

Promoting Patient Safety With Perioperative Hand-off Communication

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Effective perioperative hand-off communication is essential for patient safety. The purpose of this quality improvement project was to demonstrate how a structured hand-off tool and standardized process could increase effective perioperative communication of essential elements of care and assist in the timely recognition of patients at risk for clinical deterioration in the initial postoperative period. A team-based pilot project used the Iowa Model of Evidence-Based Practice and the principles of Lean Six Sigma to implement Perioperative PEARLS, a perioperative specific hand-off communication tool and a standardized framework for hand-off communication. The implementation of a structured hand-off tool and standardized process supports compliance with regulatory standards of care and eliminates waste from the hand-off process. A review of pre-implementation and post-implementation data revealed evidence of safer patient care. Evidence-based perioperative hand-off communication facilitates expedited patient evaluation, rapid interventions, reduction in adverse events, and a safer perioperative environment.

Keywords: *hand-off communication, perioperative, evidence-based practice, patient safety, Lean Six Sigma.*

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EFFECTIVE COMMUNICATION OF INFORMATION between health care providers is a fundamental principle of patient care. Efficient nursing communication is the foundation that ensures safe patient care during times of transition. Lack of complete, accurate communication between the caregiver and the receiver of patient information at points of transition is a major issue affecting the quality and safety of patient care in the current health care system. The focus of this quality improvement project was to promote best hand-off practice for perioperative nurses.

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Background and Significance

The process of hand-off communication has three objectives: transferring of the responsibility of care, establishing an audit or end point in care between providers, and conveying knowledge to facilitate continuation of patient care.¹ Communication failures are a leading cause of preventable adverse events that a hospitalized patient experiences in the modern American health care system.² Each transition of care when patient information is communicated from one provider to the next is a high-risk period for communication breakdown where information can be lost and/or misinterpreted.

In the postanesthesia care unit (PACU), frequent, brief, and complex handoffs occur. Handoffs are typically succinct and informal, without written documentation of the content. Handoffs involve clinical tasks, the transfer of information, and responsibility for patient care. Owing to the clinical

instability of the postoperative patient, the PACU nurse simultaneously performs patient care tasks with information transfer from the operating room (OR) and anesthesia staff. The combination of nursing care tasks with information transfer makes communication of intraoperative information susceptible to loss and error. Effective communication is adversely impacted by distractions and interruptions. Given the complexity of surgery, it is critical that adequate patient information is communicated during transitions of care.

Effective and standardized communication between care providers at perioperative handoff points helps to facilitate patient safety, anticipate, and limit complications. Ineffective handoffs can contribute to gaps in patient care and failures in patient safety. National and state accreditation and regulatory entities have recognized the significance of hand-off communication.

The purpose of this quality improvement project was to demonstrate how a structured hand-off tool and standardized process can increase effective perioperative communication of essential elements of care and assist in the timely recognition of patients at risk for clinical deterioration in the initial postoperative period (phase one). This project supports compliance with established regulatory standards for hand-off communication and eliminates waste from the hand-off process.

Evidence Used for the Practice Change

There is no universal approach to hand-off communication. A handoff in care occurs when accountability and responsibility for a patient are transferred from one health care provider to another.³ The primary function of the handoff is to communicate essential patient data to provide safe, contiguous care. The health care providers assuming care of the patient require up-to-date patient information to make informed decisions and provide seamless care.

An analysis of sentinel events by The Joint Commission identified communication as the top contributing factor to medical error, with handoff playing a distinct role in an estimated 80% of serious preventable adverse events.⁴ National Patient Safety Goal 2E, initiated in 2009, is now Element of Performance 2 for Standard

PC.02.02.01. ("The hospital coordinates the patients' care, treatment, and services based on the patients' needs.")⁵ The safety standard for hand-off communication requires communication that is timely, accurate, completely unambiguous, and understood by the recipient. The redesign of the perioperative hand-off processes in this project met The Joint Commission standard and promotes safe patient care.⁵

