HHS Public Access

Author manuscript

Int Anesthesiol Clin. Author manuscript; available in PMC 2019 October 04.

Published in final edited form as:

Int Anesthesiol Clin. 2019 ; 57(3): 35–47. doi:10.1097/AIA.0000000000000241.

Communication: Is There a Standard Handover Technique to Transfer Patient Care?

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Effective communication is integral to patient safety, especially during high-risk periods where patients are transitioning to different care areas or to different providers. However, communication failures continue to occur; The Joint Commission (TJC) reports that the number one cause of anesthesia-related sentinel events is breakdown in communication.[1] The operating room (OR), the postanesthesia care unit (PACU), and the intensive care unit (ICU) are especially vulnerable to communication failures between providers; inadequate communication in the PACU has been shown to affect mortality and morbidity.[2,3] A review of 419 reports from the Anaesthetic Incident Monitoring Study (AIMS) indicated failure in communication as the second most common contributing factor to adverse events in recovery units.[4] Indeed, observational studies have shown a direct correlation between poor handover and patient harm.[5]

Therefore, the handover process is critical to the safe care of the surgical patient. The handover is a transfer of not only information but also of professional responsibilities across teams.[6] Ideally, a handover report is attended by surgical and anesthesia staff, a nurse, and a PACU or an ICU clinician, and relays information on the patient's history, intraoperative events, and postoperative care plan. According to the American Society of Anesthesiologists, standard of care requires the presence of intraoperative anesthesia staff for monitoring during transport and verbal report.[7] However, beyond this, there is a lack of consistent guidelines; reports are vulnerable to omission of pertinent information.[8] A complete omission of information occurred in 57% of surgical malpractice claims[9] and has

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been found to be one of the key factors in causing harm from miscommunication.[8] The conditions of the perioperative environment, including time pressures, may influence the quantity and quality of data transferred during the handover.

Why is a Standardized Approach Needed?

TJC mandated that a standardized approach to handovers become a patient safety goal in 2006.[10] By standardizing consistency in communication among providers, checklists have been used effectively to reduce morbidity and mortality in both medical and surgical settings.[11] Interventional studies in PACU have shown improvement in medical errors with the implementation of checklists.[12–15] In a multicenter handover intervention by Bigham and colleagues, a physical checklist decreased handover-related failures by 69% in a year.[13] Another intervention using the “I-PASS Handover Bundle” by Starmer and colleagues led to a 23% relative reduction in overall medical errors and a 30% relative reduction in the rate of preventable adverse events.[14]

In addition to increased quantity of data transfer, checklist use is associated with improved nursing satisfaction and handover efficiency.[16] Overall, a checklist accomplishes 2 goals: first, it provides a guideline to standardize information transfer; second, a physical checklist is used as a reminder to prevent omission of vital information.[17,18] This paper will discuss key challenges to handover communication, the need for standardization, and how best to implement and sustain quality improvement projects related to handovers.

Effective Communication

Effective communication is an integral component of patient safety. Because surgical patients undergo numerous transitions in care—from the preoperative environment, to the OR, to the PACU or ICU and then to the floor—their care must be handed over repeatedly from provider to provider, magnifying the potential for communication errors. In a review of surgical malpractice claims, up to 43% of communication breakdowns associated with patient injury occurred in connection to handovers.[9] There are numerous challenges to effective communication during the handover process: distractions, recurring transfers of information with lack of standardization, and personnel dynamics.

Distractions

The literature related to patient harm as a result of distractions during perioperative handovers is conflicting. A study of surgical residents on a hepatobiliary service noted that distractions were present in 48% of handovers, characterized by pages, telephone calls, nonrelevant conversations, and general noise; however, although distractions increased the length of the handover process, these distractions did not impact handover quality.[19] In contrast, Nagpal and colleagues found that distractions occurred in one-third of postoperative handovers. Distractions were a major contributor to handover failure, which was defined as incomplete transfer of information and omission of important tasks.[20] Interruptions during handover can certainly impact the quality of the handover and the satisfaction of both the delivering and receiving providers.

Transfer of Information

In many institutions, the transfer of information during the hand-over remains significantly unstructured. Lorinc and colleagues studied handovers between the OR and neonatal ICU and noted that there was significant variability in team members present, expectations of those team members, and information transferred. Interestingly, in patients who were more critically ill, there was a greater number of interruptions and the handover length was shorter and less thorough.[21] Similarly, Mistry et al[22] found that barriers to safe handovers included inconsistent participation of both receiving and delivering teams, poor standardization of information content, and multiple interruptions.

