

## **Patient-Centered Perianesthesia Communication**

### *Practice Considerations*

Providing safe surgical and anesthesia care for every patient is the primary responsibility of Certified Registered Nurse Anesthetists (CRNAs) and the entire interdisciplinary perianesthesia team. The purpose of these practice considerations is to promote a patient-centered approach for pre-procedure briefings, checklist implementation, transfer of care, and continuous quality improvement, and to foster a safety culture of open communication among the patient care team members.

### **Perioperative Errors Continue to Occur**

The incidence of perioperative errors is difficult to determine.<sup>1-5</sup> As part of a claims-based review, Kwaan et al. estimated the incidence of non-spine wrong-site operations to be 1 in 112,994.<sup>6</sup> Incidence of surgical errors may vary among different types of surgical specialties and procedures.<sup>5-11</sup> These events may occur infrequently, but patients and practitioners agree that even one error is too many. The rare incidence of surgical errors, such as wrong-site surgery, makes it difficult to determine all influencing factors involved; however, multi-factorial elements, including systems, process, or human factors, may contribute to surgical errors.<sup>12,13</sup>

Surgical errors have been associated with incomplete information, poor professional communication, lack of teamwork,<sup>13-15</sup> inexperience, and fatigue.<sup>13</sup> Current evidence does not support a single approach to assure a safe, error-free, beneficial experience for every patient.<sup>14-16</sup> The literature suggests that collaboration among healthcare team members fosters improved outcomes.<sup>6,16</sup> By implementing a collaborative approach, all assigned healthcare members become involved and share responsibility for ensuring a safe surgical experience.

### **Anesthesia-Related Incidents**

Reports indicate that, at times, near misses or adverse events occurring during surgery may be anesthesia-related.<sup>15,17,18</sup> After reviewing 433,528 reports from the Pennsylvania Patient Safety Reporting System (PA-PSRS) from 2004-2006, the reviewers categorized 427 near misses related to surgery.<sup>15</sup> Specific to anesthesia, potential near misses involved 20 cases of patient positioning and 29 cases related to anesthesia interventions. In addition, a formal time-out was not performed in 26 cases involving local anesthetics or nerve blocks.<sup>15</sup> In a review of over 48,000 pain management procedures conducted in various types of facilities, Cohen et al. identified 13 wrong-site procedures. Causes of these wrong-site procedures were identified as issues such as procedures shifted between multiple providers, not completing steps of the Universal Protocol, lack of site marking, bilateral pathology, and different practitioners obtaining the informed consent and performing the injection.<sup>19</sup> At times, patients were aware of the wrong-site block, but chose not to speak up, trusting that the clinician was doing the correct procedure.<sup>19</sup> Examples such as this highlight the need to involve patients in their care.

## Commitment to Patient Safety

The American Association of Nurse Anesthetists (AANA) strongly supports and advocates for safe surgery and anesthesia. Through patient-centered team work and communication, the following elements promote safe surgery and anesthesia:

- Advocating for patient safety and achievement of optimal outcomes;
- Involving the patient, as often as possible, in the perioperative process;
- Promoting collaboration and communication between the patient and all interdisciplinary team members;
- Ensuring that the correct procedure is performed at the correct site on the correct patient at the correct time;
- Being adequately prepared for the planned and back-up anesthetic management, including emergency procedures for potential unanticipated patient responses;
- Creating contingency plans to mitigate potential incidents or adverse events;
- Reporting and systematic review of incidents or adverse events.

## Patient Safety Initiatives

The AANA values processes that promote patient safety, including the World Health Organization's (WHO's) World Alliance for Patient Safety *Safe Surgery Saves Lives* initiative,<sup>20</sup> the WHO Surgical Safety Checklist,<sup>20</sup> and The Joint Commission's Universal Protocol.<sup>21</sup> The AANA actively participates in the National Quality Forum (NQF) and other quality organizations to support healthcare professionals in assessing, measuring, and improving performance, as well as reporting performance measures, to promote patient safety.

The WHO *Safe Surgery Saves Lives* initiative aims to improve surgical safety in all settings by defining a core set of safety standards.<sup>20</sup> The initiative's objectives focus on four topic areas: safe surgical teams, safe anesthesia, prevention of surgical site infection, and the measurement of surgical services.<sup>20</sup> The WHO Surgical Safety Checklist streamlines the surgical safety process and reinforces safe practices and improves teamwork and communication among the surgical team.<sup>20</sup>

The Joint Commission Universal Protocol is designed to mitigate the occurrence of wrong site, wrong patient, and wrong procedure errors by using pre-procedure verification, site marking, and time-out components. The Universal Protocol applies to all surgical and nonsurgical invasive procedures.<sup>22</sup> It has been most successfully implemented in facilities that promote a culture of safety, which fosters teamwork and empowers all team members to protect patient safety.<sup>22</sup>

