Southern California CSU DNP Consortium

California State University, Fullerton
California State University, Los Angeles
Kaiser Permanente School of Anesthesia

DEVELOPING AN OPERATING ROOM TO POSTANESTHESIA CARE UNIT HANDOFF CHECKLIST: A DELPHI STUDY

A DOCTORAL PROJECT

Submitted in Partial Fulfillment of the Requirements

For the degree of

DOCTOR OF NURSING PRACTICE

By

Justin Breazeale
Junelle Jones
Gina Yan

Doctoral Project Committee Approval:

Sassoon Elisha, EdD, CRNA, FAAN, Team Leader
Hannah Fraley, Ph.D., RN, CPH, Team Member

December 2023

Author Note
Justin Breazeale - https://orcid.org/0009-0001-6007-199X
Junelle Jones - https://orcid.org/0009-0004-3595-6093
Gina Yan - https://orcid.org/0009-0003-2025-3400

DOI 10.5281/zenodo.13835737

ABSTRACT

Ineffective communication and omitting clinical information can occur during patient care. A particularly vulnerable period for this breakdown is during the transfer of care (handoff) from the operating room (OR) to the post-anesthesia care unit (PACU). It can jeopardize patient safety, compromise work efficiency, and decrease patient and staff satisfaction. Despite mandates for a handoff process by The Joint Commission (TJC), the American Association of Nurse Anesthesiology (AANA), and the American Society of Anesthesiologists (ASA), there continues to be a lack of consensus on a standardized handoff tool. Checklists have proven effective in healthcare crises and the aviation industry, assisting decision-making. The aims of this project were to revise the OR to PACU Anesthesia Handoff Report Checklist (OPAHRC) for clinical implementation using the Delphi method at Kaiser Permanente West Los Angeles (KPWLA). We recruited an expert panel of Certified Registered Nurse Anesthetists (CRNAs) to participate in two Delphi rounds. We received 31 responses from participants throughout a three month period. In an iterative process, we analyzed feedback after each round and edited the checklist based on expert opinion and group consensus. Qualitative results included five common themes for essential elements during an anesthesia handoff, and 68% of respondents (N=21) described the checklist as "concise and thorough as is." Quantitative data results included a greater than 50% consensus in all 20 Likert-scale questions. This high level of group consensus from the surveys supported the suitability of the OPAHRC for implementation at KPWLA. This tool can potentially improve the handoff process and patient safety.

Keywords: post-anesthesia handoff, transfer of information, omission of information, communication, checklist, anesthesia providers, PACU registered nurses, Delphi, consensus, essential elements, standardized tool, patient safety.

TABLE OF CONTENTS

ACKNOWLEDGEMENTS

A special thank you to Dr. Sassoon Elisha, Dr. Mark Gabot, and Dr. Hannah Fraley for their endless advice, guidance, and mentoring throughout this process. Thank you to Jill Bowen and the CRNA staff at Kaiser Permanente West Los Angeles for taking the time to hear our presentations, participate in the surveys, and provide vital feedback to help us complete our project. Lastly, thank you to my fellow group members for their continuous support, hard work, and encouragement throughout this challenging process. We did it!

Background

A handoff is the process of transferring and accepting patient care responsibilities through effective communication of relevant information between healthcare professionals (The Joint Commission [TJC], 2017). The American Association of Nurse Anesthesiology (AANA, 2019) and the American Society of Anesthesiologists (ASA, 2019) mandate a handoff report between the anesthesia provider and a qualified healthcare provider in the postanesthesia care unit (PACU) for all patients who receive anesthesia care. Although the AANA (2019) issued a recommendation regarding elements of a thorough postanesthesia handoff (PAH), there is currently a lack of standardized implementation on handoff communication (Halladay et al., 2019; Wang et al., 2021).

Numerous factors contribute to the lack of standardized PAH. Healthcare professionals from different disciplines have disparate opinions regarding relevant information and priority during handoff (Desmedt et al., 2020; Halladay et al., 2019; Randmaa et al., 2017; Wang et al., 2021). In addition, PACU nurses often care for more than one patient at a time (Kaltoft et al., 2022). The PAH commonly occurs while the PACU nurse is initiating patient monitoring, evaluating vital signs, and conducting an initial assessment of the patient. These competing demands lead to multitasking, which can heighten the potential for disruption, shorten communication, and limit the opportunity for questions during PAH (Desmedt et al., 2020; Jaulin et al., 2021; Kaltoft et al., 2022). A systematic review by Desmedt et al. (2020) found that anesthesia providers with a high workload or those under a time constraint to complete PAH to adhere to a strict operating room (OR) schedule are more likely to conduct handoff in an unstructured and informal manner. Other identified factors contributing to poor PAH include

increased complexity of patient conditions, inadequate training, and lack of interpersonal communication skills (Desmedt et al., 2020).

Ineffective communication significantly contributes to adverse effects in healthcare settings, particularly during OR to PACU handoff. Patients are in a vulnerable state due to the residual effects of anesthesia and altered mental acuity upon arrival in PACU. They often cannot report or clarify pertinent health information and must rely on thorough communication between providers to ensure safe postanesthesia care. Unstructured PAH omits critical patient information, threatens patient safety, increases morbidity and mortality, and decreases satisfaction among PACU registered nurses (RNs) (Halladay et al., 2019; Park et al., 2017). Lack of standardized PAH is also associated with an increased incidence of medical errors; eighty percent of serious medical errors can be attributed to poor handoff communication (Halladay et al., 2019; Halterman et al., 2019). According to surgical malpractice claims data, poor handoff contributes to the highest percentage of perioperative mistakes (Park et al., 2017). An analysis by Douglas et al. (2021) of the Anesthesia Closed Claims Projects (CCP) database found that out of 910 eligible claims, 446 injury-related failures are associated with one or more communication failures. Furthermore, when information is omitted, insufficient, or misinterpreted, content failures account for 60 percent of the 446 communication failures (Douglas et al., 2021).

TJC mandates using structured handoff to optimize communication and mitigate adverse events (TJC, 2017). Numerous studies and non-research Quality Improvement (QI) projects report that the utilization of a standardized or structured PAH checklist significantly increases the thoroughness of communication (Halladay et al., 2019; Jaulin et al., 2021; Jelacic et al., 2021; Lambert & Adams, 2018; Park et al., 2017). An integrative review by Rose et al. (2018) found that PAH based on an established protocol or tool reduces information omissions,

decreases miscommunications, and improves perceived teamwork. PACU nurses also report higher satisfaction with PAH using checklists (Kaltoft et al., 2022; Lambert & Adams, 2018; Randmaa et al., 2017).

Despite the support for checklist implementation in literature, there is a lack of consensus regarding what constitutes the best handoff practice, including the most relevant information and the most efficient communication sequence in a PAH (Desmedt et al., 2020). The AANA (2019) recommends the following elements to be included in the PAH: patient identification, allergies, medical and surgical history, level of consciousness, cognitive function, physical limitations, the procedure performed, vital signs, assessment findings, intraoperative course, airway status including type and difficulty of airway management, type of anesthetic used, vascular access, catheter, surgical and drain sites, intake and output, relevant laboratory values, medication administered including antibiotics and narcotics, patient-specific and hemodynamic concerns, postoperative analgesia plan, and appropriate PACU orders. However, many studies and QI projects that utilized checklists do not strictly adhere to the recommended items. Most of the studies and QI projects that support the use of standardized PAH include a combination of these elements while adding or omitting others (Halladay et al., 2019; Jaulin et al., 2021; Jelacic et al., 2021; Lambert & Adams, 2018; Park et al., 2017). No study to date examines each element's relevance and importance in preventing adverse events and improving patient outcomes. Therefore, there is a need to develop a PAH checklist based on research evidence and updated practice standards.

Due to the lack of consensus in the literature regarding the vital components of a PAH, the current handoff between anesthesia providers and PACU RNs at Kaiser Permanente (KP) facilities does not follow a structured method. Therefore, the Kaiser Permanente School of

Anesthesia (KPSA) has identified a need for an evidence-based checklist to standardize PAH. Balajadia et al. (2021) conducted an exhaustive literature review and tallied each checklist component synthesized from research evidence to meet the need for such a checklist. In addition, components listed per practice recommendations by the ASA and AANA and per Kaiser Permanente policies were included. As a result, Balajadia et al. (2021) developed an OR to PACU Anesthesia Handoff Report Checklist (OPAHRC) as a structured tool to be utilized at KP facilities to facilitate handoff communication (Appendix A).

Purpose Statement

This DNP project aimed to evaluate the effectiveness of the OPAHRC developed by Balajadia et al. (2021) and revise it for clinical implementation using the Delphi method at Kaiser Permanente West Los Angeles (KPWLA). The Delphi method has been regularly used to develop best practice guidelines in medicine and healthcare. It utilized multiple sets of anonymous controlled feedback from an expert panel to create a consensus regarding a complex problem (Nasa et al., 2021). The overall goals of this project were promoting patient safety by improving the quality of PAH, improving patient outcomes during the recovery period, and increasing satisfaction among anesthesia providers and PACU RNs.

Review of Literature

Overview

This literature review aimed to retrieve and synthesize available evidence on using a standardized checklist during PAH between anesthesia providers and PACU RNs. PubMed and CINAHL were the electronic databases utilized for this search. This literature review was organized into three key components of checklist utilization: significance of handoff, handoff checklist standardization, and implementation of a PAH checklist. The search terms used include "postanesthesia," "PACU," "handoff," "report," "checklist," "tool," "standard," "format," "safety," "outcome," and "barrier." Search results were limited to peer-reviewed articles published between 2017 and the present. Studies and articles written in languages other than English or without full-text versions were excluded. Furthermore, the reference lists of qualifying articles were reviewed to capture potential additional articles. Additional searches on PAH practice standards were conducted via the website of ASA and AANA.

Significance of Structured Handoff

Handoff refers to the transfer of information, responsibility, and control between providers and is vital to ensuring the continuity and safety of patient care (Abraham et al., 2021a; Randmaa et al., 2017). A search of the significance of PAH yielded 231 articles. Six articles are included in this review section after applying exclusion criteria, removing duplicates, and analyzing abstracts.

The postoperative handoff period is an especially vulnerable time for patients due to a downscale in monitoring and numerous PACU distractions (Lambert & Adams, 2018; Leonardsen et al., 2019). Many sources agree that handoff between anesthesia providers and PACU RNs is often inadequate and inconsistent, leading to an increased risk of omission of vital

patient information (Leonardsen et al., 2019; Saxena et al., 2020). This has led to poor outcomes, delayed discharge, and death (Abraham et al., 2021; Burns et al., 2018; Lambert & Adams, 2018; Leonardsen et al., 2019; Randmaa et al., 2017). One study reported that handoff between the OR and PACU contained only 50 percent of the relevant patient information, resulting in frequent hospital readmissions and increased morbidity and mortality (Leonardsen et al., 2019).

A standardized handoff tool acts as a cognitive aid to decrease human error and develop a shared situational awareness and understanding between the OR and PACU teams (Abraham et al., 2021; Burns et al., 2018; Randmaa et al., 2017; Saxena et al., 2020). Clinicians who utilize a standardized handoff tool concur that it is easier to establish contact at the beginning of the handover to resolve ambiguities and to document more thoroughly as the handover follows a logical structure and all relevant information is communicated (Leonardsen et al., 2019).

