An engineer’s eye on turnover time

Airl ine pilots and race pit crews bring new perspectives to OR throughput, so why not engineers? With the help of a University of Southern California (USC) Daniel J. Epstein Department of Industrial and Systems project, turnover time in 3 California hospitals dropped by an average of 9 minutes, or 21%. The California HealthCare Foundation funded the project.

“We can do more patients per month,” says Louise O’Rourke, RN, nurse manager of perioperative services at Riverside County Regional Medical Center (RCRMC), which has 10 ORs and an annual patient volume of 8,824, and reduced its turnover time from 49 to 39 minutes.

From January to July 2008, David Belson, PhD, a professor at USC, and his students worked with RCRMC, Children’s Hospital of Los Angeles, and Ventura County Medical Center (VCMC) to improve patient flow.

A fresh perspective

Turnover time is only one aspect of throughput, and it’s easy to place too much emphasis on it. Belson advocates a broad view, saying, “The effect of turnover time is more than just the arithmetic of the time between cases.”

The OR has categories of personnel and scheduling issues that have to be managed, such as cases added to the schedule, changes in the sequence of cases, backlogs of cases, and the effect of overtime and pay formulas.

Probably the most important variable is the pace of the workflow, which Belson says is difficult to quantify.

“An easy-to-quantify and obvious metric is turnover time,” says Belson. “It’s been my observation in about a dozen hospitals that turnover time is a good proxy for the pace of work. Thus, if you improve the turnover time, you probably improve throughput.”

The engineers collaborated with the hospital staff to examine throughput. “We are efficiency experts,” says Belson, who has worked with companies such as Toyota and whose research focuses on health care process improvement.

The engineers helped bring a fresh perspective.

“It was invigorating to have a different viewpoint,” says Daniel Ludi, MD, chair of surgery at RCRMC. “They brought a naïveté to the process, and their energy inspired change.”

Into the OR

Engineers donned scrubs and spent time in the OR observing processes. “The engineers walked through the layout to see how the patient progresses from point A to point B to point C to get an idea of the system,” says Brad Ditto, RN, clinical nurse manager of surgical services at VCMC, which has 5 ORs and an annual case volume of 5,500.
Ditto says for him the reasons for the study were threefold: to add more cases, to decrease overtime if more cases weren’t added, and to heighten awareness of staff about how their turnover time compared to that of other hospitals.

“Our weekly caseload has picked up slightly, and our overtime is noticeably down from before the study,” he says. “Everyone seems more aware of the need for efficiency, so our turnover times continue to be down from where they were before the study began.”

**Engineers’ suggestions**

The engineers developed specific suggestions. For example, VCMC’s preoperative area is not close to the OR, and the preop holding area holds only 4 patients for a 5-room OR. The engineers suggested caring for the fifth patient in the postanesthesia care unit instead of the preoperative area, which improved patient flow.

Engineers directly observed in the OR rooms. For privacy reasons, they left when the patient was brought into the room and returned only when the patient left. Through observation and hospital information systems, the engineers collected and analyzed data.

“They broke down turnover time in detail such as doctors, specialties, and types of procedures,” says Ditto. The engineers then looked at factors affecting throughput, such as when outpatients arrived at the hospital, on-time starts of first cases of the day, cleaning the room between cases, and add-on and emergent cases, to identify trends.

**Devising solutions with surgeons**

The hospitals had work to do, too. “We had to flow-diagram everything from mopping the floor to when the surgeon arrived. The process was enlightening,” says David Ninan, DO, chair of the anesthesiology department at RCRMC. The engineers even counted the number of steps people had to take for certain actions.

Having data to present to surgeons was invaluable, says Ditto. “It takes all the emotional aspects out of it.” He found surgeons often didn’t realize how they affected turnover time. Once they knew, Ditto could work with them to devise solutions. An example is to have a surgeon who simply can’t arrive on time for the first case of the day change his surgical schedule.

Staff had their own reactions. When they learned their turnover time was higher than they thought, “it bruised their pride a bit,” says Ditto, motivating them to improve.

Engineers in the OR produced a Hawthorne effect at VCMC.

“No one wants to look bad when you are being observed, so staff picked things up a bit,” says Ditto.

Achieving better turnover time primarily came through better scheduling, housekeeping services, and staff communication.