The NQF has developed and endorsed a set of serious reportable events, which are "unambiguous, largely preventable, and serious, as well as adverse, indicative of a problem in a healthcare setting's safety systems, or important for public credibility or public accountability."<sup>23</sup> Several of these serious reportable events, also called "never events," relate to surgical or invasive procedures being performed on the wrong patient or on the wrong site, or the wrong procedure being performed.<sup>23,24</sup>

## Use of Checklists

Many processes, such as the pre-procedure verification or the transfer of patient care, can be standardized by the use of a checklist. Facility policies and guidelines that have clear checklists or behavior-specific protocols are more likely to be followed than general or ambiguous recommendations.<sup>25</sup> Checklist creation and implementation can be a complex process. Checklists can be designed as stand-alone safety measures, but are more typically part of a broader quality improvement initiative.<sup>26</sup> Team-based checklists standardize what, when, how, and by whom interventions are done and can reduce errors in routine and emergency situations.<sup>26</sup>

Checklists for various processes can aid in standardizing the flow of patient care and increase teamwork. Implementation of a pre-procedure checklist has been associated with increased awareness of potential safety issues,<sup>27</sup> increased clinical team communication,<sup>27,28</sup> and decreased postoperative complication rates,<sup>1,29</sup> while not significantly delaying surgical start times.<sup>27,30</sup> Low et al. describe the implementation of patient flow checklists at an ambulatory surgical center. They identified high-risk moments for errors that can result in an omission or oversight that may result in patient harm.<sup>31</sup> The four high-risk moments included departure from the induction room, arrival in the operating room, departure from the operating room, and arrival in the post-anesthesia care unit (PACU).<sup>31</sup> The implementation of standardized patient flow checklists and formal staff education led to 100 percent checklist compliance, increased team communication, and promoted a safety culture within the facility.<sup>31</sup>

Despite the advantages to using a checklist to standardize a process, the active engagement of the entire surgical team is crucial for the integration of a checklist to be valuable in mitigating errors.

## Safety Culture

Creating and encouraging a safety culture is a hallmark of a high-reliability team and organization. This culture of safety must demonstrate trust and accountability, identify unsafe conditions, strengthen systems, and integrate evaluation for process improvement.<sup>32</sup> Promoting a safety culture within a facility is an essential component of preventing or reducing errors and improving overall healthcare quality.<sup>33</sup> Clinicians are empowered to speak up when a mistake or error occurs in order to learn from it and identify a process that may need improvement.<sup>34</sup> Clinicians are able to “stop the line” if they feel there is a potential risk to patient safety.<sup>34,35</sup> When clinicians request to “stop the line,” this request is treated seriously and communication occurs to address all concerns and issues prior to proceeding.

In order to execute a change in the culture of an organization, all clinical providers, managers, and executive leaders need to be engaged and committed to enhance patient safety. Senior leadership accountability is a critical aspect in fostering a facility-wide safety culture.<sup>36</sup> Leaders must understand the variation in organizational culture within the facility and target educational initiatives appropriately to engage and encourage clinicians in the promotion of a patient safety culture.<sup>37</sup> Leaders cultivate a just culture and a culture of trust, encouraging all team members to communicate errors in order to learn from errors, improve systematic processes, and enhance patient safety.

The hallmark features of a facility that embraces a safety culture include:<sup>33</sup>

- Acknowledgment of the high-risk nature of an organization's activities and the determination to achieve consistently safe operations;
- A blame-free environment where individuals are able to report errors or near misses without fear of reprimand or punishment;
- Encouragement of collaboration across ranks and disciplines to seek solutions to patient safety problems;
- Organizational commitment of resources to address safety concerns.

A safety culture also encourages reporting of near misses and errors, which allows the facility to engage in a continuous quality improvement process.<sup>34</sup> In a literature review aimed to develop a conceptual safety culture model, Sammer et al. identified seven components that influence a patient safety culture.<sup>36</sup>

- **Leadership** – Leaders seek to align mission and vision, competencies, and resources across all levels of staff.
- **Teamwork** – Collegiality, collaboration, cooperation, and open, respectful communication exists among executives and staff.
- **Evidence-based** – Patient care processes are standardized and evidence-based.
- **Communication** – All staff members, regardless of position, have the right and responsibility to advocate for the patient.
- **Learning** – Learning is valued among staff. The facility strives to learn from mistakes and improve performance.
- **Just** – Recognition that errors are a system failure, rather than individual failure, while holding individuals accountable for their actions.
- **Patient-centered** – Providing care that is centered on patients and their family/care-givers. Patients are active participants in their care.

