’ helps OR time, length of stay

In a new concept at the University of Washington, an anesthesiologist is assigned as the “block doc” in the preop holding area each day. The “block doc,” assisted by a resident and a nurse, starts regional nerve blocks for patients.

The selling point for the position was not only a savings in OR turnover time but also a reduced length of stay for orthopedic patients. The hospital’s data showed a 1.4-day savings in length of stay for orthopedic patients having regional nerve blocks.

Performing the blocks in the holding area is also expected to reduce the number of blocks given after surgery in the postanesthesia care unit, reducing stays for the PACU as well.

Top 10 teams

Each week, reports are run listing turnover times for the previous week’s cases from shortest to longest. The 10 teams with the shortest times are identified. The list is posted and e-mailed throughout the department.

Teams who have gone through RPI training tend to see themselves on the list more frequently than those who haven’t.

“As soon as we worked with urology and OB/GYN, those guys rocketed to the top,” says Mike Alotis, manager of the Surgical Improvement Project. “They had a 17% and 18% improvement. And it was no mistake that those were the groups with most surgeons participating in RPI.”

Alotis says that as soon he started sending out the top 10 list, surgeons started calling him, saying, “I want my group to go through your session.”

Lean resources

Books

The companion to the bestseller, The Toyota Way, provides practical examples for bringing Toyota’s practices to any organization.


The revised and updated edition of the classic book from those who developed the value-based system for American business based on the Toyota model.

Website
Basics on lean and other resources from the Lean Enterprise Institute. www.lean.org/WhatsLean/