

## **Auto Industry Techniques Translate To Boost Teamwork In The OR**

For a year-and-a-half, the University of Michigan Health System turned one of its head and neck surgery practices into a laboratory. The goal: to see if 'lean thinking' techniques pioneered by the auto industry could be applied to the operating room in ways that simultaneously improved service for patients as well as overall efficiency. The answer was a resounding, "Yes."

Turnaround time between surgeries fell by more than 20 percent, while measurements of morale, teamwork and effective problem solving rose. The number of cases finishing after 5 p.m., which requires paying costly overtime, was cut in half. "The efficiencies should not only enable us to reduce waiting times for patients scheduled to have elective procedures, but our results showed staff from scrub nurses to anesthesiologists are more empowered and teamwork has risen to new heights," says surgeon Carol Bradford, M.D., chair of the U-M's Department of Otolaryngology and the study's senior author.

"Extrapolating our results from one two-day-a-week surgical practice to U-M's 35 operating rooms, we calculated that lean thinking might be able to create as many as 6,500 hours of new capacity to treat patients each year -- which has the potential to provide cost savings from reducing waste to generate new revenue." The findings will be published in the June issue of the *Journal of the American College of Surgeons*. Meanwhile, surgical residents reported the changes didn't limit their training. Instead, the authors note, working in a lean environment provides an opportunity for them to carry experience with the practices to new institutions after their residency.

The lean study was the first of its kind to be implemented in an otolaryngology operating room at an academic health center. Representatives from each OR job mapped out their normal workflow, identified critical junctures in the process and worked to find root causes for valueless work - known as muda in the lean literature, an adaptation of a Japanese term. Then over a nine-month period, the researchers measured operating room turnover time (the time between the departure of one patient and the arrival of the next patient) and turnaround time (the time between the final dressing on one patient and the first incision on the subsequent patient). This provided a baseline by which to judge future changes.

Next came a three-month "observer effect period" during which staff were made aware that their efficiency was being measured, but before any lean changes were made. This allowed the researchers to determine whether monitoring alone would alter staff efficiency. Equipped with clipboards and stopwatches, the observers weren't actually collecting data, but were there to reinforce to operating room

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employees that their performance was under scrutiny. As it turned out, the observers had almost no impact. The mean baseline turnover time was 38.4 minutes. With the observers present, it was 38.3 minutes. Turnaround time rose slightly from 89.5 minutes to 92.5 minutes.

After the lean changes were implemented, a significant improvement was seen in both measurements. Turnover time fell by nearly one-third to 29 minutes while turnaround time dropped by 20 percent to 69 minutes. "What is really interesting and important is that the amount of time devoted to performing the actual surgery remained almost unchanged," says lead author Ryan M. Collar, M.D. "The efficiencies we found were in other areas."

For example, Collar explains, staff identified a wasteful delay between prepping the OR for the next patient and transporting them there. "We found it made more sense to do preparation and transport at the same time, rather than waiting for one to be done before starting the other," Collar continues. Similarly, the study found time could be saved by sending automated pages to janitorial staff when the dressing was being applied to a patient after surgery so that a cleaning crew would be available as soon as the patient left.

The researchers measured staff morale, their feelings of support and thoughts about problem solving on a five-point scale before and after the lean implementation. Progress was made in every category, with the composite score rising from 2.93 to 3.61 – an improvement of more than 20 percent. "This makes sense because lean thinking abandons top-down thinking and emphasizes the perspectives of those closest to the work when re-thinking and improving the workflow," says co-author John Billi, M.D., U-M associate vice president for medical affairs and U-M Medical School associate dean for clinical affairs.

There was no evidence that focusing on efficiency reduced the value of training for medical residents. Thirteen surgical residents were surveyed before and after lean implementation and their scores remained virtually unchanged. The authors note that while the effects on lean thinking on the surgical practice of one head and neck surgeon were substantial, surgical practices vary greatly and understanding the gains that might be realized by from broader implementation will require further study.

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