### **Situational Awareness**

Having a systematic approach to standard and emergency processes helps the surgical team function in an organized fashion. Despite the benefits of standardized checklists, all healthcare providers must continue to use their clinical judgment and situational awareness throughout the patient care process. Situational awareness refers to "the perception of elements in the environment within a volume of time and space, the comprehension of their meaning, and the projection of their status in the near future."<sup>38</sup> It involves being aware of what is happening around you and understanding how dynamically changing information, events, and actions will impact future objectives.<sup>39</sup> Situational awareness is important for decision-making, which leads to increased performance during the treatment of a patient.<sup>40</sup> Communication among team members is critical in building shared situational awareness.<sup>39</sup> As members of an interdisciplinary team, each clinician should be aware of information that is relevant to others' respective roles and responsibilities and how to coordinate and disseminate that information in a relevant way.<sup>39,40</sup>

## Pre-Procedure Communication

Ensuring a safe surgical experience for the patient begins prior to the induction of anesthesia and skin incision. A delineated, consistent, and standardized set of behavioral interventions accompanied by a compliance monitoring program is an effective measure in promoting safe surgery and anesthesia.<sup>6,41</sup> Such interventions may include site markings, preoperative briefings, and pre-procedure verification processes.<sup>6,41</sup>

Preoperative briefings are effective in promoting teamwork between anesthesia and surgical team members.<sup>16,42,43</sup> Briefings can improve care coordination and reduce the risk of near misses or wrong site surgery.<sup>16,44,45</sup> Team briefings may consist of team member introductions, a surgical time-out, and a review of anesthesia, surgical, and nursing considerations for the patient.<sup>43</sup>

## Anesthesia Pre-procedure Checks

As part of the pre-procedure preparation, anesthesia professionals should confirm the operability of all anesthesia equipment and availability of drugs prior to the induction of anesthesia.<sup>20</sup> Conducting an anesthesia safety check has been associated with a decreased risk of severe postoperative morbidity and mortality.<sup>46,47</sup> In 2008, an anesthesia equipment taskforce, which included representatives from the AANA, released the *Recommendations for Pre-Anesthesia Checkout Procedures*.<sup>48</sup> These recommendations include essential steps that should be completed prior to a procedure.<sup>47</sup> The Anesthesia Patient Safety Foundation (APSF) has also established a template Pre-Anesthetic Induction Patient Safety (PIPS) checklist (see Table 1) to provide guidance for facility policy development.<sup>49</sup>

**Table 1.** APSF Pre-Anesthetic Induction Patient Safety (PIPS) Checklist<sup>49</sup>

- Suction is working.
- Anesthesia workstation can provide ventilation with 100% oxygen under positive pressure.
- Upper airway status has been evaluated.
- Backup airway devices are immediately available.
- Patient's significant drug allergies and possible drug interactions noted.
- NPO status and aspiration risk confirmed.
- Monitors are functioning with appropriate waveforms.
- Audible and visual alarms are set appropriately.
- Appropriate medications including resuscitation drugs are available.
- Intravenous access (if indicated) is appropriate and functioning.
- Special considerations for this patient confirmed (may include but not limited to):
  - Increased risk for operating room fire.
  - Surgical positioning requirements.
  - Goals for blood pressure and/or heart rate management.

## Pre-procedure Checklist Elements

The WHO Surgical Safety Checklist was designed for use by healthcare providers to aid in improvement of the safety of operations and reduction of unnecessary surgical deaths and complications.<sup>20</sup> This checklist is divided into three sections that parallel the workflow of a procedure. Facilities should modify the process to reflect their specific patient safety needs and work-flows. The checklist is administered by a coordinator, who ensures that all processes for a

specific surgical phase are completed before moving to the next phase of the procedure.<sup>20</sup> Table 2 contains the basic elements of the WHO Surgical Safety Checklist. The WHO Surgical Safety Checklist can be downloaded in its entirety from [http://www.who.int/patientsafety/safesurgery/tools\\_resources/SSSL\\_Checklist\\_finalJun08.pdf](http://www.who.int/patientsafety/safesurgery/tools_resources/SSSL_Checklist_finalJun08.pdf).

**Table 2.** Basic Elements of the WHO Surgical Safety Checklist<sup>20</sup>

*Sign In*

- Confirmation of patient's identity, site, procedure, consent
- Site marking
- Anesthesia safety check completed
- Pulse oximeter on patient and functioning
- Known allergies?
- Difficult airway / aspiration risk?
- Risk of blood loss?

*Time out*

- Confirm all team members have introduced themselves by name and role
- Surgeon, anesthesia professional, and nurse verbally confirm the patient, site, and procedure
- Surgeon, anesthesia professional, and nurse review anticipated critical events
- Has antibiotic prophylaxis been given within last 60 minutes?
- Is essential imaging displayed?