**Optimal schedule**

Belson’s team used computer models, including a mixed integer programming model, to analyze data on OR demand for different specialties and OR times to determine optimal scheduling.

“This approach is used by airlines and the petroleum industry to find the best possible way to schedule things,” says Belson, who stresses the need to develop a realistic and accurate OR schedule.
He also advises managers to determine their true utilization, noting that hospitals often think it’s higher than it actually is. The effort is worthwhile, as OR managers know. As Belson says, “If you don’t keep an OR busy all day, you’re throwing away a lot of money.”

**Housekeeping on deck**

Ditto says housekeeping personnel are now in better contact with the charge nurse so they can determine workload and schedule breaks appropriately. The change brought a side benefit. “They stepped up to the plate,” says Ditto. “They got accolades and took more pride in what they did.”

At RCRMC, the ability to time how long it took to clean a room gave the team data needed to add an additional housekeeping staff member.

“When we have the numbers we can say, ‘Yes, that makes sense.’ The focus on the data was helpful,” says Dr Ludi.

**Communication**

“Engineers stressed communication, which everyone knows about, but it’s easy to forget,” says Ditto.

Dr Ludi says RCRMC is adding preoperative briefings and postoperative debriefings in response to the engineers’ feedback. Briefings can reduce OR delays. According to a study from Johns Hopkins University School of Medicine, a 2-minute preop briefing reduced unexpected operative delays by 31%. Another change is that “after the patient is asleep, everyone uses first names to promote a team approach.”

O’Rourke adds that the team worked on how to use different modes of communication more effectively. Those participating in the project received cell phones and 2-way pagers.

The charge nurse plays a pivotal role, says Belson, and needs to be aware of each patient’s status in the OR. “You can use walkie-talkies, a whiteboard, video monitors, or computerized patient tracking systems.”

**Translation, please**

In some ways, the engineers’ lack of health care training was a bonus. “To look at our OR through the eyes of someone who doesn’t understand the process was a breath of fresh air and renewed our commitment,” says O’Rourke, who emphasizes the need to set expectations. “It was very important in the beginning that everyone knew there wouldn’t be finger pointing or blaming.”

In addition to Dr Ninan and Dr Ludi, the team included Jill Stewart, RN, assistant nurse manager; Susan Rand, DSc, patient safety/compliance officer; and Luis Orozco, LCSW, MSW, assistant hospital administrator.

**Bridging 2 worlds**

On the other hand, the engineers’ lack of a health care background brought its own challenges.

“They didn’t understand medical procedures, how in-depth procedures can be and how invasive,” says O’Rourke, adding, “We take it for granted. If we went into their world, we wouldn’t understand their language either.”

Some problems were easily corrected. For example, engineers had to be told that the hospital defined turnover time as beginning when the patient, not the surgeon, left the room.

Other differences went deeper.

“They were unaware of how many factors affect the care of the patient—the
appointment, the arrival of the patient, a code on the floor, the admitting process; all those details,” says O’Rourke.

Working in a public care facility such as VCMC meant even more issues. “Our patients have a lot of problems with rides and getting labs done,” says Ditto. “They [the engineers] didn’t look at some of the inherent problems we have.”

Ditto, whose facility was built 50 years ago, cites the example of the engineers wanting to turn an area into a preop holding area. “They didn’t understand that it’s not that simple,” he says. However, he plans to keep their suggestions in mind if more space or a new hospital is available in the future.

“I thought they were terrific,” adds Ditto. “We butted heads a few times, which is good. They validated information we try to give doctors. It’s another way of presenting the information, because they were independent auditors.”

Do it again?

Those interviewed said they found the experience valuable and would invite engineers into their OR again.

“We want to see where we are,” says Dr. Ludi. “It helped us to look inside [our processes].”

If you’re interested in an engineer’s take on your OR, Belson recommends contacting larger universities, which likely have an industrial engineering or systems engineering department. Fewer than 10 such schools currently focus on health care. But, he says, “Health care is a hot topic these days, and it’s going to get hotter. Engineering schools are looking at how to get involved in health care, so schools would probably be receptive.”

If that’s not an option, he suggests using manufacturing-based training programs such as The Toyota Way (Lean manufacturing) to promote process improvement.

Of course, improving throughput is an ongoing effort, with or without engineers. “It’s not just turnover time,” says Dr Ninan. “It’s a constant process that we’re always working on.”

—Cynthia Saver, RN, MS

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