

## Patient Safety Tip of the Week

January 6, 2015

### Yet Another Handoff:

## The Intraoperative Handoff

In our many columns on handoffs in healthcare and other industries (see the full list at the end of today's column) we thought we had covered almost every type of handoff. But though we've often discussed perioperative handoffs, there was one we have never discussed: the **intraoperative handoff**.

Perhaps it is apropos following last week's Patient Safety Tip of the Week "[Data Accumulates on Impact of Long Surgical Duration](#)" that we discuss intraoperative handoffs. However, intraoperative changes in personnel occur not only during long surgical procedures. Hospitals that have extensive OR schedules commonly have nurses and anesthesia providers that work in shifts and those shift changes may take place during even normal duration surgical cases. In addition, work hour restrictions on physicians in training further increase the likelihood of transitions in anesthesia care. In fact, a large study at the Cleveland Clinic found that only 61% of cases had no anesthesia handoffs ([Saager 2014](#)). 21% of cases had one anesthesia handoff, 11% had two, 5% had three, and 3% had four or more handoffs.

We know that communication failures lead to errors and increased numbers of handoffs may be associated with adverse patient outcomes in multiple settings. The OR is no different. In the study by Saager and colleagues ([Saager 2014](#)) there was an **8% increase in the composite of mortality and morbidity for each increase of one handoff**. For example, those with 2 transitions had a 17% increase in the composite. Moreover, the increased occurrence of complications with handoffs affected all the individual categories of the composite (cardiac, gastrointestinal, bleeding, infection). Their findings held up after adjustment for multiple potential confounding factors and in sensitivity analyses. The adverse effect of the handoffs was similar for attending anesthesiologists, directed residents, and CRNA's. While the association does not prove causation, the association is nevertheless striking and implies the intraoperative handoffs were contributory factors to adverse outcomes. The Cleveland Clinic at the time of the study did not have a formal structured handoff process for intraoperative handoffs. The authors suggest adoption of

formal protocols, including checklists, as a potential way to reduce the adverse impact of intraoperative handoffs on patient outcomes.

A recent study from the Massachusetts General Hospital assessed the impact of an **electronic checklist** on intraoperative handoffs between anesthesia providers ([Agarwala 2015](#)). The authors developed a checklist of information to be transferred at end-of-shift handoffs. Many of the items in the checklist were pre-populated from their anesthesia information management system (AIMS) and could be accessed easily by pressing a popup button on the AIMS screen. Use of the checklist was voluntary. The authors went to the OR and observed the intraoperative handoffs and assessed transfer of information using a structured assessment tool. They compared those handoffs that used the checklist against those that did not. They found significant increases in discussions about several medications (prophylactic antibiotics, vasopressors, and antiemetics) and increased information about intravascular lines and fluid balance. (Several other items also showed upward trends, though they did not reach statistical significance, perhaps because of small sample size.) Moreover, they also assessed whether the receiving anesthesia staff was able to recall accurately critical patient information passed on during the handoff. There was a significant improvement in the anesthesiologist knowing the antibiotic given and timing of the next dose. Similarly, those using the checklist were more able to recall the neuromuscular blocking agent used and the amount of fluids administered. In addition, introduction of the incoming anesthesiologist to the rest of the OR team increased from just 3% to over 50%. And discussion about potential areas of concern and post-op plan increased from less than 50% to over 90%. Providers of multiple types (anesthesiologists, CRNA's, residents and fellows, faculty) were generally satisfied with use of the electronic checklist and use of the checklist, which was voluntary, increased to 74% by 8 months after its introduction.

Notably, using the electronic checklist did not increase the time needed for the intraoperative handoff. In fact, multiple providers responding to a post-implementation survey noted that the handoff felt less rushed when using the checklist.

Though the study did not measure impact of the improvements on patient outcomes, one would anticipate that the improvements could likely reduce untoward patient outcomes. Some of the potential errors that might arise from inadequate intraoperative handoffs include failure to give second doses of prophylactic antibiotics when needed, failure to reposition patients leading to compressive neuropathies, medication errors, failure to fully reverse neuromuscular blocking agents leading to post-op respiratory complications, and others. And intraoperative change in OR staff, particularly nursing, has been a risk factor in retained surgical items.

The Agarwala and Saager studies only addressed permanent (end-of-shift) handoffs. They did not address temporary handoffs like those that occur when anesthesiology staff go on breaks (typically 15-30 minutes). It's important we don't ignore the latter. Saager et al cite several studies from the 1970's and 1980's that concluded that breaks for anesthesia providers do not influence patient outcomes. But, anecdotally, we've seen multiple cases where such intraoperative handoffs were likely factors in adverse patient

events. When an OR team member is gone for a short period of time and then returns, there is a natural tendency to think not much likely changed while he/she was gone and such assumptions may be disastrous.

Tan and Helsten previously described development of an AIMS-based electronic checklist for anesthesia handoffs at Barnes-Jewish Hospital and Washington University in St. Louis ([Tan 2013](#)). Their tool included several useful features and visual **prompts** to facilitate the handoff. First, the tabs containing the various checklist items took up only a portion of the computer screen, allowing critical patient information to still be visible. Like the electronic checklist developed by Agarwala and colleagues, they **pre-populated** checklist items where possible. But some items are difficult to abstract from the electronic record and need to be discussed. For example, “stage of surgery” is **displayed in red with the word “DISCUSS” to prompt** the two anesthesia providers to discuss the stage of surgery. There are also tabs for items like trends in vital signs, oxygenation, acute events (anesthetic or surgical), and the analgesia plan that should prompt specific discussion. And lastly, another tab for details of fluid management and lines.