*Sign Out*

- Nurse verbally confirms:
  - Procedure recorded
  - Instrument, sponge, and needle counts are correct
  - How specimen in labeled
  - Any equipment problems to be addressed
- Surgeon, anesthesia professional, and nurse review key concerns for recovery and patient management

## The Time-Out

The time-out is part of the WHO's Surgical Safety Checklist and The Joint Commission's Universal Protocol. The time-out is a communication tool and safety check between the anesthesia, surgical, and nursing teams.<sup>25</sup> The time-out is conducted as a final assessment that the correct procedure will be done at the correct site on the correct patient.<sup>22</sup> It is optimal for the time-out to occur prior to induction of anesthesia, as the patient can be involved in the verification process.<sup>22</sup> During the time-out, team members suspend all non-critical activities and are actively engaged in the process.<sup>22,50</sup>

Facilities have taken innovative approaches to pre-procedure verification and site markings. Warren et al. describe a verification process that incorporates self-adhesive disposable radiopaque stickers, distinguishing laterality, in order for site verification to occur both visually and by radiologic imaging for endoscopic urologic procedures.<sup>51</sup> Knight et al. describe a process that incorporates an anatomic marking form, engaging the patient from the time the decision is made to pursue surgery in confirmation of the surgical site, into their pre-procedure verification procedure.<sup>52</sup>

The site mark should be visible in the prepped and draped field during the time-out.<sup>50</sup> Clinicians should be actively engaged and communicating relevant information, rather than passively listening.<sup>50</sup> The procedure should not start until all questions, uncertainties and concerns are addressed to the satisfaction of all team members.<sup>25,50</sup> Verbally verified information should be consistent with documentation.<sup>50</sup> The Joint Commission indicates that when the patient has two or more procedures, “if the person performing the procedure changes, another time-out needs to be performed before starting each procedure.”<sup>53</sup>

## Transfer of Care

Transfer of patient care between healthcare providers is a critical time for the exchange of essential patient information. Communication failures are among the top causes of sentinel events.<sup>54</sup> A standardized model to teach and monitor verbal and written patient handoff competencies can help establish a shared common language for patient handoff communications across provider types, practice settings, and handoff types.<sup>55</sup>

Standard VII of the *Standards for Nurse Anesthesia Practice* indicates that CRNAs “evaluate the patient’s status and determine when it is safe to transfer the responsibility of care. Accurately report the patient’s condition, including all essential information, and transfer the responsibility of care to another qualified healthcare provider in a manner that assures continuity of care and patient safety.”<sup>56</sup>

Anesthesia professional involvement in the transfer of care can aid in minimizing postoperative errors.<sup>44,57,58</sup> Prior to the transfer of care from the procedural setting, anesthesia professionals should review the key concerns for the recovery and management of the patient.<sup>20</sup> Best practice elements for an effective transfer of care should include:<sup>57,59</sup>

- Two-way verbal exchange, preferably face-to-face, in which the transferring and receiving qualified healthcare providers are actively engaged;
- A nonhierarchical culture of open communication;
- A location free of distractions and interruptions;
- Development of and adherence to facility policy, which may define expectations for transfer of care and professional accountability.

Checklists and mnemonics are valuable tools that may be used during a patient handoff between clinicians to aid in the identification of important steps and provide a structured process to follow. SBAR (Situation, Background, Assessment, Recommendation) is cited most frequently in the literature as a handoff mnemonic.<sup>60</sup> SBAR facilitates standardized communication between clinicians and supports accurate information exchange.<sup>61</sup> It allows clinicians to have common expectations related to what is to be communicated and how the communication is structured.<sup>62</sup> The SBAR communication expectations are:<sup>62</sup>

- S**ituation (concise statement of the problem)
- B**ackground (pertinent and brief information related to the situation)
- A**ssessment (analysis and considerations of options)
- R**ecommendation (action requested/recommended)

Wright describes the PATIENT checklist tool, developed to help foster communication and appropriate reporting during the patient transfer process.<sup>63</sup> The mnemonic guides providers to address the following information:<sup>63</sup>

- P**atient (preoperative assessment and current condition) and **P**ositioning
- A**irway (level of difficulty, current management), **A**ntibiotics, **A**llergies, and type of **A**nesthetic
- T**emperature (including type of monitoring and warming and/or cooling adjuncts)
- I**ntravenous (including type of access, invasive lines, infusions, blood products) and **I**ntake and output
- E**nd-tidal carbon dioxide (including ventilator parameters such as respiratory rate, peak inspiratory pressure, oxygenation, and ventilation mode)
- N**arcotics (including those administered as well as those that the oncoming anesthesia professional is responsible for reconciling)
- T**witches (including type of neuromuscular monitoring and degree of paralysis)

In a systematic review of available handoff mnemonics, Riesenberget al. describe other effective patient handoff tools which include: AIDET, ANTICipate, ASHICE, CUBAN, DeMIST, GRRRR, HANDOFFS, I PASS the BATON, Just Go NUTS, MIST, PACE, PEDIATRIC, I-SBAR, SBARR, SBAR-T, SHARED, SHARQ, SIGNOUT, SOAP, STICC, 4 P's, 5 P's (version 1), and 5 P's (version 2).<sup>60</sup> These tools range across specialties (e.g., anesthesia, emergency medicine, perioperative nursing, residents, and transporters). With the availability of so many tools, communication between facility clinicians is key in providing a consistent, concise, and effective patient transfer of care report within the selected framework.