Because of such variability, there is significant potential for information loss during the handover procedure. One study found that many elements of patient care may not be communicated on handover to the PACU, including administration of vasopressors, fluids, and blood products, and insertion of arterial and central access. Many items that practicing anesthesiologists deemed “necessary in handover” were reported less than half of the time, and “type of surgery” was only reported 4% of the time.[17] Similarly, Smith et al[3] observed handovers in the PACU and noted that important events were often omitted. Production pressures may limit the time allotted to the handover, resulting in incomplete transfer of data.

The handover itself is comprised of information giving on the part of the delivering team and information seeking and verifying on the part of the receiving team. Manser et al[23] found that the greatest percentage of time during handover was spent in information giving, but assessment of the patient with predictions about the patient’s course may be more helpful to the receiving team. Indeed, time allotted during the handover to ask and answer questions may be valuable not only in the care of the patient but also in provider satisfaction. Standardization of handovers can decrease the incidence of lost information, reduce task errors, and improve teamwork and nurse satisfaction.[24]

The quality of the handover may be compromised by the ready availability and accessibility of detailed intraoperative information in the electronic health record (EHR). Providers may deem the handover less important, given that much of the clinical information is already documented in the EHR. However, verbal face-to-face communication is fundamental in clinical discussion.[25] An official handover provides not only the overarching skeleton that the EHR can be used to supplement but also an opportunity for an interactive discussion about the patient that includes subjective input and observations not found in the EHR.[7,26] In addition to verbal communication, written notes and printed handouts can be helpful in preserving critical information.[27]

Personnel Dynamics

Handovers occur among providers of different disciplines and training levels: anesthesiologist to anesthesiologist, anesthesiologist to anesthesiology trainee, anesthesiologist to PACU nurse, and many more. The effective transfer of information depends, in large part, on the communication skills of both the delivering and the receiving teams. However, historically, only 8% of medical schools in the United States teach how to

conduct a proper handover.[28] There is evidence that there may be implicit status asymmetry in handovers between physicians and nurses, and that such hierarchy may prevent people from speaking up when something is wrong.[9,29,30] This so-called "authority gradient," which occurs when team members have differing levels of professional stature or expertise, has been linked to severe errors including wrong-site surgery and even patient death.[31,32] In addition, the fast-paced and large volume nature of surgical care may result in teams who work together infrequently, exacerbating the authority gradient and producing unfamiliarity and the reluctance to speak up.

Each type of provider may have their own expectations about what is needed in the handover, based on what information they need to take care of the patient in the next phase of care. For example, nurses may focus more on the "big picture," while physicians focus on critical details.[30] In addition, given the variable backgrounds of the delivering and receiving teams, it is possible that the receiving team member may not interpret the information in the same way as the delivering team member. The handover quality may vary considerably depending on the experience and training level of the delivering team member. Therefore, it may be helpful to bridge the gap between the 2 disparate teams by using a common "language"—for example, using a mnemonic such as SBAR (Situation, Background, Assessment, and Recommendation), or I-PASS, (Illness Severity, Patient Summary, Action List, Situational Planning, and Synthesis by Receiver).[30,33]

Given such differences in training, baseline communication skills, and perceptions in status, simulation may provide an opportunity to standardize communication during the handover procedure. A pilot study of anesthesia residents found that omission of information was significantly decreased after simulation training and that these gains were sustained a year later.[34] Simulation may help team members define who needs to be present at the handover. Interprofessional teams, including nurses, anesthesia providers, respiratory therapists, and others, may benefit from the simulation setting to gain familiarity with one another and with each discipline's particular role during the handover process.

Standardization in Perioperative Handovers

> "Uncontrolled variation is the enemy of quality
>
> —W. Edwards Deming[35]"

Standardization of the handover may reduce potential harm during transitions of care. Encouraged by TJC since 2006,[10] handover standardization may include the use of protocols, checklists, mnemonics, digital programs or apps, or other cognitive aids.[36] Standardization can be applied to the entire process by which care is transferred from one provider or team to another (ie, including the physical transfer of a patient with equipment and monitors from the OR to the ICU), or it can be applied to portions of the process, such as information transfer between the anesthesia provider and the ICU physician.