Critical Appraisal of the Evidence

The current format of postoperative handovers in the PACU did not meet the primary purpose of a handoff, which is the accurate transfer of information about a patient's state and care plan to ensure the safety and continuity of patient care.⁶ The literature has described perioperative handoff using terms such as brief, inconsistent, unstructured, incomplete information transfer, and informal. Disparity exists with the expectations of the Joint Commission that handoffs follow the structured formal approach of communication that is seen in highly reliable industries such as the airline and nuclear power industry.⁷

The lack of a standardized perioperative hand-off process creates the potential for error. The PACU environment is filled with distraction, concurrent activities and interruptions that influence the attention of nurses during handoff. Different members of the PACU are involved transiently in the care of the patient, so the primary care nurse is not clearly identifiable.¹ In the perioperative setting, a premium is placed on efficiency. There are strict schedules that must be kept despite constant interruptions from emergencies, add-ons, delays, and complications. Time becomes a barrier to communication. Rushing the handoff can lead to small, yet critical mistakes that can ultimately harm patients.⁸ When insufficient time is allotted for handoffs, time constraints lead to omission of pertinent patient details.⁹

The current recommendation is a guided, structured communication process for patient hand-off communication. Several standardized frameworks for generic hand-off communication are available. The SBAR (situation, background, assessment, and recommendation) communication tool is one of the most well established. The SBAR tool provides a focus to the hand-off

process by establishing what information will be communicated and how it will be communicated, which helps to promote teamwork and improves the culture of patient safety.⁹ A structured tool establishes guidelines and standardizes the communication of pertinent content during handoff. The actual content of the information to be included in the perioperative hand-off protocol should be developed from surveying the managers and staff members of the departments involved to meet the needs of the end user and promote compliance.¹⁰ Current literature lacks a perioperative specific communication tool, which could improve the unique handoff between health care professionals in the immediate postoperative period.

Perioperative Hand-off Project Plan

This quality improvement project was conducted in an acute care community hospital located in a suburb of a large metropolitan area. The facility has eight ORs and a 12-bed PACU. Owing to the nature of this practice change project, the director of surgical services determined that participation by all perioperative registered nurses (RNs) was required. No inclusion or exclusion criteria were applied to the postoperative patient population associated with the practice change project. The facility institutional review board approved the practice change as an expedited project, following initial review by the nursing research and evidence-based council.

Iowa Model of Evidence-Based Practice

The Iowa Model of Evidence-Based Practice¹¹ was used as the framework to facilitate the perioperative hand-off communication project. The Iowa Model was chosen for this project for its application to facilitate organization and establish a method for communication with the perioperative team. The model integrates a team approach to collaborate and communicate on project decisions. The Iowa Model is initiated with an emphasis on either knowledge or problem-based “triggers”^{11,12} that establish the project trajectory. This project was based on the problem-focused trigger of the need for consistent patient information to be communicated in a structured manner that met regulatory requirements. These issues supported the project as a priority for perioperative practice. A multidisciplinary

team was formed to address the issue and included a doctor of nursing practice student, OR nurse champion, PACU nurse champion, Certified Registered Nurse Anesthetist (CRNA) champion, director of surgical services, OR and PACU clinical supervisors, and a Lean Six Sigma master black belt. The evidence obtained from the literature review demonstrated sufficient findings to restructure the hand-off communication process and develop a perioperative specific hand-off communication tool.

Lean Six Sigma Methodology

The foundation of Lean Six Sigma is based on the core principles of standardized work and continuous improvement. Standardized work is the current best way to safely complete an activity with the proper outcome and the highest quality. Standardized work is the method for developing best practices. Analysis of the work helps to define the best way of doing the work.¹³

The multidisciplinary team met to identify the components of handoff that are prone to error, delay, and redundancy. These issues classified as waste include: any activity that consumes resources but does not add value to patient care.¹³ Lean Six Sigma initiatives focus on eliminating waste or nonvalued activities in a process to achieve sustainable improvement. A value stream map is a structured diagram that identifies all of the specific actions required during the entire end-to-end process for patient care or patient flow.¹³ The team met to complete an “as is” (current state) value stream map (Figure 1) of perioperative handoff (OR to PACU). The goal was to identify waste in the hand-off process. The team reconvened to review the “as is” value stream map. The development of a “future/ideal state” (ideal state; Figure 2) value stream map demonstrated waste elimination from the perioperative hand-off process. Implementation of the “future/ideal state” map was adopted as the process for handoff, after staff education.