Patient transfer of care can be supported by information technology.<sup>64</sup> Vawdrey et al. describe the development, integration, and implementation of a Patient Handoff Application into a commercial electronic medical record system. After overcoming the challenges of system integration and meeting the needs of numerous specialties and facility sites, their efforts resulted in increased collaboration, time savings, improved medication management, documentation, and the ability to create formatted generalized reports.<sup>64</sup>

As noted previously, executive leadership has an impact on the safety culture of a facility. Richter et al. conducted a Hospital Survey on Patient Safety Culture and analyzed results from 1,052 hospitals' perceptions about organizational factors that influence patient safety.<sup>65</sup> The authors found that perceptions of staffing and management support for patient safety were significantly associated with perceived successful handoffs for both management and clinical staff. Richter et al. conclude that facilities should strive to improve communication across units to support successful handoffs.<sup>65</sup>

## **Regional Anesthesia and Vascular Catheter Insertion**

Regional anesthesia and pain management procedures should undergo a pre-procedure verification process.<sup>19,66-68</sup> The American Society of Regional Anesthesia and Pain Medicine (ASRA) recommends site marking as part of a regional block pre-procedural checklist.<sup>68</sup> ASRA recommends that a time out be performed before needle insertion for each new block site if the position is changed or separated in time or performed by another team.<sup>68</sup>

Anesthesia professionals may see the patient prior to the beginning of the surgical procedure to place a vascular catheter or a regional anesthetic. Facilities are encouraged to address site marking and verification related to the placement and management of vascular catheters and nerve blocks prior to surgery.

### **Continuous Quality Improvement**

As healthcare evolves, the delivery of patient-centered quality care continues to be at the forefront. Quality improvement methodologies, such as Continuous Quality Improvement (CQI), Six Sigma, Lean, Total Quality Management (TQM), Plan-Do-Study-Act (PDSA), and Statistical Process Control (SPC), which originated from the manufacturing industry, can be applied to the healthcare and surgical setting.<sup>69</sup> Facilities that have implemented quality improvement strategies provide added value to the patient, streamline processes, increase operating room efficiency, reduce infection rates, and reduce costs.<sup>69</sup>

Integrating Lean principles into facility operations is one approach that has proven effective as facilities move towards greater emphasis on continuous quality improvement.<sup>70</sup> Principles of Lean include:<sup>70</sup>

- Embracing a culture of continuous improvement;
- Improving healthcare value for patients;
- Uniting staff for a common purpose with set priorities;
- Supporting front-line workers to drive innovation and change;
- Displaying performance metrics in a transparent format;
- Creating and continually innovating to improve a standard process.

A safety culture learns from near misses and adverse events as part of a continuous quality improvement process. Facilities may adopt various evaluation strategies to proactively and retrospectively monitor and review incidents or adverse events. For example, failure mode effect analysis is a proactive risk management strategy for potential error identification and reduction.<sup>71</sup> PDSA, also called Plan-Do-Check-Act (PDCA), is a four-step model for implementing change. The cycle includes: (1) defining a purpose and setting clear, measurable goals; (2) implementing the plan; (3) monitoring the outcomes, whether successes or problems; and (4) integrating the lessons learned into the process. The steps continue to be repeated as part of a continuous quality improvement effort.<sup>72</sup> If an adverse event or incident occurs, facilities should use a retrospective analysis technique, such as root-cause analysis, to conduct an objective evaluation of the factors that lead to the error.<sup>73</sup> To add value, provide expertise, and enhance the quality of care delivered to patients, CRNAs should participate in ongoing quality improvement initiatives within their facilities.

### **Conclusion**

An organization's mission, service lines, healthcare provider mix, and unique patient population may influence the choice and implementation methods of the practices described above. CRNAs are patient advocates, supporting the safety and well-being of the patients under their care.<sup>74</sup> CRNAs should be active participants in the entire pre-surgical verification process (e.g., preoperative briefings, time-outs), conduct structured transfers of care, and encourage a culture of open communication among all healthcare team members to foster safe surgical and anesthesia care.

