The Automated Operating Room: A Team Approach to Patient Safety and Communication

For decades, high-risk industries have relied on safety checklists to limit the adverse consequences of human error. The checklist model has only recently been adapted in the surgical field after the World Health Organization launched the “Safe Surgery Saves Lives” campaign in 2006. Various studies have shown that the use of checklists reduces death rates and perioperative complication rates, and their use also improves teamwork and communication, potentially contributing to improved patient outcomes. On the other hand, a recent study from Canada showed that this tool did not reduce mortality rates or the numbers of complications, emergency department visits, and readmissions. While the use of a checklist remains a standard of care, the priority has shifted to patient safety, compliance with mandates, efficiency, and the monitoring of outcomes. These parameters are much harder to quantify.

The Veterans Health Administration’s initiative to improve operating room safety and efficiency has motivated the Bruce W. Carter Department of Veterans Affairs (VA) Medical Center of the Miami VA Healthcare System to investigate a technology-enabled solution to automate safety checklists, integrate patient data, and track staff compliance with safety measures. Before the automated system, the Miami VA Healthcare System was only capable of auditing 5% of cases for checklist compliance, which is insufficient to ensure proper utilization, standardization, and accountability.

Methods | In June 2013, an automated workflow system (AWS; OR-Dashboard [LiveData]) was implemented at the Miami VA Healthcare System to provide a common display of perioperative data elements, viewable to every member of the surgical team. The goal was to enhance surgical team communication during the checklist process and throughout each case. Monthly reports were generated to analyze nationally reported metrics and to assess staff compliance with the checklists. Eight months after implementation, 46 surgical team members, including physicians, residents, nurses, certified registered nurse anesthetists, and surgical technicians, completed a survey about their experience with the AWS pertaining to patient safety, “timeout” efficiency, compliance, and team communication. Anonymous responses were collected using a 5-point Likert scale.

Results | One month after the implementation of the AWS, checklist compliance reached 89% for “preprocedure,” 95% for timeout, and 82% for “debrief.” The remainder of compliance was achieved using the conventional method for a total of 100%. Six months after implementation, compliance with the AWS timeout was 99%.

During the first 6 months of the AWS, first case on-time starts improved from 47% to 85%. The median timeout duration improved from 71 to 58 seconds over this same time period (Figure). Survey results show that 93% of nurses “strongly agree” or “agree” that the AWS enhances surgical team engagement, improves patient safety, and provides opportunities to prevent errors; 86% of nurses strongly agree or agree that the AWS improves the operative team’s communication compared with traditional checklist methods; more than 74% of physicians strongly agree or agree that the AWS improves surgical team engagement, improves patient safety, and improves compliance with Surgical Care Improvement Project documentation; and 100% of nurses and 79% of physicians strongly agree or agree that the AWS is user friendly (Table).

Discussion | The AWS provides a consistent, reliable, and user-friendly method for completing the surgical safety checklist and for improving operative team engagement in the process. Since implementation of the AWS at our facility, first case on-time starts have improved by 40%, and automated safety checklist compliance with timeout has improved by 4%. Cases with less than 100% compliance were reviewed, and deficiencies were attributed to, among other things, the staff learning...
Table. Responses to Survey by OR Physicians and Registered Nurses