Perioperative PEARLS

Standardizing the hand-off content ensures that each member of the team understands the significant clinical information. To facilitate an individual's comprehension of what is communicated,

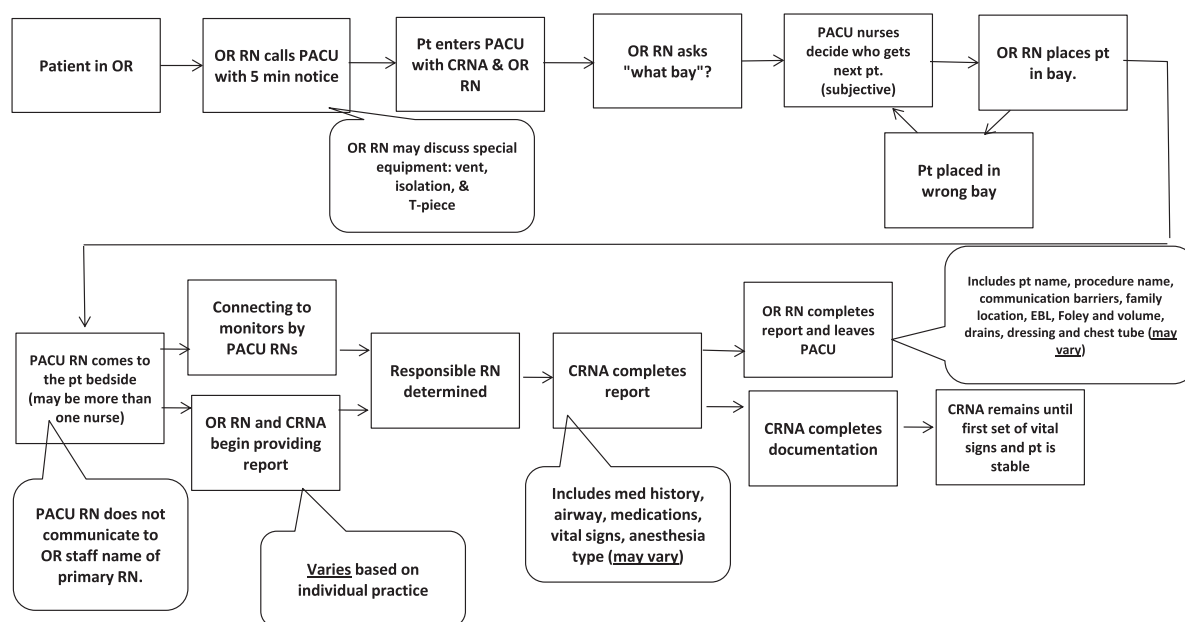


Figure 1. OR PACU handoff - present state map. CRNA, Certified Registered Nurse Anesthetist; EBL, estimated blood loss; OR, operating room; PACU, postanesthesia care unit; Pt, patient.

information must be organized in a format that the recipient is prepared to process. The use of a checklist as a memory aid serves two purposes: first, it ensures that critical information necessary for patient care is not omitted; and second, it provides a consistent order in which information should be communicated.

A literature search did not yield a perioperative specific hand-off tool. Many hand-off tools use the SBAR acronym. Owing to the nature of the perioperative environment, it was determined that SBAR might not be the most effective acronym to use for handoff. A review of the American Society of PeriAnesthesia Nurses (ASPAN) standards, a literature review, and results of the OR, PACU, and CRNA questionnaires contributed to the development of the hand-off tool Perioperative PEARLS (Table 1). Although PEARLS is not an acronym like SBAR, each letter in the word PEARLS corresponds with essential elements of care unique to the perioperative patient population.

Pilot Project

The pilot project was implemented in phases. The initial phase included the completion of a perioperative hand-off communication audit tool

(Table 2) pre-implementation. Direct observation of handoff from the OR to PACU is a critical element in the establishment of a facility appropriate hand-off tool.

