Use of a Checklist for the Postanesthesia Care Unit Patient Handoff

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Purpose: *This quality improvement project aimed to evaluate the benefits of implementing a checklist in the postanesthesia care unit (PACU) setting to decrease the omission of health information during the handoff from anesthesia to PACU nurses.*

Design: *Patient handoffs from anesthesia providers were anonymously assessed by PACU nurses before and after the implementation of a handoff checklist with the Situation, Background, Assessment, Recommendation format.*

Methods: *PACU nurses recorded use of the handoff checklist and if five items of health information were included in the handoff during the preintervention and postintervention phase.*

Findings: *Checklist use increased from 0% to 73% with omitted information decreasing with checklist use: procedure from 19% to 2%, allergies 23% to 4%, input and output 16% to 0%, antiemetic used 21% to 4%, and lines 19% to 11%. Completed handoffs increased from 13% to 82% whereas checklist use remained high, at over 79%, for the 12 weeks after implementation.*

Conclusions: *The project was successful in implementing a standardized checklist and echoed the success of the articles reviewed. The use of a PACU handoff checklist can improve transfer of care by ensuring the provider receives more pertinent medical information during these transfers.*

Keywords: *handoff, transfers, postoperative, omission errors, handoff communication.*
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IN THE HOSPITAL SETTING, patients are cared for by many different providers and specialties. When progressing through care over a period of time, it is necessary for providers to transfer care of the patient to another provider through the delivery of a patient handoff. Patient handoffs are defined as "the real-time process of passing patient-specific information from one caregiver to another to ensure the continuity and safety of patient's care."[1] Although patient handoffs are very common in health care, they can widely vary in terms of structure and information

included. Depending on the provider, expectation, and opinions on the importance of certain information can differ greatly as well.[2]

The Joint Commission, when looking at sentinel events, identified communication breakdown during patient handoffs as a major issue that impacts as many as 80% of serious medical errors.[3] The annual cost of medical errors is estimated at more than $17 billion dollars and estimated patient deaths from 200,000 to 400,000. Therefore, solutions to prevent communication breakdowns have been identified as a top safety priority.[4,5] This sentiment was echoed by the World Health Organization as part of its "High 5s" patient safety initiatives.[5] These initiatives recognized the top five preventable errors that contributed to catastrophic events in hospitals across seven countries including the United States, with "prevention of patient care hand-over errors" being identified as the first solution.[6] The addition of a checklist to structure patient handoffs has been proposed to increase knowledge transfer, improve the accuracy of relayed information, and decrease omission of pertinent medical information.

In "The Checklist Manifesto," Gawande explains how the use of checklists in numerous fields, such as aviation, impact safety through standardization.[7] Multidisciplinary teams have researched and modeled checklists after airline safety experts as well as automobile racing, nuclear power plants, National Aeronautics and Space Administration (NASA), and emergency response dispatching.[7] The surgical checklist before surgery or timeout before surgical incision are two current examples of checklists developed from these other industries.[8] The goal of each patient handoff is to transfer the pertinent information about the patient's medical history and current state to ensure a seamless transition of care from one provider to the next. Milby et al[9] demonstrated the magnitude of information that can be lost during handoff communication, with most information included in less than 60% of handoffs. Critical information such as fluid volume, antibiotics, pain management plan, and intravenous catheters were included in less than 20% of handoffs.[9] Agarwala et al[10] found that the use of a checklist significantly improved the information relayed in areas such as vasopressors (85% vs 44%, $P = .008$), antiemetics (46% vs 15%, $P = .015$), estimated blood loss (85% vs 57%,

$P = .014$), and urine output (85% vs 52%, $P = .006$). Similar results were duplicated through the studies and literature reviews appraised.

Handoffs are a daily occurrence in health care, especially nursing care. Even with all these transfers, there is little to no formal education regarding proper handoff procedures and a lack of standardization. With the potential for patients to become unstable in the perioperative setting, steps should be taken to ensure effective and complete patient handoffs. When a handoff checklist was added to the handover process, the omission of health information declined significantly.

Materials and Methods

This quality improvement (QI) project was designed to evaluate the effect of implementation of a postanesthesia care unit (PACU) handoff checklist. As shown in the literature review, a formal handoff checklist improves relayed information. Implementation of the checklist was hypothesized to improve knowledge transfer and maintain continuity of care. By implementing the checklist tool in this postanesthesia care setting, knowledge transfer should increase and help maintain high continuity of care. The project also evaluated whether key health information was omitted in patient handoffs and the frequency of those omissions. Using preintervention and postintervention assessment of patient handoffs, checklist use and information relayed were compared with baseline data. Because patient safety is a central theme in health care and transfer of care occurs frequently, use of a handoff checklist is vital during each handoff.