A number of studies have now been published evaluating interventions to improve perioperative handovers.[12,15,37–42] Nearly all of them have included some sort of structured process and/or a standard tool. Standardization reduces unnecessary variation; despite

individual clinicians' assertions that their unique approaches to routine tasks are warranted, a significant portion of variability in practice is unnecessary.[43,44] By reducing unnecessary variation, processes become more reliable and more efficient; critical steps are more often adhered to and fewer steps are omitted.

What is the Best Way to Standardize?

To date, there is neither evidence nor consensus on the *best* way to standardize perioperative handovers. One of the first and most cited methods included a Formula 1 pit crew analogy, as described by Catchpole et al.[15] Other widely accepted mnemonics, such as SBAR[45] or I-PASS,[14,33] have been used for information transfer, as have more granular checklists and mnemonics.[46,47]

How to standardize and what to include in the standard process is best determined at an institutional or a unit-based level, with buy-in and involvement from all disciplines involved in the care transition. For example, if focusing on standardizing OR to PACU handovers, a group of attending anesthesiologists, anesthesia residents, nurse anesthetists, OR nurses, PACU nurses, nursing assistants, and surgical team members should be convened to determine how to standardize the handover process in a practical way that accommodates everyone's needs. The act of standardizing the process will bring together viewpoints that may not otherwise be recognized, and may be more valuable than the details of the process itself.[19] Some structured tools should be integrated to assist with information transfer, but the use of *a* checklist or mnemonic is likely more important than *which* checklist or mnemonic is used.

What Can We Learn From Other Industries?

Perioperative settings are high-risk areas. Handovers must occur while maintaining vigilant, uninterrupted care of the patient, often in noisy, chaotic environments filled with auditory and visual distractions, some related to patient care (patient monitors and alarms), and others not (loud music, conversations). Although other handover scenarios in medical care allow practitioners to step away from direct patient care during the handover, allowing focus and limiting distractions, this is simply not always possible during perioperative care. We may be able to learn from other high-risk industries where the handover of critical tasks is also performed without breaking from continuous responsibility.

Like perioperative personnel, air traffic controllers must maintain attention while transitioning from one person to another at the end of a shift. The Federal Aviation Administration has published standards for transfer of responsibility for air traffic controllers that outline the importance of a structured process to promote safe handovers.[48] The guideline recognizes that handovers are a time of increased workload and seeks to provide a method of reducing the mental workload by creating a standard process for shift changes, with outlined responsibilities for both the incoming and the outgoing personnel. Incoming personnel are asked to review the current situation before beginning the handover and use of checklists is encouraged. The requirement for an in-person verbal handover with opportunity for the relieving personnel to ask questions and have them be completely answered is explicitly stated in the guideline, along with a clear statement declaring that transfer of

responsibility has occurred. The outgoing personnel also have responsibility to review the situation after the handover to make sure that all is well before leaving.

Common Elements for Standardized Perioperative Information Transfer

Although it is difficult to prescribe an exact process for each institution to follow for perioperative handovers, there are a number of guiding principles that are likely to be helpful in developing a standardized process. Completion of urgent tasks before beginning the handover, limiting distractions and interruptions, encouraging direct communication between providers (a “warm” handover), requiring that all relevant team members be present, and eliminating nonrelevant discussion during the handover are all important. Closed-loop communication and creating an opportunity for receiving providers to ask and answer questions can help team members create a shared mental models of the aspects of care that are most critical. Perhaps most importantly, use of a checklist or cognitive aid to assist in information transfer can standardize communication so that important elements are not missed.[20,49–51] Each institution will differ in specific elements to include in any perioperative handover. Some common postoperative handover checklist elements are provided in Table 1.

Implementation of Standardized Handovers

Challenges

A number of challenges are inherent in the implementation of any effort to improve perioperative handovers. Because handover settings can vary, transferability and generalizability may be challenging. For instance, the postoperative transition of care of a cardiac surgical patient from the OR to the cardiac surgical ICU will bear little resemblance to the signoff of the obstetric patients with an active labor epidural at the change of shift, but the same anesthesia provider may be involved in both transitions of care during a given week or month.[53,54] The challenge lies in recognizing which elements are essential to any handover and therefore transferable, versus which elements ought to be tailored to the specific environment. It is difficult to reap the benefit of standardization if a tool must be substantially altered to fit the common clinical scenarios.