A four-point Likert scale questionnaire on perioperative hand-off content was developed. The questionnaire included aspects of nurse-to-nurse communication, intraoperative patient information such as position, special devices, drains, packing, tubes, and types of dressing. Adequacy of time for handoff and the need for a more comprehensive report were also assessed. The results of the questionnaire assisted in the development of the perioperative specific hand-off tool, Perioperative PEARLS.

One week before the practice change implementation, flyers announcing Perioperative PEARLS were strategically placed in the OR and PACU areas. A PowerPoint educational presentation and opportunities for perioperative hand-off simulation to reinforce the application of the hand-off communication process were provided for all perioperative RNs. Content included background information on hand-off communication theory, regulatory requirements, the "future/ideal state" value stream map, and the hand-off tool,

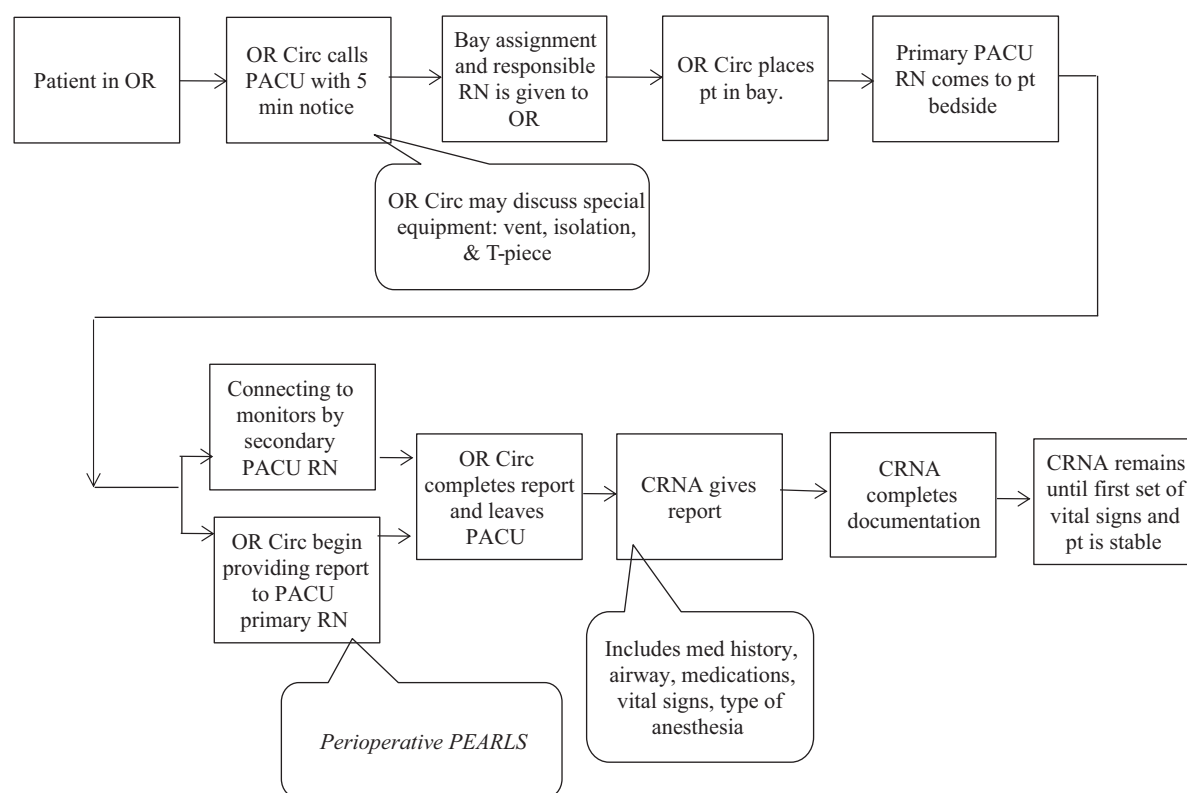


Figure 2. OR PACU handoff - future state map. CRNA, Certified Registered Nurse Anesthetist; OR, operating room; PACU, postanesthesia care unit; RN, registered nurse.