Protection of human subjects was ensured using a primary and secondary review board. They included the University of North Florida's Institutional Review Board (IRB) and Augusta University's IRB. A waiver was granted by both IRBs as the project did not meet the definition of human subject research.

This project was conducted at a 478-bed level I trauma health center located in Eastern Georgia. Key stakeholders were identified as anesthesiologists, CRNAs, resident anesthesiologists, PACU nurses, and QI nurses. The anesthesia department consists of 22 anesthesiologists, 30 Certified

Registered Nurse Anesthetists (CRNAs), 37 resident anesthesiologists, whereas the PACU consisted of 20 registered nurses. An interdisciplinary committee including representatives from all stakeholder groups was formed. Using Lean/Six Sigma tools the group took existing handoff tools and modified them based on the needs, recommendations, and decisions from the interdisciplinary team. A Situation, Background, Assessment, Recommendation (SBAR) format was chosen to align with the current nursing handoff structure in the facility. Projected costs were minimal and included printing forms as well as education and lecture materials. The most significant potential barrier identified was the perception of additional work because of the formal handoff checklist.

The three key compliance rates explored in this project were PACU SBAR handoff tool use, the omission of critical information in handoffs, and the percentage of complete reports given. Each of these was tracked using the handoff assessment form. A 70% compliance rate was chosen as the initial goal to mirror similar QI projects on the topic. Preintervention and postintervention phase data received from the handoff assessment form were recorded and compared. Each of the five identified patient information points measured (procedure, allergies, input and output, antiemetic administration, and lines and catheters) was compared to see which areas improved with the use of the checklist. The goal was to see improvements in data reporting for each of the five identified patient information points measured and compliance rate in using the PACU SBAR handoff tool for patient handoffs.

The handoff assessment form allowed the PACU nurses to record whether five key items were included in each handoff. The goal, as shown in the literature analyzed, was to decrease data omission and improve the number of complete reports. Complete reports are defined in this project as those that included all five of the items tracked: procedure, allergies, input and output, antiemetic administration, and lines and catheters.

The sample for this project included adult patients undergoing anesthesia care admitted to the adult PACU. The intervention was directed toward the anesthesia providers. PACU nurses collected the data on the completion of the handoff as discussed in the training modules shared with them before the start of the project. The anesthesia providers were blinded of the data collection. These data, collected by the PACU nurses, were assessed for its completion after the fact. To increase the likelihood of use, five items from the SBAR patient handoff checklist were identified by the interdisciplinary committee to be included on the handoff assessment form (Figure 1).

The interdisciplinary committee consisted of four PACU nurses, two CRNAs, two anesthesiologists, two resident anesthesiologists, and three QI nurses. Two meetings took place with the committee before data collection to develop goals, review national and professional handoff guidelines, create the handoff assessment form, and determine the best way to educate the PACU staff on the handoff assessment form. Preintervention data collection ran for one full week. Using the handoff assessment form, the PACU nurses anonymously assessed each handoff received on patients admitted to the PACU from the adult operative room or satellite location in the adult hospital, attempting to capture as many handoffs as possible. The results from the preintervention data were presented to the interdisciplinary committee to direct the committee in making their final recommendations for the SBAR handoffs checklist, seen in Figure 2.

After preintervention data collection, the SBAR handoff checklist was presented to the entire Anesthesia and Perioperative Medicine Department at their weekly grand rounds. It is important to note that during the education process, the five items of health information being monitored were not released to the department. When discussing the results of the preintervention data collection there was no mention of particular data points, but the percentage of omissions were shared to demonstrate the room for improvement. The percentage of complete reports, those including all five items of information, was shared as well. There was also no mention of the planned or possible postintervention data collection. This ensured bias would be limited as much as possible. Further questions and education was offered via drop-in classes provided for 1 week with handouts available.

In the education, two main points were used to help providers see the value of the change.

Was the Following Used/Included	Yes	No
1. PACU SBAR Handoff tool used		
2. Procedure		
3. Allergies		
4. I & O		
5. Antiemetic		
6. Lines/catheters		

7. Person giving report (circle)   CRNA   AA   Resident   Anesthesiologist

Figure 1. Handoff assessment form. AA, anesthesia assistant; I & O, input and output; PACU, postanesthesia care unit; SBAR, Situation, Background, Assessment, Recommendation.