Unfortunately, standardized handoff tools are not universally applied during the transfer of care to the PACU, often resulting in confusion and uncertainty between both teams (Leonardsen et al., 2019; Randmaa et al., 2017). This is because anesthesia providers and PACU nurses have different expectations regarding handoff content. Providers may omit information from a verbal report because they assume the receiving team is already aware of the situation or display selective attention to reports due to a difference in individual standards of importance, leading to a delay in care and increased handoff duration (Abraham et al., 2021). Anesthesia providers are focused on detailing events that have already occurred, such as the anesthetic process, the surgical procedure, and intraoperative observations. Comparatively, PACU nurses are more concerned with current vitals and postoperative care recommendations (Randmaa et al., 2017). This selective attention leads to a lack of situational awareness and communication

between teams, resulting in improper patient care as both teams are uncertain that all pertinent information has been conveyed (Abraham et al., 2021; Randmaa et al., 2017).

In response, hospitals have initiated standardized protocols and communication checklists to address the lack of consistency in handoff reports (Abraham et al., 2021). Many studies agreed that using a handoff tool improves information transfer completeness and improved patient outcomes (Abraham et al., 2021; Burns et al., 2018; Lambert & Adams, 2018; Leonardsen et al., 2019; Saxena et al., 2020). Anesthesia handoff was historically based on individual standards of importance, leading to significant variation in handoff methods and inconsistent information transfer (Lambert & Adams, 2018). A standardized tool assures both anesthetic providers and PACU nurses all necessary information has been communicated and allows for clarifications before the provider leaves the PACU. Using a tool created a workflow that increases patient safety while enhancing continuity of care (Burns et al., 2018).

Compliance failures

However, there is still a lack of consistency and usage of a single standardized handoff tool despite the multitude of supporting research and recommendations of the Joint Commission and the World Health Organization (WHO) (Leonardsen et al., 2019). Post-implementation findings have reported poor compliance due to a lack of leadership support and differing situational awareness (Abraham et al., 2021; Burns et al., 2018; Leonardsen et al., 2019; Saxena et al., 2020). Most sources agree that checklists and handoff tools are associated with improved patient outcomes (Abraham et al., 2021; Burns et al., 2018; Lambert & Adams, 2018; Leonardsen et al., 2019; Saxena et al., 2020). However, a systematic review of current literature reflected that only very experienced or very junior providers value the use of checklists in their

practice due to the use of impractical non-anesthesia-specific checklists and a lack of awareness and communication between teams (Abraham et al., 2021; Saxena et al., 2020).

Resistance to using a standardized handoff tool is not uncommon and can be attributed to concerns about time constraints, impedance to workflow, and interference with patient care (Abraham et al., 2021; Leonardsen et al., 2019; Saxena et al., 2020). These are valid concerns as some studies have reported increased handoff durations due to using a handoff tool (Abraham et al., 2021; Burns et al., 2018). However, conflicting findings exist that using a standardized handoff tool streamlines the handover process, improves provider focus, and decreases handoff time (Leonardsen et al., 2019). Proper education of staff and regular updates and revisions allowed for the integration of the handoff tool into the unit's existing workflows and improved the efficiency and reliability of the handoff tool (Saxena et al., 2020). Furthermore, the benefits of using a handoff tool are substantial and may be worth the extra time as handoff tools are associated with decreases in adverse events, improved patient safety, and increased efficiency (Abraham et al., 2021; Burns et al., 2018; Lambert & Adams, 2018; Leonardsen et al., 2019; Saxena et al., 2020).

Gap in the Literature

One under-explored area in the literature regarding the utilization of PAH checklists is whether implementing a checklist is associated with improvement in patient-specific outcomes. Most of the studies and QI projects focused on evaluating handoff-related outcomes such as items omitted, duration of handoff, compliance, and staff satisfaction (Bruno & Guimond, 2017; Halladay et al., 2019; Kaltoft et al., 2022; Lambert & Adams, 2018; Park et al., 2017; Rose et al., 2018; Servas et al., 2021). Only a few studies and QI projects examined other variables related to improvement in patient care and patient-related outcomes in PACU. López-Parra et al. (2020)

surveyed PACU RNs about relevant patient information twenty minutes after receiving handoff to assess retention. Jaulin et al. (2021) measured the incidence of hypoxemia, hypotension, postoperative nausea and vomiting (PONV), level of pain, length of stay (LOS) in PACU, and the number of calls from PACU staff to the anesthesia team to obtain additional information. A statistically significant decrease in the incidence of hypoxemia in the PACU after PAH checklist implementation and a statistically non-significant reduction in the occurrence of PONV, excessive pain, and call back from PACU to the anesthesia team was reported (Jaulin et al., 2021). In contrast, Jelacic et al. (2021) did not find a significant correlation between PAH checklist implementation and reduction in patient outcomes such as LOS, the incidence of adverse respiratory events, the severity of PONV, and the level of pain. An integrative review by Rose et al. (2018) could not conclusively link checklist usage to an overall decrease in adverse events in the PACU. This gap in the literature is attributed to the fact that adverse events in PACU are multi-factorial and independent of the effectiveness of handoff communication. Nevertheless, there is a need for further studies that examine the correlation between effective PAH and positive patient-specific outcomes.

Handoff Checklist Standardization

A search of the standard PAH checklist format or component yielded 74 articles. After removing duplicates, applying exclusion criteria, and examining abstracts, fifteen articles were selected for inclusion in the review. The selection of articles consists of one literature review, one integrative review, one expert opinion article, observational studies, and QI projects. The articles included in the review primarily consist of level VIII evidence and gray literature (Polit & Beck, 2019).

Accurate information transfer between anesthesia providers and PACU RNs is essential to safe patient handoff. A PAH checklist should be formulated based on current evidence, facility policies, and specific workplace environments to improve PAH and promote compliance (AANA, 2014; Rose et al., 2018). The creation of a practical PAH checklist is a complex process due to multiple factors: the numerous existing instruments in literature, lack of consensus on the most relevant components in a PAH checklist, provider resistance, the presence of existing PAH tools, and various methods of incorporating the checklist into workflow (Bruno & Guimond, 2017; Halladay et al., 2019; Rose et al., 2018; Saxena et al., 2020).

Although multiple studies and QI projects reported that using a PAH checklist improves handoff communication, the method used to formulate the checklist varies among the studies. Jelacic et al. (2021) and Lambert and Adams (2018) did not disclose how their checklists were developed before implementation. Still, the most common method of checklist development was adapting a previously published or implemented checklist and revising it based on the institution's unique needs. Several studies and QI projects used literature reviews to identify the checklist to be adopted (Jaulin et al., 2021; López-Parra et al., 2020; Park et al., 2017). Revisions based on facility needs and practice settings were achieved via pilot testing (Park et al., 2017), questionnaires to stakeholders such as CRNAs and PACU RNS (Kaltoft et al., 2022), or clinical observation and multidisciplinary team discussions (López-Parra et al., 2020). In contrast, Servas et al. (2021) relied on stakeholders and multidisciplinary team members to develop an original checklist. Another reliable method of identifying key components in a PAH checklist is using root cause analysis or failure mode and effect analysis (FEMA) to evaluate current gaps and barriers in practice (Bruno & Guimond, 2017; Rose et al., 2018). Although a non-research QI project completed by Halladay et al. (2019) adapted an existing checklist without further

modification, the implementation still resulted in improved thoroughness of handoff and provider satisfaction. Items that were consistently used in PAH across research articles and QI projects include patient identifying information, allergies, name of procedure or surgery, type of anesthesia, relevant medical history, intraoperative complications, intraoperative medications given including narcotics, intake and output, lines, postoperative orders and plans, and patient-specific concerns (Bruno & Guimond, 2017; Halladay et al., 2019; Jelacic et al., 2021; Kaltoft et al., 2022; Lambert & Adams, 2018; López-Parra et al., 2020; Park et al., 2017; Servas et al., 2021).

Furthermore, additional factors may complicate the creation of a standard PAH checklist. Many healthcare facilities utilize electronic medical records (EMR) to store and document patient health information. A PAH checklist can be incorporated in various ways to improve handoff. It can be used as a physical visual aid to guide verbal reports as an information transfer tool to be completed by an anesthesia provider or PACU RN upon handoff or embedded as a part of the EMR to facilitate handoff (Bruno & Guimond, 2017; Halladay et al., 2019; López-Parra et al., 2020). An additional advantage of using a checklist that can be physically or electronically completed is the ability to track items omitted during PAH to ensure continued evaluation and monitor compliance after implementation (Bruno & Guimond, 2017; Burns et al., 2018; Lambert & Adams, 2018). Compared to the visual aid or physical format, the electronic checklist may allow users to alter items based on the visibility of existing information within the EMR. Other factors that may impact checklist effectiveness and implementation are the length and ease of use. While most studies and QI projects demonstrate increased handoff thoroughness with checklist use, some also report an increase in handoff duration regardless of the method of implementation (Burns et al., 2018; Halladay et al., 2019; Jelacic et al., 2021; López-Parra et al.,

2020; Park et al., 2017). Given the time-pressured nature of the PACU environment, an exhaustive checklist may excessively prolong handoff duration and negatively impact handoff efficiency by decreasing usability, increasing chances of interruptions, creating information overload, and leading to "checklist fatigue" (Kiekkas & Michalopoulo, 2020; Rose et al., 2018; Saxena et al., 2020).

Professional Organization Practice Guidelines and Recommendations

Due to the lack of consensus in the literature regarding the pertinent items and standard format of a PAH, the literature review also examined the published practice guidelines and recommendations by the ASA and AANA to augment the understanding regarding most relevant information during handoff. In the 2019 Postanesthesia Care Practice Considerations, the AANA recommended 32 elements from five categories: patient, procedure, health history, anesthesia and medications, and PACU to be included in the PAH (Appendix B). Key elements highlighted by the AANA (2019) include allergies, relevant health history, relevant medication history such as home medications and last dose taken, surgery or procedure performed, antibiotics administered, anesthesia and analgesia, complications or concerns, fluids administered, volume status, and specific concerns or recommendations for the postanesthesia plan of care. The AANA (2019) advocated using a standardized handoff checklist to improve accuracy and decrease omissions.

The ASA's (2013) latest Practice Guidelines for Postanesthetic Care do not explicitly define the essential elements of a PAH or recommend using a checklist in PAH. However, the ASA (2013) states that according to high-level research evidence, the assessment of the following is essential in preventing adverse outcomes in the postanesthesia recovery period: respiratory function, neuromuscular function, mental status, temperature, pain, nausea, vomiting,

fluid status, urine output, drainage, and bleeding. Since the PACU RN is primarily responsible for patient monitoring and assessment in the recovery period, it can be inferred that PAH communication should include relevant baseline function and intraoperative course that may impact these assessment findings. The ASA also stated that preventing hypoxemia, pain, nausea, vomiting, sedation, and residual neuromuscular blockade is fundamental in facilitating recovery and discharge. Therefore, the handoff should also include communication regarding intraoperative measures and PACU orders to prevent these adverse effects.

Handoff Checklist Implementation

Checklists and standardized handoff tools have proven effective in healthcare as they streamline decision-making (Clay-Williams & Colligan, 2015; Jelacic et al., 2021). However, despite a multitude of evidence supporting PAH, there continues to be a lack of standardization in OR and PACU handoff (Halladay et al., 2019; Halterman et al., 2019; López-Parra et al., 2020; Jaulin et al., 2021; Jelacic et al., 2021; Servas et al., 2021; Wang et al., 2021). A literature search for PAH checklist implementation revealed 85 articles. A common theme identified within these articles is a need for an improved handoff process to enhance the continuity of care between providers (Halladay et al., 2019; Halterman et al., 2019; López-Parra et al., 2020; Jaulin et al., 2021; Jelacic et al., 2021; Servas et al., 2021).