Sustainability is another challenge. The intervention itself needs to be simple to execute and reinforced in preexisting systems—for instance, through incorporation of a checklist into the EHR or distribution of the checklist throughout the perioperative area. Further, efforts to onboard new providers will need to be outlined so that improvements achieved are not phased out over time as workforce turns over.

Finally, and perhaps most importantly, culture must be changed. Indeed, factors associated with a less successful implementation of quality improvement efforts include a lack of institutional commitment to improving patient safety, lack of leadership support for the program, absence of an institutional champion, and provider resistance.[55] Culture change begins with the development of the program and engagement of key stakeholders. I-PASS borrowed from the business literature in leveraging Kotter’s[56] 8-step model for transformational change, including establishing a sense of urgency, building a powerful

coalition of leaders, creating the vision, communicating the vision, empowering others to act on the vision, planning for and creating short-term wins, consolidating improvements, and institutionalizing new approaches.[57] As health care providers, we can learn effective ways to enact change management from business and other spheres.

Handover Training

The cornerstone of implementing any successful handover program is training the practitioners. Education often occurs in traditional forums, such as grand rounds presentations or faculty development workshops.[57] To improve consistency from one training session to the next, it is important that trainers themselves are adequately trained. Videos or online training programs may be used to ensure that each group of trainees receives the same messages. Hands-on sessions incorporating practice handovers and role playing will reinforce the core elements of the handover program. Furthermore, ongoing peer review and direct observation by faculty or trainers is essential to ensure that the benefits reaped by a program are sustained over time.[57]

Checklists are a common and effective component of a handover program.[12,16,18,37,58] Embedding these tools in the handover environment allows the checklist to be readily utilized and adhered to. Examples include printing posters of the checklist or wallet-sized cards that can be hung from individual identification tags. When possible, incorporating the checklist into the EHR allows data to be auto-populated and eliminates reliance on the provider's memory for specific details of, for instance, medication dosages or administration times.

Measures

As with any successful quality improvement project, it is important to measure the impact of a handover project over time. Process measures include the rate of adherence to a set handover outline or a tracking of handover score.[59] In their cardiac OR to cardiac SICU handover process implementation, the Mount Sinai Hospital in Toronto rated handover content, teamwork (eg, absence of interruptions, inclusion of readback), and patient care planning.[53] These metrics demonstrate the effectiveness of the roll-out and training sessions for a handover initiative. Outcome metrics should also be tracked; indeed, implementation of a handover program has been shown to reduce medical errors and preventable adverse events on the wards.[57] In the perioperative context, standardized handovers can reduce antibiotic delays and the number of hemodynamic and respiratory interventions required postoperatively.[60] Finally, with any new initiative, balance measures should also be used to ensure that any unintended consequences are recognized and negative effects are mitigated. Balancing measures may include length of handover and provider satisfaction.[18,53]

Summary

Perioperative handovers are a complex process that has the potential to lead to patient harm. The lack of standardization among team members present and information provided can lead to failure of communication of vital information. Standardization of the handover process can help mitigate potential errors, but must occur at the local, institutional level. In addition,

the process of implementation of the standardized handover process must include measures to ensure sustainability of the initiative. Effective communication is critical to transferring patient care in a way that mitigates harm.

Acknowledgments

E.M. receives author royalties from UpToDate. L.T. is funded by the NIH/NCI Cancer Center Support Grant P30 CA 0087478. The remaining authors declare that they have nothing to disclose.