Perioperative PEARLS. Content included the revised process for the patient trajectory from the OR to PACU, which incorporated the regulatory requirements for handoff and a more comprehensive patient admission process (Figure 3). A written quiz and evaluation were completed to ensure competency. Laminated signs of Perioperative PEARLS were posted in all of the ORs, PACU bays, staff lounges, nurse stations, and anesthesia workroom.

Evaluation Method

Evaluations were completed using a precomparison and/or postcomparison of knowledge and process. There were two areas of evaluation. First, the perioperative nursing staff completed a competency assessment to provide validation of understanding of hand-off communication and the proper use of Perioperative PEARLS. Second, data from hand-off observation audits were compared for 1 month before and after the implementation of Perioperative PEARLS and the Lean

Six Sigma “future state” value stream map. Close monitoring of perioperative hand-off practice provided opportunities for re-education, clarification of any questions or concerns, and effectiveness of the practice change. An extensive literature search was conducted to locate an established tool that would facilitate evaluation of perioperative hand-off communication. The literature lacked sufficient perioperative specific tools that would enable the outcome measurement of hand-off effectiveness. It was necessary to self-develop a perioperative specific hand-off audit tool that incorporated the essential elements of the hand-off process. Expert opinion of a PhD prepared nurse researcher was used to ensure the hand-off audit tool met project design and outcome specifications. The outcomes measured related to the improved effective communication of essential clinical information in the immediate postanesthesia period (1 to 2 hours after completion of surgical procedure). The tool also measured the standardized communication between perioperative care providers and

Table 1. Perioperative PEARLS

P	Patient name: _____ Age: _____ Allergies: _____ Procedure performed _____ Primary language spoken: <input type="checkbox"/> English <input type="checkbox"/> other: _____ Past medical history: <input type="checkbox"/> Diabetes <input type="checkbox"/> HTN <input type="checkbox"/> COPD <input type="checkbox"/> Asthma <input type="checkbox"/> OSA <input type="checkbox"/> Renal Disease <input type="checkbox"/> Seizures <input type="checkbox"/> Cardiac <input type="checkbox"/> CAD <input type="checkbox"/> PVD <input type="checkbox"/> CVA <input type="checkbox"/> Liver Disease <input type="checkbox"/> ETOH <input type="checkbox"/> Smoking (ppd _____) <input type="checkbox"/> Arthritis <input type="checkbox"/> MRSA <input type="checkbox"/> VRE <input type="checkbox"/> TB <input type="checkbox"/> C Diff <input type="checkbox"/> Deaf <input type="checkbox"/> HOH <input type="checkbox"/> Blind Position during surgery: <input type="checkbox"/> supine <input type="checkbox"/> prone <input type="checkbox"/> lithotomy (type of stirrups: <input type="checkbox"/> candy cane <input type="checkbox"/> Allen) <input type="checkbox"/> jack knife <input type="checkbox"/> Other _____ Precautions: <input type="checkbox"/> falls <input type="checkbox"/> Seizure <input type="checkbox"/> Aspiration <input type="checkbox"/> Decubitus <input type="checkbox"/> Isolation: <input type="checkbox"/> Contact <input type="checkbox"/> Droplet Personal Items: <input type="checkbox"/> Dentures <input type="checkbox"/> Glasses <input type="checkbox"/> Hearing Aids <input type="checkbox"/> Prosthesis :(_____) Pain management: <input type="checkbox"/> PCA pump <input type="checkbox"/> Epidural <input type="checkbox"/> On-Q pump <input type="checkbox"/> Other: _____
E	Extremities: <input type="checkbox"/> Ted hose <input type="checkbox"/> SCD's <input type="checkbox"/> Pulses Adverse events intraoperative: _____ Equipment needs: <input type="checkbox"/> CPM <input type="checkbox"/> Ventilator <input type="checkbox"/> Wound Vac <input type="checkbox"/> NGT <input type="checkbox"/> Cell saver Elimination: <input type="checkbox"/> Foley <input type="checkbox"/> Suprapubic tube <input type="checkbox"/> I&O <input type="checkbox"/> Straight cath
A	Assessment: <input type="checkbox"/> Skin <input type="checkbox"/> Incision <input type="checkbox"/> Packing <input type="checkbox"/> Musculoskeletal <input type="checkbox"/> Neuro Drains: <input type="checkbox"/> JP <input type="checkbox"/> Hemovac: location _____ <input type="checkbox"/> Penrose <input type="checkbox"/> Blake tube <input type="checkbox"/> Chest tubes: <input type="checkbox"/> Rt <input type="checkbox"/> Lt <input type="checkbox"/> Urology stents: <input type="checkbox"/> Rt <input type="checkbox"/> Lt <input type="checkbox"/> G tube Dressings: Location _____ Number ____ Drainage: <input type="checkbox"/> Yes: Type _____ <input type="checkbox"/> No Antibiotic: <input type="checkbox"/> Yes: Time last dose _____ <input type="checkbox"/> No
R	Relationships: Family location: _____ Contact phone #: _____ Radiology: <input type="checkbox"/> CXR <input type="checkbox"/> Other _____
L	Labs due: <input type="checkbox"/> H&H <input type="checkbox"/> BMP <input type="checkbox"/> CBC <input type="checkbox"/> PT/PTT <input type="checkbox"/> T&C <input type="checkbox"/> Accucheck <input type="checkbox"/> Blood sugar <input type="checkbox"/> ABG <input type="checkbox"/> Critical values: _____ Lines: <input type="checkbox"/> Central <input type="checkbox"/> Arterial <input type="checkbox"/> Peripheral: location: _____ <input type="checkbox"/> Swan-Ganz <input type="checkbox"/> CVP <input type="checkbox"/> PICC line <input type="checkbox"/> Port: location: _____ Blood products: _____
S	Special devices: <input type="checkbox"/> Pacemaker <input type="checkbox"/> AICD <input type="checkbox"/> Insulin pump <input type="checkbox"/> Other _____ Special needs: <input type="checkbox"/> DVT protocol <input type="checkbox"/> Specialty bed: _____ Spiritual needs: _____ Special communication needs: <input type="checkbox"/> Sign language interpreter <input type="checkbox"/> Interpreter Surgical Unit: <input type="checkbox"/> SCU <input type="checkbox"/> OSU <input type="checkbox"/> CVICU <input type="checkbox"/> PCU <input type="checkbox"/> IMCU <input type="checkbox"/> MSU <input type="checkbox"/> TMU