After applying inclusion and exclusion criteria while filtering out duplicate articles, the remaining non-research reports consisted primarily of observational QI projects. The external validity of these studies is limited due to the use of single-centered locations with small sample sizes and varied information regarding the PAH checklists between studies (Bootland et al., 2017). Halladay et al. (2019), Halterman et al. (2019), López-Parra et al. (2020), Jaulin et al. (2021), Jelacic et al. (2021), and Servas et al. (2021) used the Model for Improvement

framework to develop, test, and implement changes to enhance their handoff processes (Provost & Murray, 2011).

The first step in all QI projects is identifying a problem and an area needing change (Wensing et al., 2020). Expert opinions, direct observations, and data collected from pre-implementation and post-implementation designs identified inconsistencies and omitted data during the handoff between the OR and PACU (Halladay et al., 2019; Halterman et al., 2019; López-Parra et al., 2020; Jaulin et al., 2021; Jelacic et al., 2021; Servas et al., 2021). Input from key stakeholders, including anesthesia providers and PACU RNs, assisted in problem identification and developing an improved PAH unique to each institution. Interventions for handoff projects are directed toward anesthesia providers, with project leads collecting data and input from PACU RNs regarding the handoff completeness and provider satisfaction (Halladay et al., 2019; Halterman et al., 2019; López-Parra et al., 2020; Jaulin et al., 2021; Jelacic et al., 2021; Servas et al., 2021).

After identifying a problem, QI team leaders must assemble a team to implement the intervention (Wensing et al., 2020). A multidisciplinary team of key stakeholders and project champions from each department facilitates the process change and ensures employee buy-in and staff compliance. A strong multidisciplinary team is essential for change sustainability (Halterman et al., 2019; Servas et al., 2021). Several QI studies detailed their process of offering multiple department-wide educational sessions, distribution of badge cards, emails, and laminated checklists, along with established "project champions" to streamline the new workflow (Halladay et al., 2019; Halterman et al., 2019; López-Parra et al., 2020; Servas et al., 2021). Despite this being an essential step for QI projects, three articles lacked a detailed discussion of

their educational processes, which weakened the credibility of the projects (Jaulin et al., 2021; Jelacic et al., 2021; Wang et al., 2021).

Facilitators and barriers to change include knowledge, habits, behaviors, expectations, attitudes, financial resources, policies, and organizational processes (Wensing et al., 2020). Several QI projects voiced concerns regarding additional workload, a lengthy handoff process, resistance to new guidelines, scarcity of resources, and embedding the checklists into existing electronic medical records as possible barriers to a structured handoff checklist (López-Parra et al., 2020; Jaulin et al., 2021; Jelacic et al., 2021). Information regarding the facilitators and barriers was missing in most QI projects (Halterman et al., 2019; Jelacic et al., 2021; and Servas et al., 2021). Improving patient safety and compliance under the Centers for Medicare and Medicaid Services by completing a Merit-Based Incentive Payment System (MIPS) for reimbursement helped create provider buy-in (Halterman et al., 2019). Multiple projects discussed how standardization prolonged handoff (López-Parra et al., 2020; Jelacic et al., 2021; Jaulin et al., 2021). However, this additional time did not significantly increase the length of stay for PACU patients or decrease staff satisfaction (López-Parra et al., 2020; Jaulin et al., 2021; Servas et al., 2021). Common limitations identified during the literature review included lack of randomization, challenges with "controlling" conditions, small sample sizes, and the Hawthorne effect (Halladay et al., 2019; Halterman et al., 2019; López-Parra et al., 2020; Jaulin et al., 2021; Jelacic et al., 2021; Servas et al., 2021).

Within included QI projects, lessons learned include a standardized handoff tool leads to improved patient outcomes, but research is ongoing (Halladay et al., 2019; Halterman et al., 2019; López-Parra et al., 2020; Jaulin et al., 2021; Jelacic et al., 2020; Servas et al., 2021; Wang et al., 2021). In addition to research evidence as a fundamental component in the creation of an

evidence-based checklist, literature, and the AANA also emphasize the importance of revision and adaptation based on institutional policy, unit workflow, and staff input (AANA, 2014; Methangkool et al., 2019; Park et al., 2017; Rose et al., 2018). Methangkool et al. (2019) advocate for specific components of a PAH checklist are best determined at an institutional or unit level with buy-in and involvement from all disciplines involved in the postoperative patient transition. Furthermore, input and support from a dedicated multidisciplinary team, particularly the PACU RNs, is essential in creating a practical checklist and facilitating implementation (Bruno & Guimond, 2017; López-Parra et al., 2020; Randmaa et al., 2017; Rose et al., 2018; Servas et al., 2021; Wang et al., 2021).

The AANA, ASA, Joint Commission, and WHO have also advocated for standardization during OR to PACU handoff (AANA, 2019; ASA, 2013; Leonardsen et al., 2019). Current literature also supports the use of a structured handoff tool to limit omitted patient information, improve continuity of care, and enhance patient safety (Halladay et al., 2019; Halterman et al., 2019; López-Parra et al., 2020; Jaulin et al., 2021; Jelacic et al., 2021; Servas et al., 2021; Wang et al., 2021). Analysis of these studies, gaps in available research evidence, and lessons learned in QI reports indicate a lack of a standardized reporting tool, its components, and the actual handoff process. These variations during the handoff period have led to an increased risk of omission of vital patient information, poor outcomes, and death (Abraham et al., 2021; Burns et al., 2018; Lambert & Adams, 2018; Leonardsen et al., 2019; Randmaa et al., 2017). Therefore, this project aims to modify this process to create a standardized report checklist to improve the OR to PACU handoff.

Supporting Framework

A vital component of successful evidence-based practice (EBP) projects was adapting an appropriate model or framework that provided clear, logical guidance to implement sustainable change (Dang et al., 2021). The Iowa Model-Revised (IM-R) was selected as the overall conceptual framework for this project. The latest revision of the IM-R outlined sustainable practice change implementation in seven steps (Iowa Model Collaborative, 2017). The aim of this project was accomplished by utilizing the first four steps of the IM-R as a guide. Furthermore, the project incorporated the Delphi method as a supporting framework to supplement the execution of practical steps in the IM-R. A diagram depicting the utilization and integration of the IM-R and the Delphi method for this project can be found in Appendix C.

The IM-R was chosen as the conceptual framework for this project due to its roots in nurse-driven EBP, longstanding effectiveness in sustaining practice change, and adaptability to the unique challenges of this project (Hanrahan et al., 2019; Iowa Model Collaborative, 2017; Titler et al., 1994; Titler et al., 2001). Nurses initially developed this model to guide clinicians in evaluating and adapting research findings to patient care (Titler et al., 1994). Subsequently, it was updated to reflect the adaptation of EBP and provide detailed instructions on implementing change (Titler et al., 2001). Since its creation, clinicians throughout the United States (U.S.) and over 130 countries have used the Iowa Model as a pragmatic guide for EBP and quality improvement efforts (Iowa Model Collaborative, 2017). The latest revision and validation of the IM-R was completed by the Iowa Model Collaborative (2017) via literature review, examination of other EBP models, and a survey of 421 users. Most importantly, the latest IM-R stressed the need to conduct additional research and explore alternative ways to formulate a solution to a triggering issue when the current body of literature was insufficient to guide practice change

(Iowa Model Collaborative, 2017). This recommendation was particularly applicable to this project since there was no consensus in research studies, non-research projects, and professional organization practice recommendations regarding standardized PAH format.

The Delphi method was employed as a secondary supporting framework to formulate a viable solution to the triggering issue. Despite its original design facilitating military defense research, the Delphi method has been internationally applied to investigate various foci, including medical, social, and health sciences studies (Nasa et al., 2021; Niederberger & Spranger, 2020). The Delphi method was a structured technique to facilitate group consensus regarding a multifaceted issue, particularly from those on the frontlines of the issue (Nasa et al., 2021). Although the Delphi method does not have an established stepwise outline, the process generally begins with a facilitator identifying an issue, assembling an expert panel, and then employing multiple rounds of surveys or questionnaires to achieve group consensus (Spranger et al., 2022). It was especially effective in areas where statistical model-based evidence was unavailable, the current body of knowledge was inconclusive, it was not feasible to pull groups together for meetings, and group expert judgment was more beneficial than individual opinion (Nasa et al., 2021). Several studies utilized the Delphi method to evaluate the essential elements of handoff communication in various healthcare settings, including nursing, emergency medicine, and intraoperative anesthesia handoff (Alrajhi & Alsaawi, 2019; Julia et al., 2017; O'Rourke et al., 2018). Due to the lack of high-level research evidence on effective PAH format, the Delphi method provided a valuable roadmap applied to the steps of the IM-R. Together, both frameworks facilitated the evaluation of the OPAHRC to validate its effectiveness for clinical implementation.

Identifying Triggering Issues

The initial step of the IM-R was to identify triggering issues or opportunities for improvement (Iowa Model Collaborative, 2017). While this step was not explicitly listed as an official step in the Delphi method, a triggering issue must be identified before initiating a project and forming an expert panel (Waltz et al., 2016). Triggering issues could originate from various sources, including clinical or patient concerns, new data, or national initiatives (Iowa Model Collaborative, 2017). The Kaiser Permanente School of Anesthesia (KPSA) recognized that the lack of standardization in OR to PACU handoff was essential for improvement. National and global health organizations advocated using a standardized handoff tool, but handoff reports still lacked consistency (Leonardsen et al., 2019). Developing and utilizing a standardized handoff checklist would allow Kaiser Permanente facilities to better align with national recommendations.

State the Question or Purpose

After identifying the triggering issues, the following step in the IM-R stated the question or purpose of the project (Iowa Model Collaborative, 2017). An extensive literature search identified a lack of standardized PAH, which has led to the development of the clinical question using the PICO (population/participants, intervention, comparison, and outcome) format (Grove, 2019). The population for this project included adult postoperative patients in the PACU setting. The intervention used evidenced-based best practices and input from an expert panel via the Delphi method to revise the OPAHRC developed by Balajadia et al. (2021). This project did not include an intervention comparison since the implementation step was not anticipated during this project phase. However, the Delphi method allowed for modifying the handoff process and developing a tool specific to Kaiser Permanente providers that can be implemented later. Finally,

this project aimed to improve patient safety by decreasing the omission of patient information and increasing provider satisfaction within the Kaiser Permanente PACU department.

Form a Team

The following step in the IM-R was to form a team (Iowa Model Collaborative, 2017). Since a growing body of evidence indicated issues with an unstructured handoff process, this topic has been identified as an improvement priority within the Kaiser Permanente organization. The immediate team for this Doctor of Nursing Practice (DNP) project consisted of three DNP students taking on the role of team leaders to the project team consisting of participants in the Delphi rounds. A KPSA faculty member and one California State University of Fullerton (CSUF) faculty member helped to guide this project. Additional assistance included the aid of a research librarian for consultation during the literature review and a statistician to assist with interpreting data from the Delphi rounds.

This project sought to improve the handoff process within the PACU at Kaiser Permanente. The Delphi method was best suited for obtaining group consensus to revise the OPAHRC developed by Balajadia et al. (2021). According to Scheele (2022), one of the primary essential steps of the Delphi technique was to create a heterogeneous panel of experts consisting of stakeholders from various disciplines to provide input on the topic of interest. While multiple sources indicated that the ideal number of panelists required to perform a Delphi technique varied according to the research design, a panel of 10-20 experts was recommended (Dalkey, 2022; Niederberger & Spranger, 2020).