References

1. Joint Commission. Sentinel event data—event type by year (The Joint Commission) 2016 Available at: www.jointcommission.org/se_data_event_type_by_year_/. Accessed November 1, 2018.
2. Eichenberger A-S, Haller G, Cheseaux N, et al. A clinical pathway in a post-anaesthesia care unit to reduce length of stay, mortality and unplanned intensive care unit admission. Eur J Anaesthesiol 2011;28:859–866. [PubMed: 21885983]
3. Smith AF, Pope C, Goodwin D, et al. Interprofessional handover and patient safety in anaesthesia: observational study of handovers in the recovery room. Br J Anaesth 2008;101:332–337. [PubMed: 18556692]
4. Kluger MT, Bullock MFM. Recovery room incidents: a review of 419 reports from the Anaesthetic Incident Monitoring Study (AIMS). Anaesthesia 2002;57:1060–1066. [PubMed: 12392453]
5. Kitch BT, Cooper JB, Zapol WM, et al. Handoffs causing patient harm: a survey of medical and surgical house staff. Jt Comm J Qual Patient Saf 2008;34:563–570. [PubMed: 18947116]
6. Jeffcott SA, Evans SM, Cameron PA, et al. Improving measurement in clinical handover. Qual Saf Health Care 2009;18:272–276. [PubMed: 19651930]
7. American Society of Anesthesiologists. Standards for postanesthesia care (Standards and Practice Parameters) 2014 Available at: www.asahq.org/standards-and-guidelines/standards-for-postanesthesia-care. Accessed July 6, 2016.
8. Segall N, Bonifacio AS, Schroeder RA, et al. Can we make postoperative patient handovers safer? A systematic review of the literature. Anesth Analg 2012;115:102–115. [PubMed: 22543067]
9. Greenberg CC, Regenbogen SE, Studdert DM, et al. Patterns of communication breakdowns resulting in injury to surgical patients. J Am Coll Surg 2007;204:533–540. [PubMed: 17382211]
10. Catalano K JCAHO'S National Patient Safety Goals 2006. J Perianesth Nurs 2006;21: 6–11. [PubMed: 16446238]
11. Haynes AB, Weiser TG, Berry WR, et al. A surgical safety checklist to reduce morbidity and mortality in a global population. N Engl J Med 2009;360:491–499. [PubMed: 19144931]
12. Boat AC, Spaeth JP. Handoff checklists improve the reliability of patient handoffs in the operating room and postanesthesia care unit. Paediatr Anaesth 2013;23:647–654. [PubMed: 23683085]
13. Bigham MT, Logsdon TR, Manicone PE, et al. Decreasing handoff-related care failures in children's hospitals. Pediatrics 2014;134:e572–e579. [PubMed: 25002665]
14. Starmer AJ, O'Toole JK, Rosenbluth G, et al. Development, implementation, and dissemination of the I-PASS handoff curriculum: a multisite educational intervention to improve patient handoffs. Acad Med 2014;89:876–884. [PubMed: 24871238]
15. Catchpole KR, De Leval MR, McEwan A, et al. Patient handover from surgery to intensive care: using formula 1 pit-stop and aviation models to improve safety and quality. Paediatr Anaesth 2007;17:470–478. [PubMed: 17474955]
16. Caruso TJ, Marquez JL, Wu DS, et al. Implementation of a standardized postanesthesia care handoff increases information transfer without increasing handoff duration. Jt Comm J Qual Patient Saf 2015;41:35–42. [PubMed: 25976722]
17. Siddiqui N, Arzola C, Iqbal M, et al. Deficits in information transfer between anaesthesiologist and postanaesthesia care unit staff: an analysis of patient handover. Eur J Anaesthesiol 2012;29:438–445. [PubMed: 22569028]