These were patient safety and compliance with Center for Medicare and Medicaid Services by completing a Merit-Based Incentive Payment System (MIPS) Improvement Activity. To help engage senior leadership in the facility, this project was combined with an MIPS Improvement Activity. Falling under the "Use of Patient Safety tools" category, this project allowed the department to be in compliance with the 2017 MIPS project. The guidelines of this category state that specific measures should be taken to ensure standardization of handoffs between health care

S **Situation**	☐ Patient Name ☐ Procedure and Diagnosis ☐ Allergies
B **Background**	☐ PMH ☐ Significant Labs ☐ Notable Baseline VS ☐ • Baseline Neuro Status
A **Assessment**	☐ Anesthesia Type (GETA, LMA, MAC, Regional) ☐ Medications Given ☐ Opioids ☐Benzos ☐Antiemetic ☐Antibiotics ☐Vasopressors ☐Other ☐ Pain Management Plan ☐ IVs/Catheters ☐ I & O ☐ Surgical or Anesthetic Issues & Concerns
R **Recommendation**	☐ Additional Questions/Comments ☐ Abnormal Results ☐ • Pt Destination

Figure 2. PACU SBAR handoff. GETA, general endotracheal anesthesia; I & O, input and output; LMA, laryngeal mask airway; MAC, monitored anesthesia care; PACU, postanesthesia care unit; PMH, past medical history; SBAR, situation, background, assessment, recommendation; VS, vital signs.

providers. This is an essential component of patient safety and hence was used to educate the anesthesia care providers in our department during grand rounds and drop-in sessions. The MIPS programs are tied to each provider's National Provider Identifier number for cases billed at this facility; thus the project positively impacts their reimbursement. By showing the value in both these areas, there was a positive buy-in from providers.

Numerous avenues were used to ensure exposure and availability of the PACU SBAR tool to the anesthesia providers. There included badge cards to wear behind the provider's identification badge, laminated cards with the tool attached to the computer located in each of the PACU bays, and a note sheet with the same points for each PACU nurse to write the report that they were receiving. This ensured widespread availability of the tool. It was also essential to educate the anesthesia providers that this tool did not need to be completed or written on and it was not a permanent piece of the patient's record. This tool was meant to be used as a guide for a standardized structured handoff.

After this education session, the SBAR handoff checklist intervention was implemented. Postintervention data collection began after allowing several days for the provider to become accustomed to the tool. The postintervention data collection ran for one full week. This permitted comparison from Monday to Monday of one full week when comparing preintervention and postintervention data.

Two months after implementation of the SBAR handoff checklist, the handoff assessment form was used during a 24-hour period to assess continued use. This was compared with the week-long data received 2 months earlier. After 12 weeks of use, data were pulled from the Cerner electronic medical record (EMR) to review the usage of the SBAR handoff checklist. This information was used to measure the sustainability of the project.

The final meeting of the interdisciplinary committee allowed the group to review data and provide recommendations based on results. Future meetings will continue to discuss, monitor, and improve patient handoffs between anesthesia providers and PACU nurses.

Results

Seventy-eight PACU handoffs of the 209 patients admitted were randomly assessed during this period capturing 37% of the total reports given. The preintervention assessment indicated a 0% usage of an SBAR handoff tool. This was expected, as there was no tool adopted or suggested by the Department of Anesthesia and Perioperative Medicine or the hospital system.

The preintervention data indicated that each of the items was omitted between 17% and 23% of the time when reports were given. These data are summarized in Figure 3. This demonstrated the large gap in communication and potential areas for lack of communication that may lead to medical errors or patient harm. Each of these five items was included in the PACU SBAR handoff, along with the other pertinent information identified by the interdisciplinary committee.

Two weeks after the intervention and education was provided, data were again collected for one full week. Of the 174 patients admitted to the adult PACU during the 7-day period, 60 handoffs were assessed using the handoff assessment form, effectively capturing 35% of total reports given. Of these reports evaluated, 44 used the PACU SBAR handoff during handoff communication, showing a usage increase of 73%. This indicated not only a successful introduction of the tool into practice but also the widespread adoption of the tool by the anesthesia providers. When comparing the preintervention data with the postintervention data, only the postintervention handoffs using the PACU SBAR handoff tool were used.