A purposive sample of 10-20 anesthesia providers was selected as a panel of experts to participate in the multiple rounds of the Delphi study, with the KPSA faculty team member acting as a liaison between the DNP students and the Kaiser Permanente facility (Warner, 2014).

According to Wensing et al. (2020), resistance to change could be high if initially directed at the institutional level. Therefore, focusing on a small scale of highly motivated individuals was more beneficial to set an example for the unit. Targeting support from management and enthusiastic individuals who could operate as active "champions" was essential to facilitate sustainable change. Involving this multidisciplinary panel of key stakeholders would secure employee participation and buy-in such that the OPAHRC could be revised to better align with the organization's culture and streamline work efficiency.

Assemble, Appraise and Synthesize Body of Evidence

The next step of the IM-R was to assemble, appraise, and synthesize evidence to enhance understanding of the current problem and identify potential solutions (Iowa Model Collaborative, 2017). This step was accomplished via the literature review portion of the project, with team members focusing on current handoff practices, barriers to compliance, and checklist components that enhanced user satisfaction. The CSUF Online Learning Librarian was consulted to identify search strategies and assist in utilizing search databases, such as PubMed and CINAHL. DNP team members selected 15 relevant articles, critically appraised them, and summarized them into a table of evidence. The evidence was then synthesized into a comprehensive literature review detailing the significance of structured handoff, standardization of handoff checklists, and implementation. Both the table of evidence and literature review were shared with and evaluated by the KPSA and CSUF faculty team members.

Analysis of these articles demonstrated that research and non-research project results were inconsistent and inconclusive. Therefore, further research was needed to identify the most helpful components in a standardized handoff tool. The personalized nature of the handoff report and the involvement of various stakeholders in initiating a standardized handoff tool further

emphasized the need to integrate the Delphi method into this project, as the opinions of the expert panel would ideally represent the attitudes of the various participating groups and facilitate sustained change. Analysis of current research continued throughout the project as input from the expert panel was obtained, and the project continued to evolve.

Design and Implement Pilot Practice Change

Before attempting clinical pilot testing, the IM-R required the facilitator to evaluate evidence sufficiency to support the proposed practice change (Iowa Model Collaborative, 2017). This project aimed to ensure sufficient evidence supporting the readiness of OPAHRC for pilot testing after revision based on the expert panel consensus derived from the Delphi method. However, this DNP project terminated after achieving group consensus via the Delphi study and revision of OPAHRC. Future projects may elect to continue to complete the remaining steps of IM-R, design a protocol for pilot testing, and facilitate its implementation and evaluation.

Integrate and Sustain Practice Change

Users of the IM-R reported sustaining practice change as the most challenging step (Iowa Model Collaborative, 2017). This project concluded before this phase, but future projects may benefit from integrating additional frameworks specifically aimed at sustaining practice change along with the IM-R to ensure continued adherence to EBP. The University of Iowa has developed the Iowa Implementation for Sustainability Framework to provide additional guidance in achieving long-lasting practice change (Cullen et al., 2022). Other frameworks used by quality improvement projects in the literature include Lewin's Theory of Planned Change and the National Health Service Sustainability Model (McGrath et al., 2020; Silver et al., 2016).

Disseminate Results

Dissemination of results was the last step of the IM-R (Iowa Model Collaborative, 2017). Although this phase of the project terminated before the design and implementation of the pilot practice change step, actions must be taken to disseminate the results. Results of each round of the Delphi study and the finalized OPAHRC were shared internally within the expert panel and the Kaiser Permanente facility. Dissemination methods included emails, posters, and presentations. External dissemination was achieved via reporting results to other Kaiser Permanente healthcare system facilities, poster presentations at professional organization meetings, or preparing a manuscript for publication.

The IM-R was a framework with concise, actionable steps and has a reputation for successfully guiding EBP implementation in healthcare. The Delphi method has also proven efficacious in research studies and non-research projects aiming to identify critical elements in handoff communication among healthcare disciplines. The Delphi method worked synergistically with the first four steps of the IM-R to ensure sufficient evidence was available to support the clinical implementation of the OPAHRC. The integration of the two frameworks served as a clear and thorough blueprint to fulfill the aims of this project.

Methods

The aims of this project included evaluating and revising the OPAHRC using the Delphi method to ensure its readiness for clinical implementation at KPWLA. The project used the IM-R as the overall guiding framework, and the Delphi technique was chosen as the project design. The Delphi study was an essential step in the continued effort to create and implement a standard OPAHRC based on literature evidence and supported by expert consensus. Adaptation of the OPAHRC would lead to enhanced handoff communication, better patient outcomes, and higher provider satisfaction. The project timeline can be found in Appendix D.

Preliminary Work

KPSA and Kaiser Permanente West Los Angeles have identified a need for an evidence-based intervention to standardize PAH and improve patient outcomes. Balajadia et al. (2021) created the current version of the OPAHRC via an exhaustive literature review as the first step in the effort to standardize PAH. The OPAHRC consisted of items utilized in research studies and non-research QI projects recommended by professional organizations. Due to the lack of consensus on the standard format of PAH in literature, the next appropriate step in the IM-R would be conducting additional research to formulate a solution.

Design

This QI project utilized the Delphi methodology to evaluate and revise the OPAHRC. Since the current body of knowledge regarding the standard format of PAH was inconclusive, the Delphi study approach was used to facilitate group consensus among CRNAs via a heterogeneous expert panel. The panel's feedback from a total of two survey rounds allowed the Team to evaluate and revise the OPAHRC for clinical implementation.

Setting

The Delphi study was conducted at KPWLA. This facility did not utilize a standardized handoff tool, which literature indicated may be a source for increases in the risk of information omission during handoff. There were over 25 ORs in this facility, including five outpatient surgical center rooms. This facility offered surgical procedures for oncology, major pediatric surgery, and cardiac surgery for the Southern California area. As a hospital with a diverse staff and a well-established Surgical Department that completed 20,000 operations and procedures annually, KPWLA was an ideal location to conduct a QI project using Delphi methodology and to evaluate the effectiveness of the revised OPAHRC based on expert input gathered during the Delphi rounds.

Sample

Snowball and purposive sampling were employed in this Delphi study to recruit expert panel members. The team members determined the expert panel size to be greater than 10 (Kenney et al., 2010a). The expert panel was comprised of a heterogeneous group of CRNAs. Inclusion criteria included CRNAs with at least one year of experience in their current position. Panelists were recruited via email through the KPSA Team Lead liaison with the KPWLA Anesthesia Director. Prospective panelists were educated on the project's goal and purpose and provided a consent form.

Ethical Considerations

No inherent harm or conflicts of interest with any participating team members or clinicians were anticipated when considering the aims of this project. Additionally, there was no communication with patients or the need to access private patient information. During the

recruitment process, a Delphi participant information sheet was made available to all potential panelists (Appendix E).

The right to anonymity and confidentiality posed a difficulty due to the nature of the Delphi technique and the need to follow participants through multiple rounds (Keeney et al., 2010a). The small sample size allowed respondents to be known by one another and the researchers. Therefore, the complete anonymity of the participants could not be guaranteed. However, "quasi-anonymity" was maintained by communicating with respondents over secured email rather than face-to-face and by keeping feedback and opinions anonymous from other panelists (Keeney et al., 2010a). All panelists were informed of the potential conflict in maintaining anonymity during recruitment, and consent was obtained before participation.

Before project implementation and data collection, this research proposal was submitted to the Institutional Review Board (IRB) for KPSA and CSUF. Approval from the IRB confirmed that the project design and procedures were ethically sound and compliant with the code of conduct for both KPSA and CSUF. Furthermore, Dr. Elisha served as the KPSA team lead and the team proposed the project in person to garner support from the anesthesia department at KPWLA. The project began after receiving IRB approval and permission from the KP facility and CSUF. Data collected from the Delphi surveys was kept anonymous, and only de-identified data was kept on a team member's password-protected computer with security software. The computer was held in a locked office to protect the collected data.

Measures

The Delphi study included two rounds of online surveys (Appendix F). The surveys were developed using CSU Fullerton's Qualtrics survey software and distributed electronically to the panelists via the Kaiser Permanente email system by the department administrator. The surveys

were emailed to the 25 CRNAs in the KPWLA anesthesia department. Each survey round comprised three sections: 1) demographic data; 2) two open-ended questions; 3) and a series of Likert scale questions. The demographic data included participant's gender, age, and years of experience. The open-ended questions elicited participants' opinions on essential elements of a thorough OR to PACU anesthesia handoff and feedback on whether the OPAHRC was appropriate for clinical implementation. The third section asked the participants to rate each item in the OPAHRC for importance in the OR to PACU anesthesia handoff using a 5-point Likert scale (1, very important; 2, important; 3, neither important or not important; 4, not important; 5, irrelevant/should not be included). Results from the first survey were used to adjust the original OPAHRC. Group consensus from the results was used to finalize the checklist.

Data Collection

The data collection process began in May 2023. An initial email with a survey link and instructions on completing the survey was sent to each panelist. Participants were given three weeks to return the first survey and four weeks to return the second survey. For each survey round, a reminder was emailed one week before the conclusion of data collection. After the conclusion of data collection for the first round, content analysis and revision of the second-round survey took place in the following two weeks. The second survey round was administered by the end of July 2023. Content and statistical analysis for both survey rounds concluded in August 2023.

Method of Evaluation

The Delphi survey rounds yielded qualitative and quantitative data; therefore, each round required different data analysis methods. Qualitative data was analyzed using a qualitative descriptive methodology (Sandelowski, 2004). The DNP students performed separate content

analysis and statement extraction and combined them to synthesize prominent themes and patterns in the responses, as well as using WordCloud software to represent common themes visually. Quantitative data was analyzed using Statistical Package for the Social Scientists (SPSS). Descriptive statistics, including mean, standard deviations, and variance, were used to determine which items have reached a consensus. For this study, the group consensus was defined as greater than 50 percent of panelists reporting similar scores on the Likert scale. Both scores of 5, very important, and 4, important, were included in the consensus determination.

The items that did not reach group consensus were evaluated by the DNP students and the team leader, Dr. Elisha, for appropriateness, in addition to referencing facility policy and professional organization practice recommendations. The project concluded with a revised OPAHRC incorporating items from literature evidence, professional organization recommendations, facility policies, and expert panel consensus.

Acquiring group consensus on essential PAH elements via the Delphi surveys helped guide the OPAHRC revision. The design, data collection process, and results of this QI project adhered to the strict ethical research standards required by KPSA and CSU Fullerton. Participant information remained confidential, and data was maintained according to each organization's data security standards. Results from the Delphi rounds directed changes to the OPAHRC to tailor a handoff process to ensure ease of use, continuity of critical patient information, and employee satisfaction. Once a standardized OPAHRC was developed, implementation of the checklist into clinical practice would proceed.

Results

The first round of the survey yielded 24 responses, representing a response rate of 96%. The second survey yielded 17 total responses, representing a response rate of 68%. Six participants from the first round and four participants from the second round failed to answer all questions. Thus, their responses were excluded from the data analysis. A total of 31 responses, 18 from the first round and 13 from the second round were included in the data analysis.