18. Salzwedel C, Bartz H-J, Kühnelt I, et al. The effect of a checklist on the quality of post-anaesthesia patient handover: a randomized controlled trial. Int J Qual Health Care Qual 2013;25:176–181.
19. Anderson CE, Nicksa GA, Stewart L. Distractions during resident handoffs: incidence, sources, and influence on handoff quality and effectiveness. JAMA Surg 2015;150:396–401. [PubMed: 25738805]
20. Nagpal K, Abboudi M, Fischler L, et al. Evaluation of postoperative handover using a tool to assess information transfer and teamwork. Ann Surg 2011;253:831–837. [PubMed: 21475027]
21. Lorinc A, Roberts D, Slagle J, et al. Barriers to effective preoperative handover communication in the neonatal intensive care unit. Proc Hum Factors Ergon Soc Annu Meet 2014;58:1285–1289.
22. Mistry KP, Jaggers J, Lodge AJ, et al. Advances in patient safety: ruing Six Sigma(R) methodology to improve handoff communication in high-risk patients. In: Henriksen K, Battles JB, Keyes MA, Grady ML, eds. Advances in Patient Safety: New Directions and Alternative Approaches (Vol 3: Performance and Tools) Rockville, MD: Agency for Healthcare Research and Quality; 2008:1–11.
23. Manser T, Foster S, Flin R, et al. Team communication during patient handover from the operating room: more than facts and figures. Hum Factors 2013;55:138–156. [PubMed: 23516799]
24. Nagpal K, Abboudi M, Manchanda C, et al. Improving postoperative handover: a prospective observational study. Am J Surg 2013;206:494–501. [PubMed: 24079469]
25. Coiera E, Tombs V. Communication behaviours in a hospital setting: an observational study. Br Med J 1998;316:673–676. [PubMed: 9522794]
26. Flemming D, Hübner U. How to improve change of shift handovers and collaborative grounding and what role does the electronic patient record system play? Results of a systematic literature review. Int J Med Inform 2013;82:580–592. [PubMed: 23628146]
27. Pothier D, Monteiro P, Mooktiar M, et al. Pilot study to show the loss of important data in nursing handover. Br J Nurs 2005;14:1090–1093. [PubMed: 16301940]
28. Solet DJ, Norvell JM, Rutan GH, et al. Lost in translation: challenges and opportunities in physician-to-physician communication during patient handoffs. Acad Med 2005;80:1094–1099. [PubMed: 16306279]
29. Lane-Fall M Attending intensivist handoffs are far from perfect. Crit Care Med 2018;46:1861–1862. [PubMed: 30312226]
30. Leonard M, Graham S, Bonacum D. The human factor: the critical importance of effective teamwork and communication in providing safe care. Qual Saf Health Care 2004;13(suppl 1):i85–i90. [PubMed: 15465961]
31. Cosby KS, Croskerry P. Profiles in patient safety: authority gradients in medical error. Acad Emerg Med 2004;11:1341–1345. [PubMed: 15576526]
32. Kohn LTCJ, Donaldson MS. To Err is Human: Building a Safer Health System Washington, DC: National Academy Press; 2000.
33. Starmer AJ, Spector ND, Srivastava R, et al. Changes in medical errors after implementation of a handoff program. N Engl J Med 2014;371:1803–1812. [PubMed: 25372088]
34. Pukenas EW, Dodson G, Deal ER, et al. Simulation-based education with deliberate practice may improve intraoperative handoff skills: a pilot study. J Clin Anesth 2014;26:530–538. [PubMed: 25439416]
35. Kang CW, Kvam PH. Basic Statistical Tools for Improving Quality Brentwood, CA: John Wiley & Sons Inc; 2012.
36. Riesenberg LA, Leitzsch J, Little BW. Systematic review of handoff mnemonics literature. Am J Med Qual 2009;24:196–204. [PubMed: 19269930]
37. Agarwala A, Firth P, Warren L, et al. An electronic checklist improves patient information transfer and retention at intraoperative handoff of care. Anesth Analg 2015;120:96–104. [PubMed: 25625256]
38. Caruso TJ, Marquez JLS, Gipp MS, et al. Standardized ICU to OR handoff increases communication without delaying surgery. Int J Health Care Qual Assur 2017;30:304–311. [PubMed: 28470134]
39. Craig R, Moxey L, Young D, et al. Strengthening handover communication in pediatric cardiac intensive care. Paediatr Anaesth 2012;22:393–399. [PubMed: 22211700]