The postintervention data showed a marked decrease in omissions of data; from 19.2% to 2.2% for procedure, 23.1% to 4.5% for allergies, 16.7% to 0% for input and output, 21.8% to 4.5% for antiemetic administration, and 19.2% to 11% for lines and catheters. These results, seen in Figure 4, indicate the dramatic improvement because of the project. The number of complete reports also increased greatly with a change from 13% preintervention to 82% postintervention, which can be seen in Figure 5.
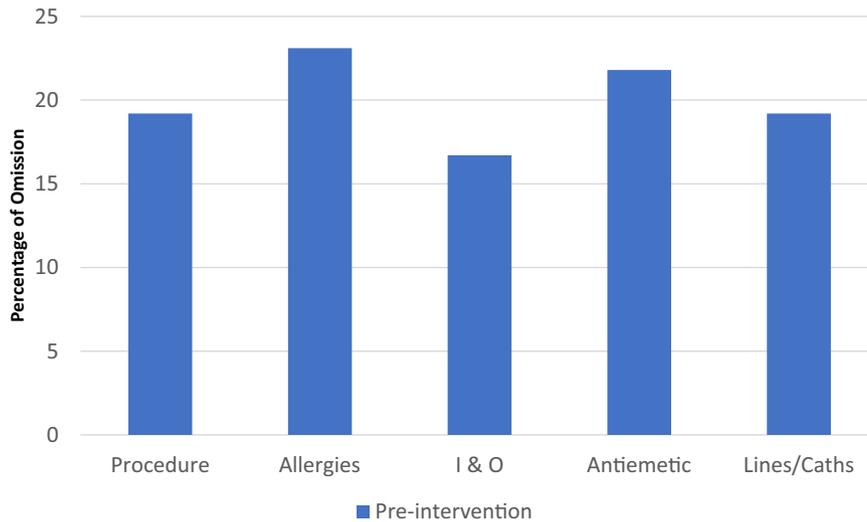
Figure 3.   Preintervention omission. I & O, input and output. This figure is available in color online at www.jopan.org.

To measure continued use and sustainability, two additional data points were gathered. First, during a 24-hour period, the handoff assessment form was used to assess continued use. This was conducted 2 months after implementation of the SBAR handoff checklist. Eighteen handoffs were evaluated of a possible 39 admitted to the PACU, capturing 46%. Of those, 13 used the SBAR handoff, showing 72.2% of reports using the handoff. When the full 12 weeks of data were evaluated from the Cerner EMR of documented usage of the SBAR handoff checklist, the data indicated a 77% use the first week of implementation, which is compared with the 73% use demonstrated by the handoff assessment form collection that same week. For the next 11 weeks, the usage was between 80% and 89%. These data are summarized in Figure 6.

Discussion

This QI project was the first step in the standardization of handoffs of our facility. The scope of the
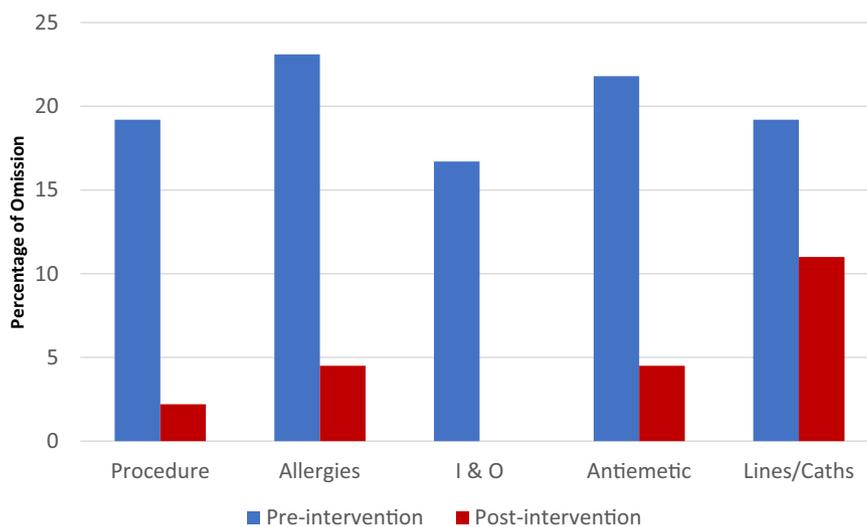

Figure 4.   Postintervention omission. I & O, input and output. This figure is available in color online at www.jopan.org.
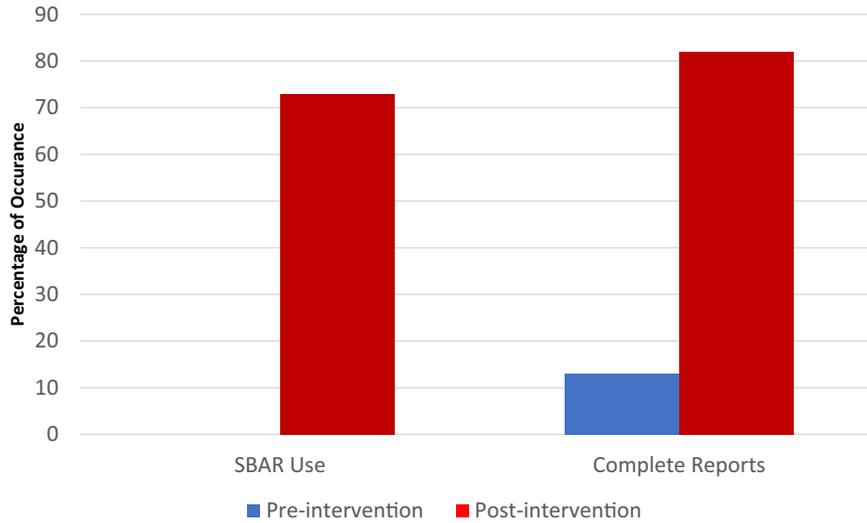
Figure 5.   SBAR use and complete reports. SBAR, Situation, Background, Assessment, Recommendation. This figure is available in color online at www.jopan.org.

