



*It's time to take the
Toyota Production System
into operating rooms*



BY TIMOTHY STANSFIELD AND JOSHUA MANUEL

THE MEDICAL INDUSTRY CAN LEARN A GREAT DEAL FROM automotive manufacturing history. Specifically, there are many tools used in automotive engineering that can cross over and be useful in the medical industry. In order to demonstrate how a proactive approach is beneficial to the medical industry, a specific case study has been selected. This case study targeted a common specific measurable that is used in every hospital throughout the industry: surgery first case on-time starts. Improvements in this metric will ultimately lead to higher operating room utilization, higher profits, lower overtime costs and improved morale among the surgical staff, as well as enhanced customer satisfaction.

This article describes an IE firm's work with an Ohio-based medical center to improve first case on-time start performance in the main operating rooms. To attain significant improvement, three aspects of the surgical preparation process needed to be observed, measured, optimized, redesigned and implemented. The three contributing factors for punctuality in the pre-operation area depend on the patient, the provider and information flow. Bottom line results were the product of using industrial engineering principles to improve this specific process.

The importance of surgery starting on time may seem fairly obvious, but the ramifications of a late start are detrimental to the hospital's bottom line. Consider how the following factors would be affected:

- Patient satisfaction: Decrease probability of future business from future operations.
- Operating room utilization: Empty rooms equal lower profits.
- Overtime requirements: Longer hours from shifted schedules equal higher costs.
- Staff morale: Long hours and inconsistency yield employee turnover.

In an ideal situation where the number of surgeries scheduled is growing at a significant rate, poor performance in first case on-time start for surgeries is even more detrimental. During times of growth, operating room utilization becomes a premium and any loss of this asset is equivalent to lost revenue. Where some margin for error could be made up at the end of the day after normal business hours, there is no longer such a grace period.

It should be clear that improving the performance of first case on-time start for surgeries will positively influence the bottom line. Higher operating room utilization coupled with decreased overtime requirements and reduction of new employee training all lead to higher profit margins.

Defining the problem

A five-week study of the pre-operative surgery area was conducted at a local hospital to identify the reasons for patients being taken back to surgery late. To ensure the data collection was completely unbiased, a third-party representative was appointed to make observations. Each morning this representative would visit the pre-op area and observe all of the activities as they related to preparing the patient for surgery. Information such as pre-op room number, operation room number, scheduled surgery start time, the time the patient was taken into surgery, surgeon name, clinic represented, pre-op nurse name, patient arrival time, the time when the paperwork was completed, the time of pre-op surgeon visit, the time of anesthesiologist visit, the time of resident visit, the time of local block performed and the time of special procedure performed were recorded.

Each of these activities was recorded for every first case start. If the patient was taken back more than five minutes after the scheduled time, the case was considered a late start. At that

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point, the third-party representative would begin to investigate, if it was not already obvious, why the surgery was going to start late. Primary and secondary reasons were recorded for each late start case, along with how late the surgery actually started.

Results from this study showed that 34.7 percent of the late cases were due to the surgeon not arriving early enough to perform the required tasks prior to the scheduled start time. Anesthesiologists were responsible for 17.3 percent of the late cases for the same reason. It was determined that 8 percent were patient related, 6.7 percent were operating room nurse related, 6.7 percent were due to lack of surgeon availability and the remaining reasons included incomplete paperwork and scheduling problems.

Conventional wisdom would dictate that the solution is simply to have the doctors show up on time and everything should run smoothly. Perhaps that is true for a percentage of the instances, but not for every case. The data showed that certain surgeons from specific clinics consistently outperformed the majority. This reveals that there is a process that works and that starting on time is not an unreachable target. Further analysis of the process for scheduling surgery was deemed necessary.

Analyzing the situation

Letting data drive the design, every aspect of the surgery-scheduling process was recorded onto a single document called a process record. To gain the knowledge required to create this document, a series of interviews with all of the key resources from every applicable department were conducted. During the interviews, the key resources were asked to explain their responsibilities as they related to scheduling surgery. Information flow and patient flow were the integral pieces of information collected during the interview sessions.

Since the key resources are the subject experts in their respective areas, they were asked for any ideas they thought might improve either the quality or the speed of the information flow. These ideas were discussed on an individual basis and in group discussions during workshops. Not all of the ideas were feasible; however, they all were representative of an area that could be improved.

The cumulative knowledge gained from the key resources was consolidated and mapped onto the process record. Since the surgery-scheduling process is immensely complex, there were several branches on the process record that would otherwise be too difficult to comprehend. For processes such as this one, the process record is the perfect tool to look at information flow from a high level and see where there are opportunities for improvement. After waste reduction and quality improvements

were performed, a more simplified process was proposed.

Standardizing the process

During the interview process at the clinic level, it quickly became apparent that there is no set way to schedule a surgery. Not only did the process vary from clinic to clinic, but even within the same clinic the process would vary from doctor to doctor.

One example of incongruence was the surgery scheduling form that is required to be filled out for all requests for surgery. For some doctors, the form is filled out completely by the medical assistant and for others it is partially filled out by the resident. Some doctors would require the form be signed prior to being forwarded to the scheduling department, while other doctors would sign the form after it had already been forwarded.