Demographic Data

In both survey rounds, most participants were female, with 61% of participants (N=11) identified as female in the first round and 62% (N=8) identified as female in the second round. In the first round, the most common age groups were 25 to 34 (33%, N=6) and 45 to 54 (33%, N=6). In the second round, the most common age groups were 35 to 44 (31%, N=4) and greater than 55 (31%, N=4). Regarding clinical experience, 33% of respondents (N=6) reported having 5 to 10 years of experience in the first round. The following prominent groups were those with greater than 15 years of experience (28%, N=5) and those with less than five years of experience (22%, N=4). In the second round, 38% of respondents (N=5) reported having 5 to 10 years of experience, and 38% (N=5) reported having more than 15 years of experience. Tables I1 and I2 represent the demographic data from both surveys.

Qualitative Data

Five themes were identified in response to the first question, “What are the essential elements during a thorough OR to PACU anesthesia handoff?” The five themes identified are:

- Patient information: including identifying information, allergies, pertinent medical history, preferred language, and psychosocial data if relevant to patient care. One

participant stated “patient name & age, preferred language, allergies…”. Another stated “relevant medical history, allergies…, psychosocial data if relevant”.

- Surgical and anesthetic information: including surgery performed, surgeon’s name, type of anesthesia administered. One respondent reported “name, age…type of anesthesia, surgery, surgeon…”.
- Intraoperative considerations: including lines and drains placed, hemodynamic concerns, any significant surgical or anesthetic events or complications. One participant stated: “ L/D/A [lines, drains, airway], physiologic abnormalities during perioperative course…”. Another replied: “intraop[erative] complications (if any) affecting hemodynamics…”.
- Medications and fluid management: medications administered, including analgesics, anti-emetics, reversal agents for paralytics, responses to medications given, intake and output with estimated blood loss (EBL). One respondent listed: “pertinent meds given with additional information if needed (such as patient is a “lightweight”), EBL, fluids and blood given, urine output…”. Another respondent stated: “…total fluids given, EBL, analgesics & anti-emetics given”.
- Postoperative considerations: disposition of the patient, follow-up laboratory tests, hemodynamic monitoring, opportunity for questions and concerns. One CRNA replied: “any special [hemodynamic] issues to pay extra attention to. Additional case by case pertinent information such as patient is taking Uber home or should stay in PACU for additional time. Prior to leaving PACU, ask whether there are any questions and concerns”. Another respondent stated: “ any immediate labs, accuchecks or other interventions that need to be done in the immediately recovery phase”.

The items represented in these five themes were largely consistent with items in the OPAHRCs. Specific elements reported that were not part of the OPAHRC included patient disposition after the recovery period (N=5), relevant psychosocial data (N=3), preferred language (N=2), and surgeon's name (N=3).

Most responses to the second question, "Please examine the checklist and assess its appropriateness for clinical implementation," were positive. 68% of respondents (N=21) described the checklist as "concise and thorough as is" and expressed willingness to utilize it in clinical practice. One participant described the checklist as "thorough, but succinct". In the first survey round, one respondent proposed a dedicated "time-out" at the start of the handoff process to ensure all parties are engaged and avoid disruption. Although this was a singular suggestion, the team members and leader deemed it relevant and beneficial to the handoff process. Based on this recommendation, a Likert scale question regarding the importance of a "timeout" before handoff was added to the second survey.

Two respondents suggested the addition of psychosocial information that was relevant to patient care. Two respondents suggested clarification of terminology for Monitored Anesthesia Care (MAC) and central venous catheter (CVC). Three respondents expressed concern about increased redundancy in documentation and prolonging the handoff process. To reduce redundancy and improve workflow, these respondents suggested the addition of checkboxes for commonly used anesthetic medications and integrating the checklist in the EMR. One respondent stated: "I'm not going write out versed, fentanyl, ancef, Zofran, etc every single time. I would not use this [checklist] unless it has checkboxes for common medications". Another reported concern was that using paper checklists with patient identifying information can increase the risk of violating the Health Insurance Portability and Accountability Act of 1996 (HIPAA). One

CRNA stated: “my recommendation would be to have this built in EMR as a tab [to be] utilized by anesthesia and PACU. This would eliminate paper waste, decrease risk of HIPAA violations, increase user adherence, and be more easily accessible…”. Notably, although most respondents stated the OPAHRC as appropriate for implementation, four respondents deemed the checklist “not ready for implementation” without a specific explanation in the second round. Table 2 and Figures H1 and H2 display the content analysis and the WordCloud representation of responses for the open-ended questions.

Quantitative Data

The first survey contained 19 Likert scale questions, each representing an item in the OPAHRC. The second survey contained 20 Likert scale questions. As previously discussed, the additional question regarding a dedicated “time-out” was added based on the input from the first-round result. Overall, all items in both surveys achieved a greater than 50% consensus. The responses from the Likert scale questions of each round, the descriptive statistics, and the consensus level of each item can be found in Tables J1 and J2.

In the first survey round, 7 out of 19 items achieved a consensus of 100%, including allergies, anesthesia technique, pertinent medical history, intraoperative course and complications, analgesics given, intake and output with EBL, and high alert postoperative concerns. The three items with the lowest level of consensus from the first round were antibiotics given (56%), postoperative order entry (61%), and anesthesia provider (67%). In the second survey round, 8 out of 20 items achieved a consensus of 100%, including allergies, anesthesia technique, pertinent medical history, intraoperative course and complications, analgesics given, pertinent lab results, high alert postoperative concerns, and opportunity for questions. The addition of “timeout” before handoff received a consensus level of 77%. The three items with the

lowest level of consensus from the second survey were patient identifying information (62%), identification of the anesthesia provider (62%), and antibiotics administered (62%).

Discussion

The findings highlighted the high levels of consensus among respondents that the OPAHRC contained essential elements for the PAH and was appropriate for clinical implementation. Responses to the first open-ended question, “What are the essential elements in a thorough OR to PACU anesthesia handoff?” reiterated the importance of a concise but thorough PAH without omission of information leading to compromised patient care. The five themes generated from the responses to the first questions were largely consistent with items in the OPAHRCs. Although there was consensus that the checklist was concise, thorough, and appropriate for clinical implementation, respondents reported concern that using a physical checklist created redundancy in workflow and may lead to inefficiency during the handoff process. However, these concerns were inconsistent with findings in the literature, as some studies have reported increased handoff durations while others concluded that handover checklists improve the information being transferred without prolonging interaction time (Abraham et al., 2021; Burns et al., 2018; Saxena et al., 2020). To improve workflow and efficiency, revisions may be made to incorporate checkboxes for commonly used anesthetic medications and integrating the PAH checklist into the EMR. Using a standardized electronic handoff tool would help streamline the completeness of patient information (Bell et al., 2023; Lee et al., 2018). However, the feasibility of such modifications would depend on facility resources and the variability in anesthetic practice. Integrating OPAHRC into the EMR would decrease the risk of HIPAA compliance violations. The decision to include the “time-out” component before PAH was well received by the CRNAs, with a consensus level of 77%, indicating that it could promote engagement and minimize disruption. This uninterrupted pause mirrors the briefings in the OR, helping to reduce distractions and interruptions while allowing a

period for questions and concerns (Talley et al., 2019). Although all the items in the checklist achieved consensus on the Likert scale, “anesthesia provider” and “antibiotics given” had the lowest level of consensus in both survey rounds. The lower consensus level indicated that the CRNAs consider these items less important and are more likely to omit them in a PAH. Overall, with the addition of "timeout” on the second round of OPAHRC, the consensus level of both open-ended and Likert scale questions remained high, which validated the usability and suitability of the checklist for clinical implementation.

Limitations

Despite the initial objective of recruiting a heterogeneous expert panel consisting of CRNAs, anesthesiologists, and PACU RNs, a limitation of this Delphi study was the lack of participation from other providers involved in anesthesia care, including anesthesiologists and PACU RNs. Given that these providers are integral in the PAH process and have their own area of expertise in the care of postoperative patients, their absence from the expert panel limited the group's heterogeneity and thus negatively impacted the generalizability of the results (Keeney et al., 2010b). The lack of participation of PACU RNs was due to an unexpected change in administrative personnel before the first survey round. Furthermore, the lack of involvement from PACU RNs and anesthesiologists corresponded with a lack of buy-in from other perioperative departments. Specifically, the DNP team was unsuccessful in identifying a physician anesthesiologist champion who would assume a leadership role in clinical piloting and implementation of the OPAHRC as the next step of this DNP project. As a result, the validated OPAHRC will not be undergoing clinical piloting and implementation at KPWLA in the following academic year. Therefore, this DNP project does not have further plans for the next step in the IM-R, design and implement pilot practice change (Iowa Model Collaborative, 2017).

Implications

The survey results illustrated that CRNAs at KPWLA perceived the OPAHRC as thorough and logical for anesthesia workflow. The respondents also discerned some of the most cited barriers to checklist implementation in the literature, indicating consistency with other research findings (Abraham et al., 2021; Leonardsen et al., 2019; Saxena et al., 2020). The high response rate for both surveys signified that the CRNAs at KPWLA recognized the importance of thorough PAH and the need for a standardized, efficient handoff process to ensure safe patient care. It also reflected the CRNAs' openness to the potential piloting and adaptation of the OPAHRC into clinical practice. The Delphi technique was instrumental in achieving group consensus and promoting provider buy-in before piloting testing. Still, it also helped the DNP team members evaluate whether sufficient evidence was generated to support the proposed practice change per the IM-R (Iowa Model Collaborative, 2017). The high level of group consensus from the survey supported the suitability of OPAHRC for clinical pilot testing and implementation at KPWLA when future opportunity arises for other DNP project groups to do so. The revised OPAHRC based on the Delphi study result can be found in Appendix K.

Recommendations

Although there is no immediate plan for pilot testing and clinical implementation at KPWLA, the literature and the Delphi survey results suggest that using a standardized handoff tool can potentially improve PAH and patient outcomes. The DNP team members recommend future DNP project groups continue to educate and advocate for the formation of a focus group at KPWLA, led by a physician anesthesiologist champion, to facilitate the implementation of a standardized handoff process. The validated revised OPAHRC is an evidence-based tool that can be readily tested or revised to expedite the process, regardless of which facility were to be

chosen as the clinical piloting site. The DNP team members recommend future project groups utilize the Iowa Implementation for Sustainability Framework to guide implementation strategies in order to achieve long-lasting practice change (Cullen et al., 2022). The Iowa Implementation for Sustainability Framework is an application-oriented framework with four implementation phases and a list of 81 implementation strategies (Appendix L). It is designed to work synergistically with the IMR. The four phases of the Iowa Implementation for Sustainability Framework include “creating awareness & interest”, “ build knowledge & commitment”, “promote action & adoption”, and “pursue integration & sustained use”. In order to create awareness and interest, the Iowa Implementation for Sustainability Framework recommend strategies such as distribution of key evidence, highlighting compatibility, and utilizing staff meetings and posters (Cullen et al., 2022). Since the DNP team is scheduled to disseminate at KPWLA via PowerPoint presentation and poster presentation, the dissemination effort serves as a strategy to highlight the usability of the revised OPAHRC and its compatibility with the anesthesia practice at the facility. The next phase of implementation is building knowledge and commitment via strategies such as identification of change agents such as a change champion or leader, live or virtual education session, and matching practice change with available resources and equipment (Cullen et al., 2022). The future DNP project groups may work with a group of stakeholders consisting of all perioperative departments, including PACU and anesthesia, as well as a physician anesthesiologist champion, to allocate staff and material resources available and formulate a piloting plan. Depends on resources available and stakeholder feedback, the revised OPAHRC may be piloted using electronic or paper format and adopted by all or selected PACU and anesthesia providers. In person or virtual education for selected users should be provided before piloting. The third phase of the Iowa Implementation for Sustainability Framework is

promoting action and adoption (Cullen et al., 2022). Strategies to promote action include data collection by clinicians, report progress and updates, as well as multidisciplinary discussion and troubleshooting (Cullen et al., 2022). Per the IMR, the data and feedback collected during the pilot testing will be used to evaluate if the OPAHRC appropriate for adoption into clinical practice steps (Iowa Model Collaborative, 2017). The last phase of the Iowa Implementation for Sustainability Framework is pursuing integration and sustained use (Cullen et al., 2022). Strategies to promote sustained integration include share protocol revisions with clinicians who provided feedback, reporting to senior leadership, reporting to quality improvement programs and revision of hospital policy and procedure (Cullen et al., 2022).