project focused on the adult PACU. In the future, the department hopes to extend this project to various areas of the hospital where anesthesia personnel are involved. This includes intraoperative handoffs between anesthesia providers, as well as patients admitted to the pediatric PACU and the multiple intensive care units located in the hospital. The tools for each area may require slight alteration to fit the need for the location.

Some limitations were present in the project design. First, the assessments were done by PACU nurses in a highly distracting environment. At the conclusion of the project, some anesthetists expressed concern about interruptions and distractions that may have led to the PACU nurse missing some information during the report. Second, although the anesthesia providers were not aware that a postintervention data collection was
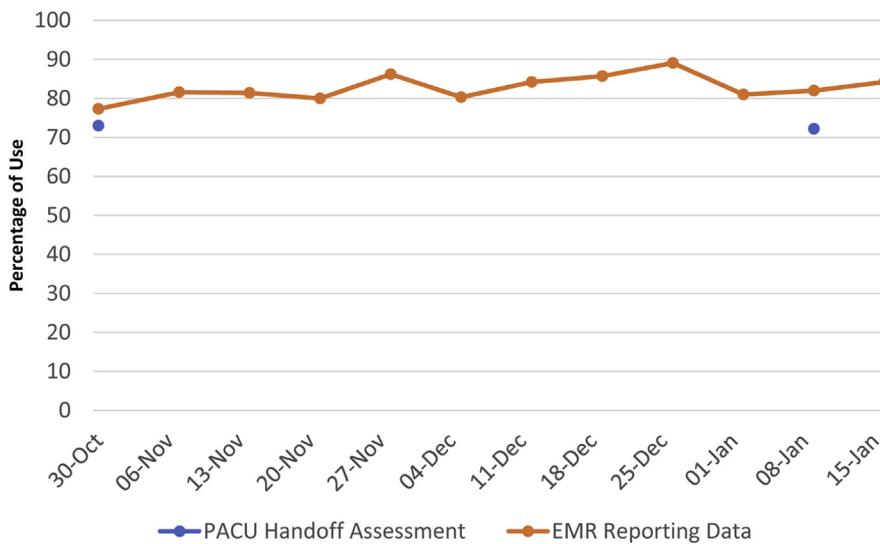

Figure 6.   SBAR checklist use. EMR, electronic medical record; PACU, postanesthesia care unit; SBAR, Situation, Background, Assessment, Recommendation. This figure is available in color online at www.jopan.org.

occurring, they were aware that a preintervention data collection had happened in the past. This may have led to a Hawthorne effect based on the knowledge of possible monitoring. The anonymous assessments completed by the PACU nurse after the report helped to assist in limiting this bias, as opposed to direct observation by a third party.

Another limitation is that the postintervention data were collected during a transition period for anesthesia residents, as they switch rotations at the beginning of each month. This led to two groups of residents being included in the postintervention data assessment. Many of these residents may have been unfamiliar with the new SBAR process, although further education was offered to the entire department. Finally, the EMR data used to show sustainability was mostly self-reported. It did not show actual use but reported use by the anesthesia provider. This allows self-reporting bias as a provider could have documented the use without actually using the tool during handoff.

Conclusions

The use of a standardized checklist has been shown to improve the information transferred during handoff from one provider to another. The goal of this project was to improve knowledge transfer and decrease omissions during the handoff period between the anesthesia staff and PACU staff. The project was successful in implementing a standardized checklist and support the success of the articles reviewed. Further education will be necessary to improve and maintain this success. Similar projects can be easily replicated in other settings, in this facility and others, to improve and deliver the best care possible for patients undergoing anesthesia care. The next phase of the SBAR handoff that the committee plans to address is handoff in the pediatric PACU, intraoperative handoffs between anesthesia providers, and operating room to intensive care unit handoffs, these are not in the purview of this project.

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