components of regulatory requirements for hand-off communication. Although quality of handoff was not a direct focus of this project, a survey tool “the Coordination of Handoff Effectiveness Questionnaire” has been validated for measuring hand-off quality and evaluating the tangible hand-off interventions in the context of local, unit-level norms. The Coordination of Handoff Effectiveness Questionnaire assesses two core elements of a handoff: (1) quality of information transfer and (2) quality of the interaction process.¹⁴ Trend analysis compared pre-implementation and post-implementation perioperative hand-off communication audit data. The trend

analysis was presented in a graph format that demonstrated comparative outcomes of the perioperative hand-off communication practice change. The results were presented to the perioperative nurse council to determine the justification and sustainability of the perioperative hand-off communication pilot.

Outcomes

The desired outcomes of this quality improvement project were multidimensional. The first desired outcome was improved communication of essential elements of care in the immediate

Table 2. Hand-off Communication Audit Tool

Criteria	Yes	No	N/A	Comments
Was structured handoff process used (PEARLS)?				
Was handoff communication interactive?				
Was there an opportunity for questions/clarification during handoff?				
Were interruptions limited during handoff?				
Was patient identification verified?				
Was there a comprehensive review of essential patient information/ pertinent medical history and alerts?				
Were patient care tasks performed simultaneous with verbal handoff report?				
Was intraoperative position communicated during handoff?				

postoperative period (1 to 2 hours after completion of surgical procedure). This supports compliance with the regulatory standard for hand-off communication. The second desired outcome was the standardization of hand-off communication among perioperative nursing providers.