Think of the keyboard that you use on your personal computer or at work. What if every computer manufacturer randomly put the letters on the keyboard where it was most comfortable for them on that day? Productivity around the world would dip dramatically because people would have to use the hunt-and-peck method for each letter that they typed. Standardization is the reason the letter Q always sits in the upper left spot on the keyboard. Since everyone that types knows where to find each letter without looking, the speed and quality of typing is at its best.

Taking the same approach, it should be obvious that all of the variations in the surgery-scheduling process do not lead to a robust process of information flow. Not only does this type of environment promote mistakes, but the special treatment leads to morale issues among the staff.

The single greatest way to control a process is to standardize that process. Standardization creates results that can be measured and tracked to specific performance goals ensuring that continuous improvement progresses. Standardization also improves quality by eliminating variance. When an issue does arise, it can be pinpointed accurately and handled in a timely manner.

Improving the tools

During the waste reduction process while analyzing the process records, there was one area that stood out. The information exchange between the clinic and the scheduling department was performed via fax. There were three major problems with this process. First, the faxing process is inefficient. Second, the faxing process is error-prone, which may allow quality defects. Lost requests caused process delays and rework, while illegible requests also caused rework or defects. Last, this process is not economic when the cost of ink and paper is calculated.

To simplify the process and eliminate rework and defects,

an electronic scheduling request system was proposed. This would solve the issue of illegible handwriting by eliminating it. Electronic receipts could be generated to ensure that requests were not lost and the turnaround time for confirmation would improve dramatically by reducing rework.

During the brainstorming workshops held with key resources from all of the clinics, there was a theme that surfaced in each meeting. At issue was the patient's inability to show up prepared, on time and at the right location for surgery. One tool that was created was a "patient information packet." This packet will be distributed in the clinic to each patient that is going to be scheduled for surgery. In this packet there will be educational material on their upcoming surgery, food and medication instructions for the day before surgery, directions to the correct check-in station with a detailed map and a contact list if they have questions.

A significant reason that surgeries were starting late during the study was not starting soon enough to finish the work required before the scheduled start time. This statement is not clear enough on its own. That is, "soon enough" does not define a specific time for the key resources to begin their work. This is most likely how the issue of tardiness began; there was not a clear definition for when to start the required work.

Currently in the pre-op area, there is a checklist of required work that must be completed prior to moving the patient into the operation room. This is a good idea, but it is not a complete idea. In order for this checklist to be relevant, there should be a timeline associated with the tasks. Without assigning a window of time for each key resource to perform its part of the patient's care, it is possible that two or more key resources may arrive at the patient's bedside at the same time causing delay, confusion and, ultimately, a higher potential for a late start.

In the interest of time and optimal patient care, a standardized pre-op checklist was organized so that all of the required tasks are performed in a chronological order. Each task was separated along a time scale that specifically designated a time period for each key resource to perform the required tasks. In theory, by following the timelined pre-op checklist, an on-time start for surgery is guaranteed under normal circumstances.

Full integration of the chronological pre-op checklist needs to be coordinated with the surgery scheduling department to ensure key resources are distributed properly to fulfill all of the patient's needs. As expected, this quickly becomes a complex issue and one that is being tackled at the medical center to strive toward customer satisfaction.

Incentives for surgeons

Statistically, the largest contributor to late surgery starts

were surgeons not showing up early enough to complete the required tasks prior to the scheduled start time. It is essential that this metric move in a positive direction with so much opportunity for improvement at stake. The most direct approach to eliminating late starts in the OR is to revoke low-performing surgeons' permission to schedule surgery during the morning start times by instituting an incentivized block scheduling system.

The proposed system states that only high-performing surgeons, those whose on-time start percentage is above a certain target, are qualified for morning start times. Measuring results and defining expectations around this metric creates a work environment that best serves the patient's needs. Implementation of this system, however, does create concern from the surgeon's perspective. Specifically, the culture must change, which traditionally does not happen quickly or easily. This step of the improvement process has yet to be implemented, but is being worked through as the value is too great to ignore.

Moving forward with all of the proposals, implementation plans for the prescribed improvements are underway. It is expected that the surgery first case on-time start percentage will double and reach unprecedented heights in the medical industry.

From that point, the hospital that is able to make continuous improvement will become the benchmark for the industry, similar to Toyota in the automotive industry. Staying ahead of the curve will create customer loyalty and higher profit margins. There is a requirement for reformation in the health care industry and significant change is just around the corner. The question is whether an organization desires to lead this reformation or spend the next generation struggling in a competitive chase. We can expect vital health care reformation through a systematic engineered approach, using the tools of lean, Six Sigma, process mapping, teamwork, measurement, goal-setting, feedback and many other necessary enablers of analysis, redesign and significant change. ❖

Timothy Stansfield is president of Industrial Engineering Technologies Inc. (IET) in Toledo, Ohio. He has more than 20 years of manufacturing and management consulting experience in more than 1,000 manufacturing plants and health care organizations.

Joshua Manuel is industrial engineering supervisor of IET. He holds a B.S. in industrial engineering and has led process improvement projects at numerous hospitals, nursing facilities, health care administrative operations and universities.