How Does TeamSTEPPS Affect Operating Room Efficiency?

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Abstract

Objective. To evaluate the effect of TeamSTEPPS (Team Strategies and Tools to Enhance Performance and Patient Safety) on operating room efficiency for the otolaryngology service at a tertiary care medical center.

Study Design. Retrospective database review.

Setting. Otolaryngology department at tertiary care medical center.

Subjects and Methods. To assess the impact of implementing an evidence-based patient safety initiative, TeamSTEPPS, on operating room efficiency in the otolaryngology department, the operative times, time lost to delayed starts, and turnover times during the year following the implementation of TeamSTEPPS were compared with the values from the prior year.

Results. The study compared 1322 cases and 644 turnovers in the year prior to TeamSTEPPS implementation with 1609 cases and 769 turnovers in the following year. There were no statistically significant decreases in operating room efficiency in the year after the TeamSTEPPS rollout.

Conclusion. Operating room efficiency was preserved after the rollout of a rigorous evidence-based patient safety initiative that requires active participation from all operating room team members.

Keywords

TeamSTEPPS, operating room efficiency, quality improvement

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The modern medical system seeks to optimize patient safety, quality, and experience, as there is increased focus placed on the disparate levels of cost and quality in the health care system.¹ The operating room (OR) is an area of this system under particular scrutiny because it is a high-stakes environment in terms of both risk for adverse events and high costs.²,³ In addition, 66% of all medical mistakes occur in ORs, and 54% of these mistakes are preventable.⁴ A growing body of research suggests that medical errors are primarily due to communication failures and ineffective leadership within surgical teams.⁵ This has led to the development and implementation of systems aimed at improving teamwork and communication within surgical teams.⁶

TeamSTEPPS (TS; Team Strategies and Tools to Enhance Performance and Patient Safety) is one such patient safety tool that was developed by the Department of Defense and the Agency for Healthcare Research and Quality and has been implemented across the nation. The program is based on 4 core competencies: leadership, situational monitoring, communication, and mutual support. The ultimate goal is to improve communication and teamwork among healthcare teams.⁷ The basis of TS in the OR is the preoperative briefing, which is analogous to a preflight checklist in the airline safety community.³ In each OR, a morning briefing is conducted 30 minutes prior to the start of the first case. The attending surgeon, attending anesthesiologist or nurse anesthetist, circulating nurse, and OR technician are all present for the briefing, lasting 5 to 10 minutes. Team members are introduced by name, and the topics typically covered are detailed in Figure 1. Additionally, a quick debrief is conducted at the end of each case to ensure correct instrument counts, clarify postoperative plan for the patient, and discuss ways in which the team could...

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operate more safely and effectively in the future. All team members are encouraged to provide feedback during the morning briefing and the postoperative debriefings; this is a central aspect of TS because it helps to eliminate rigid hierarchies that can be detrimental to patient safety. Nonphysician team members often have important observations that can positively affect patient safety, but rigid hierarchies in the OR traditionally would bar them from such communication.

Multiple authors have validated TS as an effective tool that increases patient safety, team member satisfaction, and communication, but few studies have examined its impact on the team’s efficiency. Though improved efficiency is not a primary goal of TS, it is important to understand how such a program influences OR efficiency given the ever-increasing demands on health care providers. A recent study conducted by the urology department at our institution showed significant improvements in OR efficiency after the implementation of TS. The goal of this study was to examine the changes in efficiency within the otolaryngology department at the same institution to evaluate whether changes attributed to TS are universal or variable between departments.

Methods
This study was exempt from Institutional Review Board review at the San Antonio Military Medical Center as a quality improvement and patient safety project. TS was implemented in ORs at our institution on November 13, 2013, after all OR personnel had been trained in the program using a series of didactic sessions. This study measured OR efficiency in the year preceding and the year following the implementation of TS. The goal of this study was to examine the changes in efficiency within the otolaryngology department at the same institution to evaluate whether changes attributed to TS are universal or variable between departments.