Some unique issues arise at academic centers where attendings are supervising residents and fellows or sites where attendings may be supervising CRNA’s. At Cincinnati Children’s Medical Center a quality improvement project improved the intraoperative anesthesia handoff ([Boat 2013](#)). The quality improvement team consisted of pediatric anesthesiologists and CRNA’s with input from the IT department. They discussed key elements of a good handoff and the various components and analyzed aspects of their current handoff process. One barrier they identified was that the attending anesthesiologists often were not present in the OR when they did their handoff. Such handoffs were often done in the hallway, anesthesia lounge, main desk, or even on the phone. That left the in-room anesthesia provider (CRNA or resident/fellow) temporarily unsupervised. More important, it often left the in-room anesthesia provider out of the loop (i.e. they did not know what was discussed at the handoff). They developed a standardized checklist and a campaign to use the checklist and ensure the handoff was done in the OR, both done over multiple PDSA cycles. In addition, anesthesiologists who failed to comply with the new process received an email notifying them of the failure and a follow up phone call to ascertain the reason for the failure and reinforce the importance of the process. Compared to only 20% compliance with all elements of the handoff and performance of the handoff within the OR before the project, compliance increased to 100%. Their IT team later incorporated the handoff checklist into the intraoperative electronic medical record. That both allowed for documentation of the handoff and further encouraged compliance with the handoff protocol. In addition to standardization of the process with a checklist, key drivers were use of the “team huddle” approach with in-room anesthesia providers and the supervising attendings and ensuring situational awareness of the intraoperative environment at the time of the handoff. Having as “early adopters” those attendings who had previously experienced the impact of poor handoffs helped overcome the barrier of other attendings not recognizing the need for change.

**Simulation** has also been used to improve intraoperative handoffs. In a pilot study ([Pukenas 2014](#)) 10 anesthesiology residents participated in a one-day simulation-based

handoff course. Each resident repeated simulated handoffs to deliberately practice with an intraoperative handoff checklist. One year later, 7 of the 10 residents participated in simulated intraoperative handoffs. Initially, the overall communication failure rate, defined as the percentage of handoff omissions plus errors, was 29.7%. After deliberate practice with the intraoperative handoff checklist, the communication failure rate decreased to 16.8%, and decreased further to 13.2% one year after the course.

Screenshots of the electronic checklists are provided in the full text of the Tan, Agarwala, and Boat papers. Another important point in the Agarwala study that we've made in our numerous columns on checklists: **keep your checklists short!** When they developed their electronic checklist they purposely kept the number of items to a minimum.

Today's column has focused on the intraoperative handoff as it pertains to anesthesia staff. Intraoperative handoffs pertaining to nursing in the OR are beyond the scope of today's column. But we refer you to the great resources AORN has on perioperative handoffs ([AORN 2012](#)).

**Read about many other handoff issues (in both healthcare and other industries) in some of our previous columns:**

May 15, 2007	<a href="#">“Communication, Hearback and Other Lessons from Aviation”</a>
May 22, 2007	<a href="#">“More on TeamSTEPPS™”</a>
August 28, 2007	<a href="#">“Lessons Learned from Transportation Accidents”</a>
December 11, 2007	<a href="#">“Communication...Communication...Communication”</a>
February 26, 2008	<a href="#">“Nightmares...The Hospital at Night”</a>
September 30, 2008	<a href="#">“Hot Topic: Handoffs”</a>
November 18, 2008	<a href="#">“Ticket to Ride: Checklist, Form, or Decision Scorecard?”</a>
December 2008	<a href="#">“Another Good Paper on Handoffs”</a> .
June 30, 2009	<a href="#">“iSoBAR: Australian Clinical Handoffs/Handovers”</a>
April 25, 2009	<a href="#">“Interruptions, Distractions, Inattention...Oops!”</a>
April 13, 2010	<a href="#">“Update on Handoffs”</a>
July 12, 2011	<a href="#">“Psst! Pass it on...How a kid's game can mold good handoffs”</a>
July 19, 2011	<a href="#">“Communication Across Professions”</a>
November 2011	<a href="#">“Restricted Housestaff Work Hours and Patient Handoffs”</a>
December 2011	<a href="#">“AORN Perioperative Handoff Toolkit”</a>
February 14, 2012	<a href="#">“Handoffs – More Than Battle of the Mnemonics”</a>
March 2012	<a href="#">“More on Perioperative Handoffs”</a>
June 2012	<a href="#">“I-PASS Results and Resources Now Available”</a>
August 2012	<a href="#">“New Joint Commission Tools for Improving Handoffs”</a>
August 2012	<a href="#">“Review of Postoperative Handoffs”</a>
January 29, 2013	<a href="#">“A Flurry of Activity on Handoffs”</a>
December 10, 2013	<a href="#">“Better Handoffs, Better Results”</a>
February 11, 2014	<a href="#">“Another Perioperative Handoff Tool: SWITCH”</a>
March 2014	<a href="#">“The “Reverse” Perioperative Handoff: ICU to OR”</a>

September 9, 2014    [“The Handback”](#)  
December 2014        [“I-PASS Passes the Test”](#)

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