Conclusion

The postoperative handoff period is a vulnerable period for patients who have received anesthesia, and a need for a standardized OR to PACU handoff tool has been identified at KPWLA. The OPAHRC by Balajadia et al. (2021) was developed to meet this need to increase patient safety and staff satisfaction. This Delphi study validated the potential effectiveness of the OPAHRC by Balajadia et al. (2021), and this tool has been revised using feedback from an expert panel to optimize its utility on the unit. Members of this DNP research team hope that this OPAHRC may be utilized in other facilities as national organizations have continued to endorse the standardization of OR to PACU handoff to improve patient care.

References

Abraham, J., Meng, A., Sona, C., Wildes, T., Avidan, M., Kannampallil, T. (2021). An observational study of postoperative handoff standardization failures. *International Journal of Medical Informatics, 151*, 104458–104459. https://doi.org/10.1016/j.ijmedinf.2021.104458

Alrajhi, & Alsaawi, A. (2019). Developing an emergency medicine handoff tool: An electronic Delphi approach. *International Journal of Emergency Medicine, 12(*1), 1–6. https://doi.org/10.1186/s12245-019-0249-4

American Association of Nurse Anesthesiology. (2014). Patient-centered perianesthesia communication practice considerations. https://issuu.com/aanapublishing/docs/9_-_patient-centered_perianesthesia_communication?fr=sNTcwZjU2NDAxMjU

American Association of Nurse Anesthesiology. (2019). Postanesthesia care practice considerations. https://issuu.com/aanapublishing/docs/12_-_postanesthesia_care?fr=sMWQxZTU2NDAxMjU

American Society of Anesthesiologist. (2013, February). Practice guidelines for postanesthetic care: An updated report by the American Society of Anesthesiologists Task Force on postanesthetic care. https://doi.org/10.1097/ALN.0b013e31827773e9

American Society of Anesthesiologists. (2019, October 23). Standards for postanesthesia care. https://www.asahq.org/standards-and-practice-parameters/standards-for-postanesthesia-care

Balajadia, M. V., Dominguez, S. S., & Karimianpour, Y. (2021). Operating room to post-anesthesia care unit handoff checklist [Unpublished doctoral dissertation]. Southern California CSU DNP Consortium.

Bell, E., Benefield, D., Vollenweider, A., Wilson, K., Warren, L. L., & Aroke, E. N. (2023). Improving communication between ICU nurses and anesthesia providers using a standardized handoff protocol. *Journal of PeriAnesthesia Nursing, 38*(2), 200–205. https://doi.org/10.1016/j.jopan.2022.08.002

Bootland, D., Coughlan, E., Galloway, R., Goubet, S., & McWhirter, E. (2017). *Critical appraisal from papers to patient: A practical guide*. CRC Press.

Bruno, G. M. & Guimond, M. E. (2017). Patient care handoff in the Postanesthesia Care Unit: A quality improvement project. *Journal of Perianesthesia Nursing, 32*(2), 125-133. https://doi.org/10.1016/j.jopan.2015.10.002

Burns, S., Parikh, R., & Schuller, K. (2018). Utilization of a checklist to standardize the operating room to postanesthesia care unit patient handoff process. *Perioperative Care and Operating Room Management, 13*, 1-5. https://doi.org/10.1016/j.pcorm.2018.10.002

Clay-Williams, R., & Colligan, L. (2015). Back to basics: Checklists in aviation and healthcare. BMJ Quality & Safety, 24(7), 428–431. https://doi.org/10.1136/bmjqs-2015-003957

Cullen, L., Hanrahan, K., Edmonds, S. W., Reisinger, H. S., & Wagner, M. (2022). Iowa implementation for sustainability framework. *Implementation Science, 17*. https://doi.org/10.1186/s13012-021-01157-5

Dalkey, N. C. (2022). Toward a theory of group estimation. In H. A. Linstone & M. Turoff (Eds.), The Delphi method: Techniques and applications [Electronic version] (pp. 231-256). New Jersey Institute of Technology.

Dang, D., Dearholt, S. L., Bissett, K., Ascenzi, J., & Whalen, M. (2021). Johns Hopkins evidence-based practice for nurses and healthcare professionals: Model and guidelines (4th ed.). Sigma Theta Tau.

Desmedt, M., Ulenaers, D., Grosemans, J., Hellings, J., & Bergs, J. (2020). Clinical handover and handoff in healthcare: A systematic review of systematic reviews. *International Journal for Quality in Health Care, 33*(1). https://doi.org/10.1093/intqhc/mzaa170

Douglas, R. N., Stephens, L. S., Posner, K. L., Davies, J. M., Mincer, S. L., Burden, A. R., & Domino, K. B. (2021). Communication failures contributing to patient injury in anaesthesia malpractice claims. *British Journal of Anaesthesia, 127*(3), 470–478. https://doi.org/10.1016/j.bja.2021.05.030

Grove, S. K. (2019). Building an evidence-based nursing practice. In S. K. Grove & J. R. Gray (Eds.), *Understanding nursing research: Building an evidence-based practice* (7th ed., pp. 387-429). Elsevier.

Halladay, M. L., Thompson, J. A., & Vacchiano, C. A. (2019). Enhancing the quality of the anesthesia to postanesthesia care unit patient transfer through use of an electronic medical record-based handoff tool. *Journal of Perianesthesia Nursing, 34*(3), 622–632. https://doi.org/10.1016/j.jopan.2018.09.002

Halterman, R. S., Gaber, M., Janjua, M., Hogan, G. T., & Cartwright, S. (2019). Use of a checklist for the postanesthesia care unit patient handoff. *Journal of Perianesthesia Nursing, 34*(4), 834-841. https://doi.org/10.1016/j.jopan.2018.10.007

Hanrahan, K., Fowler, C., & McCarthy, A. M. (2019). Iowa model revised: Research and evidence-based practice application. *Journal of Pediatric Nursing, 48*, 121-122. https://doi.org/10.1016/j.pedn.2019.04.023

Iowa Model Collaborative et al. (2017). Iowa model of evidence-based practice: Revisions and validation. *Worldviews on Evidence-Based Nursing, 14*(3), 175-182. https://doi.org/10.1111/wvn.12223

Jullia, M., Tronet, A., Fraumar, F., Minville, V., Fourcade, O., Alacoque, X., LeManach, Y., & Kurrek, M. M. (2017). 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. *European Journal of Anaesthesiology, 34*(7), 471–476. https://doi.org/10.1097/EJA.0000000000000636

Jaulin, F., Lopes, T., & Martin, F. (2021). Standardised handover process with checklist improves quality and safety of care in the postanaesthesia care unit: The postanaesthesia team handover trial. *British Journal of Anaesthesia, 127*(6), 962– 970. https://doi.org/10.1016/j.bja.2021.07.002

Jelacic, S., Togashi, K., Bussey, L., Nair, B. G., Wu, T., Boorman, D. J., & Bowdle, A. (2021). Development of an aviation-style computerized checklist displayed on a tablet computer for improving handoff communication in the postanesthesia care unit. *Journal of Clinical Monitoring and Computing, 35*(3), 607–616. https://doi.org/10.1007/s10877-020-00521-y

Kaltoft, A., Jacobsen, Y. I., Tangsgaard, M., & Jensen, H. I. (2022). ISBAR as a structured tool for patient handover during postoperative recovery. *Journal of Perianesthesia Nursing, 37*(1), 34-39. https://doi.org/10.1016/j.jopan.2021.01.002

Keeney, S., Hasson, F., & McKenna, H. P. (2010a). Ethical considerations. In *The delphi technique in nursing and health research* (pp. 105–113). Wiley-Blackwell.

Keeney, S., Hasson, F., & McKenna, H. P. (2010b). Reliability and validity. In *The delphi technique in nursing and health research* (pp. 96-104). Wiley-Blackwell.

Kiekkas, P., & Michalopoulos, E. (2020). Patient handover in the PACU: When less can be more. *Journal of Perianesthesia Nursing, 35*(3), 343–344. https://doi.org/10.1016/j.jopan.2020.01.009

Lambert, L. H., & Adams, J. A. (2018). Improved anesthesia handoff after implementation of the Written Handoff Anesthesia Tool (WHAT). *American Association of Nurse Anesthesiolgy Journal, 86*(5), 361–370. https://pubmed.ncbi.nlm.nih.gov/31584405/

Lee, S. C., Atkinson, M. E., Minard, C. G., & O'Brien, A. (2018). Electronic tool helps anaesthesia trainee handovers. *The Clinical Teacher, 16*(1), 58–63. https://doi.org/10.1111/tct.12768

Leonardsen, A.-C., Moen, E. K., Karlsøen, G., & Hovland, T. (2019). A quantitative study on personnel's experiences with patient handovers between the operating room and the postoperative anesthesia care unit before and after the implementation of a structured communication tool. *Nursing Reports, 9*(1). https://doi.org/10.4081/nursrep.2019.8041

Scheele, D. S. (2022). Reality construction as a product of Delphi interaction. In H. A. Linstone & M. Turoff (Eds.), *The Delphi method: Techniques and applications* [Electronic version] (pp. 35-67). New Jersey Institute of Technology.

López-Parra, Porcar-Andreu, L., Arizu-Puigvert, M., & Pujol-Caballé, G. (2020). Cohort study on the implementation of a surgical checklist from the Operating Room to the

Postanesthesia Care Unit. *Journal of Perianesthesia Nursing, 35*(2), 155-159. https://doi.org/10.1016/j.jopan.2019.08.015

McGrath, J. K., Elertson, K. M., & Morin, T. (2020). Increasing patient safety in hemodialysis units by improving handoff communication. *Nephrology Nursing Journal, 47*(5), 439-445. https://doi.org/10.37526/1526-744X.2020.47.5.439

Methangkool, E., Tollinche, L., Sparling, J., & Agarwala, A. V. (2019). Communication: Is there standard handover technique to transfer patient care? *International Anesthesiology Clinics, 57*(3). https://doi.org/10.1097/AIA.0000000000000241

Nasa, P., Jain, R., & Juneja, D. (2021). Delphi methodology in healthcare research: How to decide its appropriateness. *World Journal of Methodology, 11*(4), 116–129. https://doi.org/10.5662/wjm.v11.i4.116

Niederberger, M., & Spranger, J. (2020). Delphi technique in health sciences: A map. *Frontiers in Public Health, 8*. https://doi.org/10.3389/fpubh.2020.00457

O'Rourke, Abraham, J., Riesenberg, L. A., Matson, J., & Lopez, K. D. (2018). A Delphi study to identify the core components of nurse to nurse handoff. *Journal of Advanced Nursing, 74*(7), 1659–1671. https://doi.org/10.1111/jan.13565

Park, L. S., Yang, G., Tan, K. S., Wong, C. H., Oskar, S., Borchardt, R. A., & Tollinche, L. E. (2017). Does checklist implementation improve quantity of data transfer: An observation in Postanesthesia Care Unit (PACU). *Open Journal of Anesthesiology, 7*(4), 69-82. https://doi.org/10.4236/ojanes.2017.74007

Polit, D., & Beck, C. (2019). Nursing research: Generating and assessing evidence for nursing practice. Wolters Kluwer Health.