<table>
<thead>
<tr>
<th>Statement</th>
<th>% of Respondents Who Strongly Agree or Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>Registered Nurse</td>
</tr>
<tr>
<td>Use of the AWS timeout process improves surgical team engagement compared with the traditional timeout process.</td>
<td>86.96</td>
</tr>
<tr>
<td>Use of the AWS improves patient safety compared with the traditional timeout process.</td>
<td>84.78</td>
</tr>
<tr>
<td>Use of the AWS improves compliance with SCIP documentation compared with traditional methods.</td>
<td>91.11</td>
</tr>
<tr>
<td>Use of the AWS improves the opportunities to prevent OR errors/near misses compared with traditional communication methods.</td>
<td>84.44</td>
</tr>
<tr>
<td>Use of the AWS improves the operative team’s communication throughout the surgical procedure compared with traditional communication methods.</td>
<td>78.26</td>
</tr>
<tr>
<td>The AWS is user friendly.</td>
<td>84.44</td>
</tr>
<tr>
<td>I feel competent using the AWS.</td>
<td>81.82</td>
</tr>
<tr>
<td>The postoperative debriefing checklist in the AWS ensures that a consistent verification process takes place prior to the patient exiting the OR.</td>
<td>88.00</td>
</tr>
<tr>
<td>I have received feedback on my compliance with the AWS checklist.</td>
<td>100.00</td>
</tr>
<tr>
<td>The preprocedure checklist helps improve the preprocedure safety verification process.</td>
<td>92.86</td>
</tr>
</tbody>
</table>

Abbreviations: AWS, automated workflow system; NA, not applicable; OR, operating room; SCIP, Surgical Care Improvement Project.

* Only physicians and registered nurses responded.

NA Only registered nurses responded.

curve and technical problems with implementation early in use. Surveys show that physicians and staff members believe that the AWS improves communication, team engagement, patient safety, and compliance with Surgical Care Improvement Project measures. Future goals for the AWS at our facility include tracking near misses to improve patient safety and staff education opportunities, developing a structured feedback system for operative team members, and incorporating other risk assessments.

Juliet Nissan, MD
Valeria Campos, RN, BSN, CPAN
Hector Delgado, RN, MSN, MHA
Christina Matadial, MD
Seth Spector, MD

Author Affiliations: Bruce W. Carter Department of VA Medical Center, Miami VA Healthcare System, University of Miami Miller School of Medicine, Jackson Memorial Hospital, Miami, Florida.

Corresponding Author: Juliet Nissan, MD, Bruce W. Carter Department of VA Medical Center, Miami VA Healthcare System, University of Miami Miller School of Medicine, Jackson Memorial Hospital, 1611 NW 12th Ave, East Tower, Ste 2169, Miami, FL 33136 (jjnissan@med.miami.edu).


Author Contributions: Dr Nissan had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis. Study concept and design: All authors. Acquisition, analysis, or interpretation of data: All authors. Drafting of the manuscript: Nissan, Campos, Spector. Critical revision of the manuscript for important intellectual content: All authors. Statistical analysis: Nissan, Campos, Delgado, Spector. Administrative, technical, or material support: Matadial, Spector. Study supervision: Matadial, Spector.

Conflict of Interest Disclosures: None reported.

Previous Presentation: The paper was presented at the 38th Annual Surgical Symposium of the Association of VA Surgeons; April 7, 2014; New Haven, Connecticut.

Additional Information: LiveData, the company that manufactured the AWS used in our institution (OR-Dashboard), had no role in the design and conduct of the study; analysis and interpretation of the data; preparation, review, or approval of the manuscript; and decision to submit the manuscript for publication.


ASSOCIATION OF VA SURGEONS

Measuring Surgical Quality: Which Measure Should We Trust?

The use of surgical quality measures to target quality improvement efforts and evaluate hospital performance is now standard. Surgical quality in Veterans Affairs (VA) hospitals is measured by the VA Surgical Quality Improvement Program (VASQIP),1 the Surgical Care Improvement Program (SCIP),2 and the Patient Safety Indicators (PSIs).3 Each approach has a different perspective on surgical quality and uses a different source of data. For example, the VASQIP evaluates 30-day postoperative morbidity and mortality outcomes among other parameters, the SCIP measures compliance with specific perioperative processes of care, and the PSIs calculate the rates of potentially preventable, inpatient, surgical adverse events using administrative data. We explored the correlation between VASQIP, SCIP, and PSI measures and how consistently they identified high- and low-performing VA hospitals.

Methods | We used quality indicator data from fiscal year 2009 (ie, from October 1, 2008, to September 30, 2009) from 67 VA