40. Joy BF, Elliott E, Hardy C, et al. Standardized multidisciplinary protocol improves handover of cardiac surgery patients to the intensive care unit. Pediatr Crit Care Med 2011;12:304–308. [PubMed: 21057370]
41. Jullia M, Tronet A, Fraumar F, et al. Training in intraoperative handover and display of a checklist improve communication during transfer of care: an interventional cohort study of anaesthesia residents and nurse anaesthetists. Eur J Anaesthesiol 2017;34:471–476. [PubMed: 28437261]
42. Weinger MB, Slagle JM, Kuntz AH, et al. A multimodal intervention improves postanesthesia care unit handovers. Anesth Analg 2015;121:957–971. [PubMed: 25806398]
43. Wennberg JE. Unwarranted variations in healthcare delivery: implications for academic medical centres. BMJ 2002;325:961–964. [PubMed: 12399352]
44. Wennberg JE. Time to tackle unwarranted variations in practice. BMJ 2011;342: 687–690.
45. Haig KM, Sutton S, Whittington J. SBAR: a shared mental model for improving communication between clinicians. Jt Comm J Qual Patient Saf 2006;32:167–175. [PubMed: 16617948]
46. Lane-Fall MB, Pascual JL, Massa S, et al. Developing a standard handoff process for operating room-to-ICU transitions: multidisciplinary clinician perspectives from the Handoffs and Transitions in Critical Care (HATRICC) Study. Jt Comm J Qual Patient Saf 2018;44:514–525. [PubMed: 30166035]
47. Nasarwanji MF, Badir A, Gurses AP. Standardizing handoff communication: content analysis of 27 handoff mnemonics. J Nurs Care Qual 2016;31:238–244. [PubMed: 26845420]
48. Federal Aviation Administration. 7110.65M Air Traffic Control Washington, DC, Federal Aviation Administration; 2000.
49. Agarwala AV, Lynde GC. Intraoperative handoffs: Do they cause harm? What can we do to make them safer? ASA Monitor 2018;82:48–49.
50. Barbeito A, Agarwala AV, Lorinc A. Handovers in perioperative care. Anesthesiol Clin 2018;36:87–98. [PubMed: 29425601]
51. Patterson ES, Roth EM, Woods DD, et al. Handoff strategies in settings with high consequences for failure: lessons for health care operations. Int J Qual Health Care Qual 2004;16:125–132.
52. Agarwala AV, Nurudeen S, Haynes AB. Perioperative checklists and handoffs. Adv Anesth 2015;33:191–217.
53. Gleicher Y, Mosko JD, McGhee I. Improving cardiac operating room to intensive care unit handover using a standardised handover process. BMJ Open Qual 2017;6:e000076.
54. Dharmadasa A, Bailes I, Gough K, et al. An audit of the efficacy of a structured handover tool in obstetric anaesthesia. Int J Obstet Anesth 2015;35:84–85.
55. Alidina S, Goldhaber-Fiebert SN, Hannenberg AA, et al. Factors associated with the use of cognitive aids in operating room crises: a cross-sectional study of US hospitals and ambulatory surgical centers. Implement Sci 2018;13:50. [PubMed: 29580243]
56. Kotter J Leading change: why transformation efforts fail. Harv Bus Rev 1995;73:59–67.
57. Rosenbluth G, Destino LA, Starmer AJ, et al. Committee I-PC. I-PASS handoff program: use of a campaign to effect transformational change. Pediatr Qual Saf 2018;3:e088. [PubMed: 30229199]
58. Potestio CMJ, Kelley E, DeGroot K. Improving post anesthesia care unit (PACU) handoff by implementing a succinct checklist. APSF Newsl 2015;30:13–15.
59. Park LS, Yang G, Tan KS, et al. Does checklist implementation improve quantity of data transfer: an observation in postanesthesia care unit (PACU). Open J Anesthesiol 2017;7:69–82. [PubMed: 29780662]
60. Breuer RK, Taicher B, Turner DA, et al. Standardizing postoperative PICU handovers improves handover metrics and patient outcomes. Pediatr Crit Care Med 2015;16:256–263. [PubMed: 25607744]

Table 1.

Common Postoperative Handoff Checklist Elements

Patient demographics
Patient identification (Name, Date of Birth, Medical Record Number)
Age
Diagnosis
Surgical procedure
Medical history
American Society of Anesthesiologists Physical Status
Pertinent previous medical history
Cardiac (coronary artery disease, heart failure, hypertension, arrhythmia)
Pulmonary (asthma, chronic obstructive pulmonary disease)
Neurological (transient ischemic attack/cerebrovascular accident, Parkinson)
Liver disease
Kidney disease
Metabolic disease (diabetes)
Infectious diseases (human immunodeficiency virus, hepatitis C)
Psychiatric disease
Substance use (alcohol, tobacco, drugs)
Anesthesia risks (malignant hyperthermia, postoperative nausea, and vomiting)
Allergies
Medications
Preoperative vital signs
Operative anesthetic management
Location and size of intravenous access
Invasive monitoring
Drugs
Premedications (sedatives, enhanced recovery pathway medications)
Antibiotics
Induction agents, maintenance of anesthesia
Opioids/pain control
Vasoactive drugs
Bronchodilators
Muscle relaxants and reversal agents
Antiemetics
Procedure-related drain care, restrictions on positioning
Anesthetic course
Difficulties with intravenous access
Airway management, including ease of intubation
Intraoperative hemodynamic instability
Electrocardiographic changes
Relevant intraoperative laboratory values

Fluid balance
Amount and type of intravenous fluid
Blood loss and any blood product transfusions
Estimated fluid losses including urine output
Postoperative management and course
Laboratory tests or imaging required in PACU
Post-PACU disposition (home, inpatient floor, ICU)

ICU indicates intensive care unit; PACU, postanesthesia care unit.

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