Provost, L. P., & Murray, S. K. (2011). The Health Care Data Guide: Learning from Data for Improvement (1st ed.). Jossey-Bass.

Randmaa, M., Engström, M., Swenne, C. L., & Mårtensson, G. (2017). The postoperative handover: A focus group interview study with nurse anaesthetists, anaesthesiologists and PACU nurses. *British Medical Journal Open, 7*(8). https://doi.org/10.1136/bmjopen-2016-015038

Rose, M. W., Newman, S., & Brown, C. (2018). Postoperative information transfers: An integrative review. *Journal of Perianesthesia Nursing, 34*(2), 403–424. https://doi.org/10.1016/j.jopan.2018.06.096

Sandelowski, M. (2004). Using qualitative research. *Qualitative Health Research, 14*(10), 1366-1386. https://doi.org/10.1177/1049732304269672

Saxena, S., Krombach, J. W., Nahrwold, D. A., & Pirracchio, R. (2020). Anaesthesia-specific checklists: A systematic review of impact. *Anaesthesia Critical Care & Pain Medicine, 39*(1), 65–73. https://doi.org/10.1016/j.accpm.2019.07.011

Servas, L., Hayes, C., Mayhorn, T., & Milner, K. A. (2021). Navigating the path to a sustainable "PACU Pause" and standardized perioperative handoff: A quality improvement project. *Journal of Perianesthesia Nursing, 37*(1), 44–47. https://doi.org/10.1016/j.jopan.2021.06.104

Silver, S. A., McQuillan, R., Harel, Z., Weizman, A. V., Thomas, A., Nesrallah, G., Bell, C. M., Chan, C. T., & Chertow, G. M. (2016). How to sustain change and support continuous quality improvement. *Clinical Journal of the American Society of Nephrology, 11*(5), 916-924. https://doi.org/10.2215/CJN.11501015

Spranger, J., Homberg, A., Sonnberger, M., & Niederberger, M. (2022). Reporting guidelines for Delphi techniques in health sciences: A methodological review. *The Journal of Evidence and Quality in Health Care, 172*, 1–11. https://doi.org/10.1016/j.zefq.2022.04.025

Talley, D. A., Dunlap, E., Silverman, D., Katzer, S., Huffines, M., Dove, C., Anders, M., Galvagno, S. M., & Tisherman, S. A. (2019). Improving postoperative handoff in a surgical intensive care unit. *Critical Care Nurse, 39*(5), 13–21. https://doi.org/10.4037/ccn2019523

The Joint Commission. (2017). Inadequate hand-off communication. *Sentinel Event Alert, 58*(1), 6. https://www.jointcommission.org/-/media/tjc/documents/resources/patient-safety-topics/sentinel-event/sea_58_hand_off_comms_9_6_17_final_(1).pdf?db=web&hash=5642D63C1A5017BD214701514DA00139&hash=5642D63C1A5017BD214701514DA00139

Titler, M. G., Kleiber, C., Steelman, V., Goode, C., Rakel, B., Barry-Walker, J., Small, S., & Buckwalter, K. (1994). Infusing research into practice to promote quality care. *Nursing Research, 43*(5), 307–313. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/7937178

Titler, M. G., Kleiber, C., Steelman, V. J., Rakel, B. A., Budreau, G., Everett, L. Q., Buckwalter, K. C., Tripp-Reimer, T., & Goode, C. J. (2001). The Iowa model of evidence-based practice to promote quality Care. *Critical Care Nursing Clinics of North America, 13*(4), 497–509. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/11778337

Waltz, C. F., Strickland, O. L., & Lenz, E. R. (2016). Measurement in nursing and health research, fifth edition (C. F. Faan Waltz, Ed.; 5th ed.). Springer. https://doi.org/10.1891/9780826170620

Wang, X. L., He, M., & Feng, Y. (2021). Handover patterns in the PACU: A review of the literature. *Journal of Perianesthesia Nursing: Official Journal of the American Society of PeriAnesthesia Nurses, 36*(2), 136–141. https://doi.org/10.1016/j.jopan.2020.05.005

Warner, L. A. (2014). Using the Delphi technique to achieve consensus: A tool for guiding extension programs. *EDIS, 2014*(8). https://doi.org/10.32473/edis-wc183-2014

Wensing, M., Grol, R., & Grimshaw, J. (2020, May 11). *Improving patient care: The implementation of change in health care* (3rd ed.). Wiley-Blackwell.

Appendix A

OR to PACU Anesthesia Handoff Checklist

<table>
<tr><td>Patient sticker (Name, DOB/Age, MRN)</td><td>☐ Allergies:</td></tr>
<tr><td>☐ Procedure:</td><td>Anesthesia technique:
☐ General anesthesia
☐ Local/MAC
☐ Peripheral nerve block
☐ Spinal</td></tr>
<tr><td>☐ Pertinent medical history:</td><td>☐ Anesthesia provider:</td></tr>
<tr><td rowspan="2">Intraoperative course:
☐ Difficult airway:

☐ Intraoperative complications:

Medications:
☐ Analgesia: _____
☐ Antiemetic: _____
☐ Antibiotic: _____
☐ Sedative: _____
☐ Reversal: _____
☐ Other:</td><td>Intake:
☐ Fluids: _____
☐ Blood products: _____

Output:
☐ EBL:_____
☐ UO:_____</td></tr>
<tr><td>Lines:
☐ PIV(s)
☐ Arterial line</td></tr>
<tr><td>☐ Pertinent labs:</td><td>☐ Labs to recheck:</td></tr>
<tr><td>☐ Postoperative orders entered?</td><td>☐ High alert postoperative concerns:</td></tr>
</table>

Do you have any questions or concerns?

Appendix B

Table 1: AANA Postanesthesia Care Practice Considerations: Elements to Include in the Handoff

Table 1

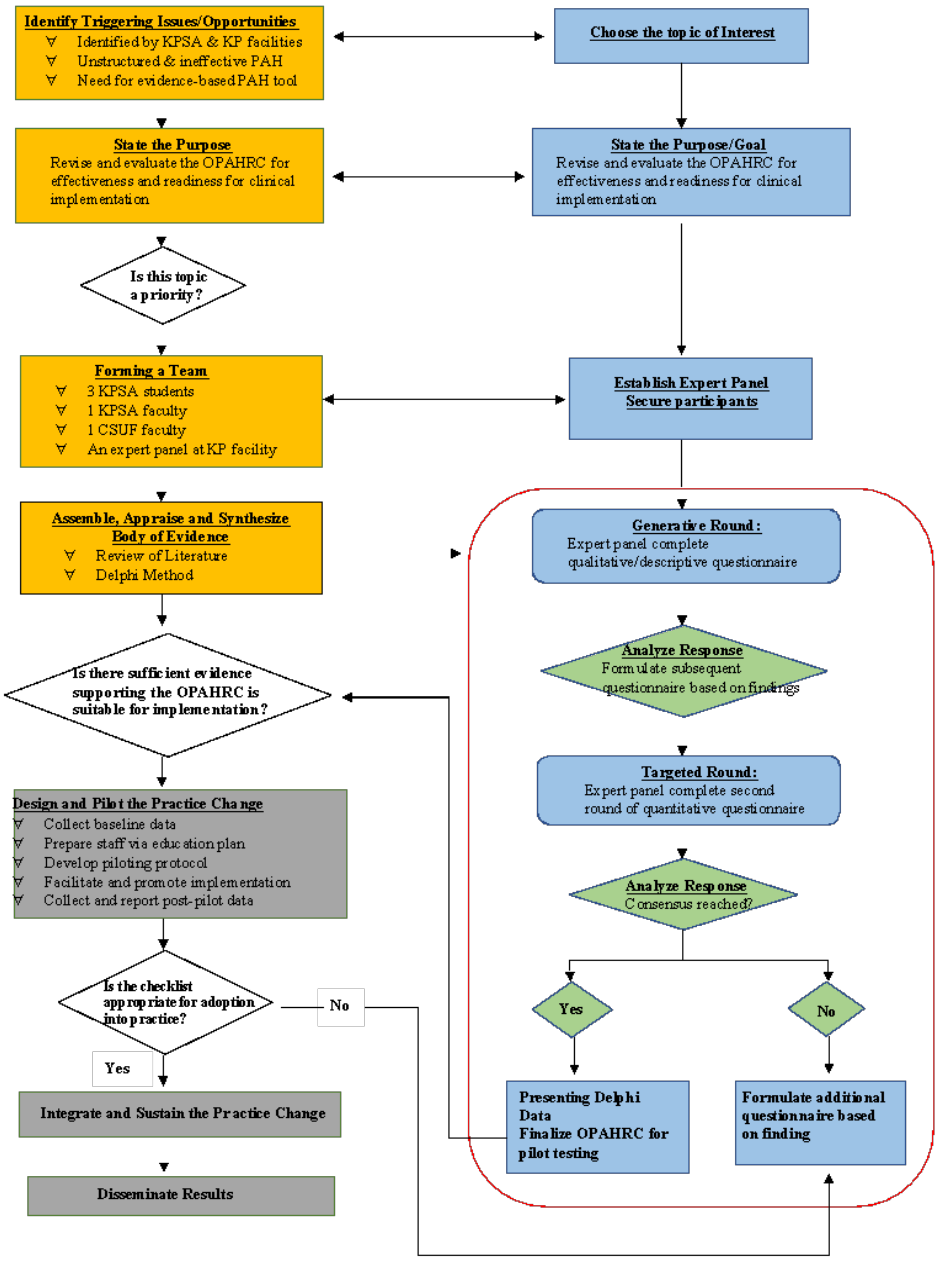
AANA Postanesthesia Care Practice Considerations: Elements to Include in the Handoff

Patient	Patient name, age, gender/identified gender
	Level of consciousness/orientation
	Weight [for pediatric patients]
	Allergies/Reactions
	Procedure(s) performed
	Airway status
	Relevant patient medical and surgical/procedural history
	Vital signs and assessment findings
	Physical limitations
	Intraoperative course (include unanticipated intraoperative events) and considerations for management of similar issues in the PACU/ICU
Procedure	Positioning of the patient (if other than supine)
	Type and difficulty of airway management
	Vascular access/lines/catheters
	Status of dressings and surgical/procedural site
	Fluids/losses (include drainage tubes) ● Crystalloid/colloid/blood products ● Estimated blood loss ● Urine output
Health History	Preoperative vital signs
	Pertinent health and medication history
	Physical status score
	Preoperative cognitive function
	Extremity restrictions, preoperative level of activity

Anesthesia and Medications	Type of anesthesia delivered
	Airway management concerns
	Relevant lab values
	Vital signs and monitoring trends (CV, respiratory, neuromuscular function)
	Patient-specific procedure and hemodynamic considerations
	Current medications/administration/dose/timing ● Anti-emetics ● Time of last and next dose of antibiotic
	Other intraoperative medications (steroids, antibiotics, antihypertensives, etc.)
	Analgesia management plan
	Regional anesthetic (for postoperative pain)
PACU	Medications due during PACU
	PACU orders
	Pain and comfort management plan