The results of the 1-month pilot were reported to the perioperative nurse council, perioperative leadership team, the facility institutional review board, and the nursing research and evidence-based practice council. All perioperative nurses scored 100% on the perioperative hand-off education post-test, signifying cognitive confidence of the staff with hand-off content. Analysis of hand-off audit results identified a marked improvement in effective communication of essential elements of care in the immediate postoperative period (1 to 2 hours after completion of surgical procedure; Figures 4–6). The results of this evidence-

based practice change demonstrated a statistically significant difference between the hand-off observation and/or audit criteria pre-implementation and post-implementation. A substantially higher post-implementation hand-off criterion was achieved. This finding indicated that the standardized hand-off process and the use of Perioperative PEARLS improved the effective transfer of essential patient information and compliance with regulatory hand-off communication standards.

Evaluation of the practice change data was one of the final steps in the application of the Iowa Model of Evidence-Based Practice.¹⁰ Data were analyzed using a paired *t* test design. Data from the 8-week post-implementation period were compared with data collected pre-implementation to determine the impact of intervention. The results exhibited a statistically significant increase in mean scores from pre-implementation to post-implementation. Evidence from the data analysis suggests that the use of a structured hand-off process and perioperative specific hand-off tool is effective in the

- Clearly identify PACU RN receiving report
- Patient connection to monitoring and initial VS assessment
- OR RN assists PACU RN with connection
- Patient identified using TWO identifiers (by OR & PACU RNs)
- NO simultaneous pt. care tasks during report
- PACU RN states readiness to receive report
- Report is provided face-to-face
- Distractions & interruptions during handoff are to be limited
- OR RN provides report first using Perioperative PEARLS
- Perioperative PEARLS remains with PACU RN
- Handoffs are interactive – allowing for questions/clarification
- CRNA/Anesthesia MD provides report after OR RN
- PACU RN uses Perioperative PEARLS to give report to unit

Figure 3. Handoff Communication Guidelines. CRNA, Certified Registered Nurse Anesthetist; MD, Medical Doctor; OR, operating room; PACU, postanesthesia care unit; RN, registered nurse; VS, vital signs.

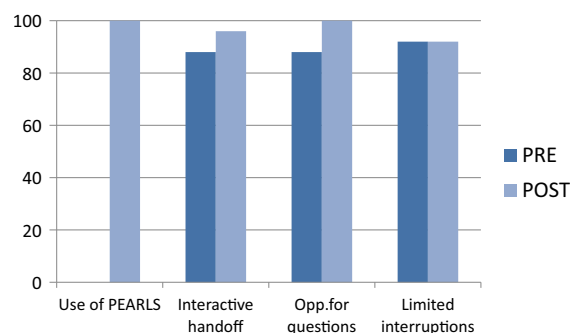


Figure 4. Percentage of "yes" Responses N = 50 handoff observations. This figure is available in color online at www.jopan.org.

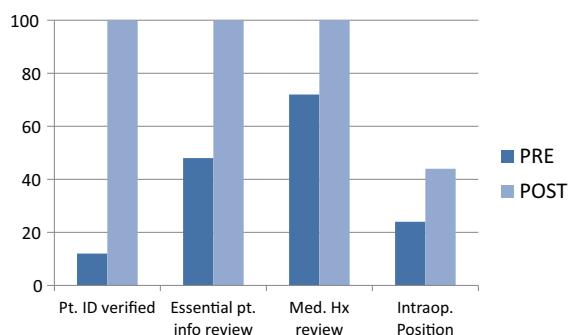


Figure 5. Percentage of “yes” Responses N = 50 handoff observations. Percentage of “yes” responses; N = 50 handoff observations. Hx, history; ID, identification; Pt, patient. This figure is available in color online at www.jopan.org.

communication of essential patient information, compliance with regulatory standards, and the promotion of perioperative patient safety.