Team members manually time-stamp a variety of events during a case, including the time that the patient entered the room, the time that anesthesia turned the patient over to the surgeon, incision time, operating time, and the time that the patient left the OR.

Various time intervals were calculated from the anesthesia log for all the ENT cases to measure the team’s efficiency. “Surgeon time” is the interval from the surgeon’s first incision to the time that the surgeon completed the case. “Case time” spans the entire time that the patient was in the OR. “Turnover time” is the interval of cases logged from the time that the patient leaves the room to the time that the next patient enters the room. The “on-time first start rate” measures how often the OR day begins at the assigned time. An “on-time start” is defined as the patient entering the OR at or before the scheduled start time for the case, typically 7:30 AM. The turnover time data and delayed start data are recorded daily in the institution’s computerized OR log, kept by the circulating nurse. These intervals (with the exception of on-time first start data) were all measured for a year before (November 12, 2012, to November 12, 2013) and after (November 13, 2013, to November 13, 2014) TS was implemented. The first start data were measured for only the 6 months before (May 12, 2013, to November 12, 2013) and after (November 13, 2013, to May 13, 2014) TS began because of changes to the ENT service OR schedule that occurred in July 2014. To evaluate the statistical significance of these intervals before and after TS, the data were compared with a t test for the majority of the intervals, and a chi-square test was used for the percentage of on-time first case start data.

We began evaluating TS immediately after its implementation and did not allow for a “washout” interval while the health care team became acclimated to the program. We chose to start measuring efficiency changes immediately after implementation because the providers had completed extensive training before the program began, thereby obviating the need for an adjustment period. Furthermore we
believe that maintaining efficiency during the initial months after a TS rollout are essential to keeping team member “buy-in” for the program. Allowing for a washout interval would therefore have weakened the relevance of our conclusions. However, we did measure the efficiency intervals for the first 6 months after TS implementation separately as a check to examine whether there were differences in the intervals that could be attributed to washout.

Results
The study compared 1322 cases and 644 turnovers in the year prior to TS with 1609 cases and 769 turnovers in the year following the implementation of the program. Table 1 shows the OR efficiency data before and after the TS rollout. There was no statistically significant change in any of the efficiency metrics after the TS rollout. Table 2 shows the OR efficiency for the first 6 months after TS rollout, and these data show no major differences from the 1-year intervals.

Discussion
TS has been shown to improve patient safety by fostering better communication, teamwork, and leadership among OR personnel. Due to extraordinary operating costs, hospitals are financially motivated to minimize delays in the OR. Such motivation could cause hesitation in adopting TS, despite the growing body of literature that supports its utility in improving patient safety. Widespread adaptation of TS would be difficult if it caused significant delays in and around the OR; thus, it is important to consider the potential for decreases in efficiency before adapting new policies or procedures. Several other authors have suggested that TS could, in fact, improve surgical case times and decrease OR delays. One such study was conducted by the urology service at our institution, and it showed decreased mean case times within the department in the year following the implementation of TS. However, the study did not include data from other surgical services. To our knowledge, there are no published examinations of how TS affects efficiency in an otolaryngology service.

OR times and turnover times are well-recognized measures of hospital efficiency. Not only do hospitals have financial motivation to minimize lost time in the OR due to high operating costs, but there are potential patient benefits of decreased anesthesia time and better satisfaction due to shorter wait times. The results of this study suggest that TS is not changing OR efficiency significantly in the ENT department at our institution. The lack of impact that TS has had on efficiency does not reflect negatively on the program’s overall merit, because TS is a tool aimed primarily at improving patient safety. To the contrary, the fact that TS does not compromise efficiency will lead to hospitals continuing it as a patient safety measure without concern for adverse effects on the financial bottom line. Our study is not powered to measure the impact of TS on patient safety. Because sentinel events such as retained sponges and wrong site surgeries are relatively rare, more data are needed to determine if TS is having the expected positive impact on patient safety within the ENT department.

Table 1. Operating Room Efficiency Data Collected from Anesthesia and Nursing Logs for the Year before and after TeamSTEPPS Implementation.