## References

1. de Vries EN, Prins HA, Crolla RM, et al. Effect of a comprehensive surgical safety system on patient outcomes. *N Engl J Med*. Nov 11 2010;363(20):1928-1937.
2. To err is human: building a safer health system. In: Kohn L, J. C, M. D, eds. *Institute of Medicine*. Washington, DC: National Academy Press; 1999: [http://www.nap.edu/catalog.php?record\\_id=9728](http://www.nap.edu/catalog.php?record_id=9728). Accessed August 1, 2014.
3. The Joint Commission. Sentinel Event Alert, Issue 6: Lessons Learned: Wrong Site Surgery. 1998; [http://www.jointcommission.org/assets/1/18/SEA\\_6.pdf](http://www.jointcommission.org/assets/1/18/SEA_6.pdf). Accessed August 1, 2014.
4. The Joint Commission. Sentinel Event Alert, Issue 24: A Follow-up Review of Wrong Site Surgery. 2001; [http://www.jointcommission.org/assets/1/18/SEA\\_24.pdf](http://www.jointcommission.org/assets/1/18/SEA_24.pdf). Accessed August 1, 2014.
5. Jhawar BS, Mitsis D, Duggal N. Wrong-sided and wrong-level neurosurgery: a national survey. *J Neurosurg Spine*. Nov 2007;7(5):467-472.
6. Kwaan MR, Studdert DM, Zinner MJ, Gawande AA. Incidence, patterns, and prevention of wrong-site surgery. *Arch Surg*. Apr 2006;141(4):353-357; discussion 357-358.
7. Lee JS, Curley AW, Smith RA, Insitute of M. Prevention of wrong-site tooth extraction: clinical guidelines. *J Oral Maxillofac Surg*. Sep 2007;65(9):1793-1799.
8. Groff MW, Heller JE, Potts EA, Mummaneni PV, Shaffrey CI, Smith JS. A survey-based study of wrong-level lumbar spine surgery: the scope of the problem and current practices in place to help avoid these errors. *World Neurosurg*. Mar-Apr 2013;79(3-4):585-592.
9. James MA, Seiler JG, 3rd, Harrast JJ, Emery SE, Hurwitz S. The occurrence of wrong-site surgery self-reported by candidates for certification by the American Board of Orthopaedic Surgery. *J Bone Joint Surg Am*. Jan 4 2012;94(1):e2(1-12).
10. Schweitzer KM, Jr., Brimmo O, May R, Parekh SG. Incidence of wrong-site surgery among foot and ankle surgeons. *Foot Ankle Spec*. Feb 2011;4(1):10-13.
11. Shen E, Porco T, Rutar T. Errors in strabismus surgery. *JAMA Ophthalmol*. Jan 2013;131(1):75-79.
12. van Wagendonk I, Smits M, Merten H, Heetveld MJ, Wagner C. Nature, causes and consequences of unintended events in surgical units. *Br J Surg*. Nov 2010;97(11):1730-1740.
13. Gawande AA, Zinner MJ, Studdert DM, Brennan TA. Analysis of errors reported by surgeons at three teaching hospitals. *Surgery*. Jun 2003;133(6):614-621.
14. Gibbs VC. Patient safety practices in the operating room: correct-site surgery and nothing left behind. *Surg Clin North Am*. Dec 2005;85(6):1307-1319, xiii.
15. Clarke JR, Johnston J, Finley ED. Getting surgery right. *Ann Surg*. Sep 2007;246(3):395-403, discussion 403-395.
16. Makary MA, Mukherjee A, Sexton JB, et al. Operating room briefings and wrong-site surgery. *J Am Coll Surg*. Feb 2007;204(2):236-243.
17. Fritzen T, Kremer M, Biddle C. The AANA Foundation Closed Malpractice Claims Study on nerve injuries during anesthesia care. *AANA J*. Oct 2003;71(5):347-352.
18. Cheney FW, Domino KB, Caplan RA, Posner KL. Nerve injury associated with anesthesia: a closed claims analysis. *Anesthesiology*. Apr 1999;90(4):1062-1069.
19. Cohen SP, Hayek SM, Datta S, et al. Incidence and root cause analysis of wrong-site pain management procedures: a multicenter study. *Anesthesiology*. Mar 2010;112(3):711-718.