The collaboration team reconvened to review the practice change implementation and process. The project feedback was overwhelmingly positive from both the OR and PACU nurse champions. The OR champion verbalized concern over time spent waiting for the PACU staff to complete the initial patient care tasks. As previously mentioned, this role function appears to belong to the PACU nurse, despite the willingness of many OR staff to assist with initial patient care tasks. This was addressed by the OR RN assisting with the initial connection to monitoring devices, thus improving the time management concerns. This resulted in

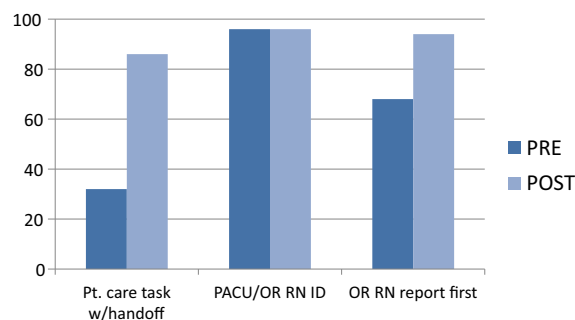


Figure 6. Percentage of “yes” Responses N = 50 handoff observations. Pt, patient; PACU, postanesthesia care unit; OR, operating room; RN, registered nurse. This figure is available in color online at www.jopan.org.

greater collaboration and teamwork between the OR and PACU staff. Discussion also included the “ownership” of medical history information sharing. The philosophy of the director of surgical services was that the OR nurse needs to know the patients’ medical history. At issue is “who” communicates medical history to the PACU nurse. The anesthesia staff has perceived ownership of medical history because of their direct involvement in treatment and medication administration. This resulted in a sharing of patient information handoff that was important yet redundant. The findings of this quality improvement project are similar to those of the team at the Johns Hopkins Hospital in 2009.¹⁵

Perioperative Nursing Implications

While the utilization of Perioperative PEARLS was an additional responsibility for both OR and PACU nurses, the methodology demonstrated value as an effective guideline for hand-off communication. The adverse implications of inconsistent, ambiguous and inadequate perioperative hand-off communication are clear. Perioperative nurses must be accountable for improving patient safety through standardized handoff. The application of Lean Six Sigma principles to the hand-off process improved efficiency, and the perioperative work environment. Eliminating waste from the hand-off process and the consistent use of a specific hand-off tool improves patient safety by providing clear, accurate patient information between perioperative nurses. Concise, pertinent hand-off communication provided in an organized format results in fewer incidents of missed information.

Although the focus of risk reduction is on health maintenance and/or promotion, the perioperative hand-off communication project influences risk reduction from a patient safety perspective. Failure to rescue can result from a lack of adequate patient clinical information. The prevention of adverse events in the perioperative setting is an essential component of nursing practice. The implication is that resources be provided for perioperative nurses regarding intraoperative risk factors that could adversely influence patient outcomes. A prime example is the implication of intraoperative position on patient outcomes in the initial postoperative period. Intraoperative

position must be communicated in hand-off report in order for the PACU nurse to be aware of potential complications. In this regard, clinical prevention is equitable to prevention of harm and the promotion of patient safety.

Discussion

Regulatory standards and patient safety initiatives focus on hand-off communication. The high acuity and physiological instability of the postoperative patient necessitate a standardized hand-off communication tool and structured process that are essential to perioperative nursing practice.¹⁰ Perioperative staff involvement using the team approach of the Iowa Model¹¹ and the principles of Lean Six Sigma¹³ promoted the practice change. The perioperative hand-off communication practice change promoted positive patient outcomes, through implementation of strategies for effective nurse-to-nurse communication.

The overall project has intensified the awareness of the perioperative staff regarding the use of current literature for establishing best practice. The

major limitation of this practice change project was the primary focus on OR to PACU handoff. The provision of safe patient care across the surgical continuum requires the incorporation of the preoperative area to OR and then to PACU hand-off communication. The principles of Lean Six Sigma and Perioperative PEARLS can be easily applied to the preoperative area to OR and then to PACU patient trajectory.

Conclusion

Quality improvement is an essential component for safe perioperative patient care. The root cause of the majority of perioperative adverse events is gaps in communication and transfer of critical patient data. Well-structured perioperative handoff assisted by a specific tool promotes patient safety by reducing the number of adverse incidents caused by communication failure. The perioperative hand-off communication project is a prime example of how nurses can advocate for patient safety and implement best practice. Because of the project, the perioperative patients at the facility receive the seamless promotion of a safe patient outcome from their surgical experience.

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