<table>
<thead>
<tr>
<th>TeamSTEPPS</th>
<th>Before</th>
<th>After</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total, n</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cases</td>
<td>1322</td>
<td>1609</td>
<td></td>
</tr>
<tr>
<td>Turnovers</td>
<td>644</td>
<td>769</td>
<td></td>
</tr>
<tr>
<td>First starts in year</td>
<td>497</td>
<td>677</td>
<td></td>
</tr>
<tr>
<td>First starts in 6 mo</td>
<td>231</td>
<td>336</td>
<td></td>
</tr>
<tr>
<td>On-time starts in 6 mo, n (%)</td>
<td>107 of 231 (46.3)</td>
<td>171 of 336 (50.8)</td>
<td>.28</td>
</tr>
<tr>
<td>Average time, min</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turnover</td>
<td>35.2</td>
<td>41.4</td>
<td>.54</td>
</tr>
<tr>
<td>In room to turnover-to-surgeon</td>
<td>11.6</td>
<td>12.1</td>
<td>.63</td>
</tr>
<tr>
<td>Turnover-to-surgeon to surgical start</td>
<td>17.0</td>
<td>17.8</td>
<td>.11</td>
</tr>
<tr>
<td>Surgeon</td>
<td>107</td>
<td>111.6</td>
<td>.32</td>
</tr>
<tr>
<td>Total case</td>
<td>147</td>
<td>152.0</td>
<td>.40</td>
</tr>
</tbody>
</table>

Table 2. Data in 6-Month “Washout” Period after TeamSTEPPS Implementation.

<table>
<thead>
<tr>
<th>After TeamSTEPPS, 6 mo</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cases, n</td>
</tr>
<tr>
<td>Average time, min</td>
</tr>
<tr>
<td>In room to turnover-to-surgeon</td>
</tr>
<tr>
<td>Turnover-to-surgeon to surgical start</td>
</tr>
<tr>
<td>Surgeon</td>
</tr>
<tr>
<td>Total case</td>
</tr>
</tbody>
</table>
Weaknesses of this study include its retrospective nature and the fluidity of a large surgical department. The ENT service performed 287 more cases with 125 more turnovers in the year following the implementation of TS than it did the year prior. These differences may have served as confounding variables if there had been a significant change in OR efficiency in either direction. However, since efficiency was essentially the same, it is reasonable to assume that the departmental changes were not masking TS effects. Additionally, we began evaluating TS immediately after its implementation and did not allow for a “washout” interval while the health care team adjusted to the program. We chose to start measuring efficiency changes immediately after implementation because the providers had completed extensive training before the program began, which should have minimized the adjustment period. Nevertheless, there may have been some initial decrease in efficiency due to the process change in the OR. We did examine the efficiency data for the first 6 months after TS implementation (Table 2), and the intervals were very similar to those measured at 12 months, which supports the idea that there was minimal washout effect.

Conclusion
TS did not lead to significant changes in efficiency within the otolaryngology surgical service in the year after its implementation. In fact, the ENT service at a major teaching hospital was able to maintain its OR efficiency despite adopting the rigorous TS patient safety initiative. Although TS is a highly acclaimed evidence-based method improving patient safety and teamwork, more study is needed to determine if it can decrease sentinel events and other preventable medical errors.

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Author Contributions
Alexandra Shams, data collection and interpretation, drafted manuscript, final approval, accountable for accuracy; Mostafa Ahmed, data collection and statistical analysis, prepare and edit manuscript, final approval, accountable for accuracy; Nicholas J. Scalzitti, interpretation and analysis of data, preparation and editing manuscript, final approval, accountable for accuracy; Matthew Stringer, data collection, data analysis, review and editing manuscript, final approval, accountable for accuracy; N. Scott Howard, data analysis and interpretation, review and editing manuscript, final approval, accountable for accuracy; Stephen Maturo, study design, data analysis, review and editing manuscript, final approval, accountable for accuracy.

Disclosures
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References