20. WHO Guidelines for Safe Surgery. World Alliance for Patient Safety. World Health Organization. 2008;  
[http://www.who.int/patientsafety/safesurgery/knowledge\\_base/WHO\\_Guidelines\\_Safe\\_Surgery\\_finalJun08.pdf](http://www.who.int/patientsafety/safesurgery/knowledge_base/WHO_Guidelines_Safe_Surgery_finalJun08.pdf). Accessed August 1, 2014.
21. Universal Protocol. The Joint Commission.  
[http://www.jointcommission.org/standards\\_information/up.aspx](http://www.jointcommission.org/standards_information/up.aspx). Accessed August 1, 2014.
22. The Joint Commission. National Patient Safety Goals Effective January 1, 2014.  
[http://www.jointcommission.org/assets/1/6/HAP\\_NPSG\\_Chapter\\_2014.pdf](http://www.jointcommission.org/assets/1/6/HAP_NPSG_Chapter_2014.pdf). Accessed August 1, 2014.
23. National Quality Forum (NQF). Serious Reportable Events In Healthcare - 2011 Update: A Consensus Report. Washington, DC: NQF; 2011.
24. Agency for Healthcare Research and Quality (AHRQ). Patient Safety Primers: Never Events. <http://psnet.ahrq.gov/primer.aspx?primerID=3>. Accessed July 24, 2014.
25. Michaels RK, Makary MA, Dahab Y, et al. Achieving the National Quality Forum's "Never Events": prevention of wrong site, wrong procedure, and wrong patient operations. *Ann Surg*. Apr 2007;245(4):526-532.
26. Winters BD, Gurses AP, Lehmann H, Sexton JB, Rampersad CJ, Pronovost PJ. Clinical review: checklists - translating evidence into practice. *Crit Care*. 2009;13(6):210.
27. Takala RS, Pauniah SL, Kotkansalo A, et al. A pilot study of the implementation of WHO surgical checklist in Finland: improvements in activities and communication. *Acta Anaesthesiol Scand*. Nov 2011;55(10):1206-1214.
28. Calland JF, Turrentine FE, Guerlain S, et al. The surgical safety checklist: lessons learned during implementation. *Am Surg*. Sep 2011;77(9):1131-1137.
29. Paull DE, Mazzia LM, Wood SD, et al. Briefing guide study: preoperative briefing and postoperative debriefing checklists in the Veterans Health Administration medical team training program. *Am J Surg*. Nov 2010;200(5):620-623.
30. Mainthia R, Lockney T, Zotov A, et al. Novel use of electronic whiteboard in the operating room increases surgical team compliance with pre-incision safety practices. *Surgery*. May 2012;151(5):660-666.
31. Low DK, Reed MA, Geiduschek JM, Martin LD. Striving for a zero-error patient surgical journey through adoption of aviation-style challenge and response flow checklists: a quality improvement project. *Paediatr Anaesth*. Jul 2013;23(7):571-578.
32. Chassin MR, Loeb JM. High-reliability health care: getting there from here. *Milbank Q*. Sep 2013;91(3):459-490.
33. Agency for Healthcare Research and Quality (AHRQ). Patient Safety Primers: Safety Culture. <http://psnet.ahrq.gov/primer.aspx?primerID=5>. Accessed July 24, 2014.
34. Furman C, Caplan R. Applying the Toyota Production System: using a patient safety alert system to reduce error. *Jt Comm J Qual Patient Saf*. Jul 2007;33(7):376-386.
35. Washington University School of Medicine in St. Louis. Stop the line: Responsibility and authority to intervene to protect patient safety. 2010;  
<https://fpp.wustl.edu/fpppolicies/Documents/Policies/Stop%20The%20Line%20Policy%2010.01.19.pdf>. Accessed August 1, 2014.
36. Sammer CE, Lykens K, Singh KP, Mains DA, Lackan NA. What is patient safety culture? A review of the literature. *J Nurs Scholarsh*. Jun 2010;42(2):156-165.

37. Morello RT, Lowthian JA, Barker AL, McGinnes R, Dunt D, Brand C. Strategies for improving patient safety culture in hospitals: a systematic review. *BMJ Qual Saf.* Jan 2013;22(1):11-18.
38. Endsley MR. Towards a theory of situation awareness in dynamic systems. *Hum Factors.* 1995;37:32-64.
39. Gillespie BM, Gwinner K, Fairweather N, Chaboyer W. Building shared situational awareness in surgery through distributed dialog. *J Multidiscip Healthc.* 2013;6:109-118.
40. Schulz CM, Endsley MR, Kochs EF, Gelb AW, Wagner KJ. Situation awareness in anesthesia: concept and research. *Anesthesiology.* Mar 2013;118(3):729-742.
41. 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.* Jan 29 2009;360(5):491-499.
42. Ali M, Osborne A, Bethune R, Pullyblank A. Preoperative surgical briefings do not delay operating room start times and are popular with surgical team members. *J Patient Saf.* Sep 2011;7(3):139-143.
43. Hicks CW, Rosen M, Hobson DB, Ko C, Wick EC. Improving Safety and Quality of Care With Enhanced Teamwork Through Operating Room Briefings. *JAMA Surg.* Jul 9 2014.
44. Nagpal K, Vats A, Ahmed K, et al. A systematic quantitative assessment of risks associated with poor communication in surgical care. *Arch Surg.* Jun 2010;145(6):582-588.
45. Einav Y, Gopher D, Kara I, et al. Preoperative briefing in the operating room: shared cognition, teamwork, and patient safety. *Chest.* Feb 2010;137(2):443-449.
46. Arbous MS, Meursing AE, van Kleef JW, et al. Impact of anesthesia management characteristics on severe morbidity and mortality. *Anesthesiology.* Feb 2005;102(2):257-268; quiz 491-252.
47. Feldman JM, Olympio MA, Martin D, Striker A. New Guidelines Available for Pre-Anesthesia Checkout. *APSF Newsletter.* Spring 2008;23(1):6-7.
48. Recommendations for Pre-Anesthesia Checkout Procedures. 2008; [http://www.asahq.org/For-Members/Clinical-Information/~/\\_media/For%20Members/Standards%20and%20Guidelines/FINALCheckoutDesignguidelines.ashx](http://www.asahq.org/For-Members/Clinical-Information/~/_media/For%20Members/Standards%20and%20Guidelines/FINALCheckoutDesignguidelines.ashx). Accessed August 1, 2014.
49. Stoelting RK. APSF survey helps establish pre-induction checklist. *APSF Newsletter.* Spring-Summer 2013;28(1):1, 11-13.
50. Pennsylvania Patient Safety Authority. Time-Out! Wrong-Site Surgery Update. *Pennsylvania Patient Safety Advisory.* June 2011;8(2):80-84.
51. Warren GJ, Roberts WW, Hollingsworth J, Wolf JS, Jr., Faerber GJ. Prevention of wrong site surgery during upper tract endoscopy. *Urology.* Feb 2012;79(2):475-477.
52. Knight N, Aucar J. Use of an anatomic marking form as an alternative to the Universal Protocol for Preventing Wrong Site, Wrong Procedure and Wrong Person Surgery. *Am J Surg.* Dec 2010;200(6):803-807; discussion 807-809.
53. The Joint Commission. Speak Up - The Universal Protocol for Preventing Wrong Site, Wrong Procedure, and Wrong Person Surgery. [http://www.jointcommission.org/assets/1/18/UP\\_Poster1.PDF](http://www.jointcommission.org/assets/1/18/UP_Poster1.PDF). Accessed August 1, 2014.
54. The Joint Commission. Sentinel Event Data - Root Causes by Event Type. 2014; [http://www.jointcommission.org/Sentinel\\_Event\\_Statistics/](http://www.jointcommission.org/Sentinel_Event_Statistics/). Accessed August 1, 2014.
55. 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.* Jun 2014;89(6):876-884.

56. Standards for Nurse Anesthesia Practice. Park Ridge, IL: American Association of Nurse Anesthetists; 2013.
57. Clarke CM, Persaud DD. Leading clinical handover improvement: a change strategy to implement best practices in the acute care setting. *J Patient Saf.* Mar 2011;7(1):11-18.
58. Smith AF, Mishra K. Interaction between anaesthetists, their patients, and the anaesthesia team. *Br J Anaesth.* Jul 2010;105(1):60-68.
59. Knych SA. Handoffs and transitions in care: an inpatient perspective. *Prescriptions for Excellence in Health Care.* 2011(11).
60. Riesenber LA, Leitzsch J, Little BW. Systematic review of handoff mnemonics literature. *Am J Med Qual.* May-Jun 2009;24(3):196-204.
61. Randmaa M, Martensson G, Leo Swenne C, Engstrom M. SBAR improves communication and safety climate and decreases incident reports due to communication errors in an anaesthetic clinic: a prospective intervention study. *BMJ Open.* 2014;4(1):e004268.
62. Institute for Healthcare Improvement (IHI). SBAR Toolkit. 2014; <http://www.ih.org/resources/Pages/Tools/SBARToolkit.aspx>. Accessed August 18, 2014.
63. Wright SM. Examining transfer of care processes in nurse anesthesia practice: introducing the PATIENT protocol. *AANA J.* Jun 2013;81(3):225-232.
64. Vawdrey DK, Stein DM, Fred MR, Bostwick SB, Stetson PD. Implementation of a computerized patient handoff application. *AMIA Annu Symp Proc.* 2013;2013:1395-1400.
65. Richter JP, McAlearney AS, Pennell ML. The influence of organizational factors on patient safety: Examining successful handoffs in health care. *Health Care Manage Rev.* Jul 15 2014.
66. Nixon HC, Wheeler P. Wrong-site lower extremity peripheral nerve block: process changes to improve patient safety. *Int Anesthesiol Clin.* Spring 2011;49(2):116-124.
67. Stanton MA, Tong-Ngork S, Liguori GA, Edmonds CR. A new approach to preanesthetic site verification after 2 cases of wrong site peripheral nerve blocks. *Reg Anesth Pain Med.* Mar-Apr 2008;33(2):174-177.
68. Mulroy MF, Weller RS, Liguori GA. A checklist for performing regional nerve blocks. *Reg Anesth Pain Med.* May-Jun 2014;39(3):195-199.
69. Nicolay CR, Purkayastha S, Greenhalgh A, et al. Systematic review of the application of quality improvement methodologies from the manufacturing industry to surgical healthcare. *Br J Surg.* Mar 2012;99(3):324-335.
70. Toussaint JS, Berry LL. The promise of Lean in health care. *Mayo Clin Proc.* Jan 2013;88(1):74-82.
71. Chiozza ML, Ponzetti C. FMEA: a model for reducing medical errors. *Clin Chim Acta.* Jun 2009;404(1):75-78.
72. The W. Edwards Deming Institute. The PDSA Cycle. 2014; <https://www.deming.org/theman/theories/pdsacycle>. Accessed August 1, 2014.
73. Cassin BR, Barach PR. Making sense of root cause analysis investigations of surgery-related adverse events. *Surg Clin North Am.* Feb 2012;92(1):101-115.
74. Code of Ethics for the Certified Registered Nurse Anesthetist. Park Ridge, IL: American Association of Nurse Anesthetists; 2005.

---

Adopted by AANA Board of Directors September 2014.

© Copyright 2014