Appendix C

Iowa Model and Delphi Method Diagram



Appendix D

Project Timeline

Month/Year	Targeted Steps Completion
January 2023	Obtain KPSC IRB approval Obtain CSUF IRB approval Obtain facility permission from KP West Los Angeles
February 2023	Determine expert panel size Expert panel recruitment Obtain consent and demographic information Finalize expert panel roster
May 2023	First Delphi survey Data analysis from first survey Modify second round survey
July 2023	Second Delphi survey Data analysis from second survey Attend Dissemination Day at CSUF
September 2023	Create data table representing study findings Complete data analysis OPAHRC revision based on study findings Evaluate guideline adherence
October 2023	Write up data analysis Change proposal to past tense Begin write-up of full doctoral project paper Doctoral project paper revision based on TL/TM feedback Checking upcoming conferences for abstract submission
November 2023	Continue doctoral project paper revision Submit abstract if applicable Document clinical hours Continue doctoral project paper revision Professional presentation if applicable
December 2023	Continue doctoral project paper revision to be sure it meets committee approval
January 2024	Continue paper revision
February 2024	Finalize paper Prepare poster presentation
March 2023	Finalize paper Prepare poster presentation
April 2024	Present on Dissemination Day
May 2024	Graduation

Appendix E

Delphi Participant Information Sheet

Welcome to Developing an Operating Room to Post-Anesthesia Care Unit Handoff Checklist: A Delphi Study

Study Title: Developing an Operating Room to Post-Anesthesia Care Unit Handoff Checklist: A Delphi Study

Protocol Number: HSR-22-23-314

Researchers:
Rachel McClanahan (Primary Investigator), CSUF Associate Professor of Nursing, Coordinator of the School Nurse Credential and MSN Program, and the Director of the Southern California CSU DNP Consortium, (657) 278-7536
Justin Breazeale, RN, BSN, CSUF DNP CRNA Student, (951) 526-8340
Junelle Jones, RN, BSN, CSUF DNP CRNA Student, (951) 941-2077
Gina Yan, RN, BSN, CSUF DNP CRNA Student, (909) 348-2329

Sponsor: Kaiser Permanente School of Anesthesia, California State University, Fullerton

You are being asked to take part in a research study carried out by Rachel McClanahan, Justin Breazeale, Junelle Jones, and Gina Yan. This consent form explains the research study and your part in it if you decide to join the study. Please read the form carefully, taking as much time as you need. Ask the researcher to explain anything you don't understand. You can decide not to join the study. If you join the study, you can change your mind later and leave the study at any time. There will be no penalty or loss of services or benefits if you decide to not take part in the study.

What is this study about?

This research study evaluates the effectiveness of the OR to PACU Anesthesia Handoff Report Checklist (OPAHRC) and revises it for clinical implementation using the Delphi method at Kaiser Permanente West Los Angeles. This project's overall goals are promoting patient safety by improving the quality of post-anesthesia handoff (PAH), improving patient outcomes during the recovery period, and increasing satisfaction among anesthesia providers and PACU RNs.

You are being asked to participate in this study because you are an Anesthesiologist, a Certified Registered Nurse Anesthetist (CRNA), or a Registered Nurse working in the Post-Anesthesia Care Unit (PACU), and therefore participate in the handoff process between OR and PACU. You cannot take part in this study if you have less than two years of experience working in your current professional role.

Taking part in the study will take about twenty to forty minutes in two divided sessions in the period of three months.

What will I be asked to do if I am in this study?

If you take part in the research study, you will be asked to complete two surveys within a three-month period. Each survey will require about ten to twenty minutes to complete. The first survey includes two open-ended questions. The first question asks you to state what they believe to be the essential elements in a thorough OR to PACU anesthesia handoff. The second question asks you to examine and evaluate the OR to PACU Anesthesia Handoff Report Checklist for its appropriateness for clinical implementation. You will be asked to complete the first survey within two weeks of receipt. The second survey will be sent to you after the first survey results are recorded and analyzed. The second survey utilizes a Likert-Scale. You are asked to rank each of the items included in the OR to PACU Anesthesia Handoff Report Checklist for importance in the OR to PACU anesthesia handoff. In addition, you will also be asked to complete a demographic survey, which includes age, sex, job title, and years of experience in your current profession. You have the right to refuse to answer any questions in the demographic data collection form and the surveys.

Are there any benefits to me if I am in this study?

There are no direct benefits to you for being in this study. However, the study is an essential component of the continued effort to improve anesthesia to PACU handoff process and promote patient safety. Your participation will contribute to this effort and help achieve these goals.

Are there any risks to me if I am in this study?

There are no foreseeable risks to you if you participate in the study. However, possible discomfort may occur while completing the survey relating to expressing your opinion and assessment on components of clinical practice. If you feel uncomfortable at any time, you can refuse to answer any of the survey questions. Employment will not be affected in any way based on answers to the survey.

Will my information be kept anonymous or confidential?

The data for this study will be kept anonymous. No published results will identify you, and your name will not be associated with the findings. You will remain anonymous to the other participants throughout the study, and only the researchers can identify your questionnaire answers. All information will be handled and stored following the requirements of the Data Protection Act. The data will be stored on a password-protected computer. The data collected will only be available to members of the research team.

Are there any costs or payments for being in this study?

There will be no cost to you for taking part in this study, nor will you receive money or any other compensation for participating in this study. Whom can I contact if I have questions? If you have questions about this study or the information in this form, please contact the researcher Junelle Jones (junelle.jones@csu.fullerton.edu (951) 941-2077). If you have questions about your rights as a research participant or would like to report a concern or complaint about this study, please contact the Institutional Review Board at (657) 278-7719 or e-mail irb@fullerton.edu.

What are my rights as a research study volunteer?

Your participation in this research study is completely voluntary. You may choose not to be a part of this study. There will be no penalty for you if you choose not to take part. You may choose not to answer specific questions or to stop participating at any time.

By clicking the button below, you acknowledge the following:

- **I acknowledge that participation in the study is voluntary.**
- **I am at least 18 years of age.**
- **I understand I may choose to terminate my participation anytime for any reason.**
- **I have carefully read and/or have had the terms used in this consent form and their significance explained to me.**
- (You may print this page for your records).

Appendix F

Delphi Survey Template

Standardization of OR to PACU Anesthesia Handoff
Open-ended Questions
Please answer the following questions using words, short phrases, and/or complete sentences. You can list as many answers as you wish, and the answers do not have to be in a particular order.
Question 1: What are the essential elements in a thorough OR to PACU anesthesia handoff?
Question 2: Please examine the attached OR to PACU Anesthesia Handoff Report Checklist and provide an assessment of its appropriateness for clinical implementation.

Standardization of OR to PACU Anesthesia Handoff					
Likert-Scale Questions					
Please place an X in the box that best describes how important each item is in the OR to PACU Anesthesia Handoff. The numbers correspond to a response as below: 1 – Very Important 2 – Important 3 – Neither important or not important 4 – Not important 5 – Irrelevant/Should not be included					
Items	**1**	**2**	**3**	**4**	**5**
Patient identifying information (Name, Date of Birth, Medical Record Number)					
Allergies					
Procedure/Surgery					
Anesthesia technique					
Anesthesia provider					
Pertinent medical history					
Intraoperative course and complications					
Medications given					
Intake & output					
Lines					
Pertinent labs					
Labs needed to check					
Postoperative order entry					
High-alert postoperative concerns					
(Additional items generated from Round 1)					
(Additional items generated from Round 1)					
(Additional items generated from Round 1)					

Appendix G

Table 2: Content Analysis for Question 1

Table 2

Content Analysis for Question 1

Content Analysis for Question 1: What are the essential elements in a thorough OR to PACU anesthesia handoff?

Patient Information	• Identifying information • Allergies • Pertinent medical history • Preferred language • Psychosocial data if relevant (e.g., transportation arrangements)
Surgical and Anesthetic Information	• Surgery performed • Surgeon's name • Type of anesthesia administered (General Anesthesia, MAC, Neuraxial, regional, etc.)
Intraoperative Considerations	• Lines and drains placed • Hemodynamic concerns • Any significant surgical or anesthesia events or complications (difficult intubation, bleeding, transfusions, etc.)
Medications and Fluid management	• Medications administered including analgesic, anti-emetic, reversal agents for paralytics, and responses to medications given • Intake and Output (I/O) • Estimated blood loss (EBL)
Postoperative considerations	• Disposition (home, ICU, etc.) • Follow up labs, vital signs of concern • Opportunity for questions/concerns

Appendix H

Figure H1: Question 1 WordCloud

Figure H1

Question 1 WordCloud

WordCloud for Question 1: What are the essential elements in a thorough OR to PACU anesthesia handoff?

Figure H2

Question 2 WordCloud

WordCloud for Question 2: Please examine the attached OR to PACU Anesthesia Handoff Report Checklist and provide an assessment of its appropriateness for clinical implementation.

Appendix I

Table I1: First Round Demographic Data

Table I1

First Round Demographic Data

Baseline Characteristics	Full Sample	
	n	%
Gender		
Male	6	33%
Female	11	61%
Do not wish to answer	1	6%
Age		
25-34	6	33%
35-44	2	11%
45-54	6	33%
>55	4	22%
Years of Experience		
<5 Years	4	22%
5-10 Years	6	33%
10-15 Years	3	17%
>15 Years	5	28%

Table I2

Second Round Demographics Data

Baseline Characteristics	Full Sample	
	n	%
Gender		
Male	5	38%
Female	8	62%
Do not wish to answer	0	0%
Age		
25-34	3	23%
35-44	4	31%
45-54	2	15%
>55	4	31%
Years of Experience		
<5 Years	2	15%
5-10 Years	5	38%
10-15 Years	1	8%
>15 Years	5	38%

Appendix J

Table J1: First Round Likert Results

Table J1:

First Round Likert Results

Likert Scale Questions	Very Important	Important	Neutral	Not Important	Irrelevant/ Should not be included	Total Responses	*M*	*SD*	Variance	Consensus Level
Patient Ident Info	12	4	1	0	1	18	1.56	1.01	1.02	89%
Allergies	16	2	0	0	0	18	1.11	0.31	0.1	100%
Procedure/Surgery	16	1	0	1	0	18	1.22	0.71	0.51	94%
Anesthesia Technique	14	4	0	0	0	18	1.22	0.42	0.17	100%
Anesthesia Provider	1	11	4	0	2	18	2.5	1.01	1.03	67%
Pertinent Medical History	14	4	0	0	0	18	1.22	0.42	0.17	100%
Intraoperative Course and Complications	18	0	0	0	0	18	1	0	0	100%
Medications Given: Analgesics	13	5	0	0	0	18	1.28	0.45	0.2	100%
Medications Given: Antiemetic	7	10	0	1	0	18	1.72	0.73	0.53	94%
Medications Given: Antibiotics	4	6	5	1	2	18	2.5	1.21	1.47	56%
Medications Given: Sedative	9	4	1	2	2	18	2.11	1.41	1.99	72%
Medications Given: Neuromuscular Reversal	4	9	2	2	1	18	2.28	1.1	1.2	72%
Intake & Output Including EBL (Estimated Blood Loss)	11	7	0	0	0	18	1.39	0.49	0.24	100%
Lines/Vascular Access	7	8	1	2	0	18	1.89	0.94	0.88	83%
Pertinent Lab Result	7	9	1	1	0	18	1.78	0.79	0.62	89%
Labs Needed to Recheck	11	6	1	0	0	18	1.44	0.6	0.36	94%
Postoperative Order Entry	3	8	4	3	0	18	2.39	0.95	0.9	61%
High alert Postoperative Concerns	16	2	0	0	0	18	1.11	0.31	0.1	100%
Opportunity for Questions	13	4	0	0	1	18	1.44	0.96	0.91	94%

M = Mean; SD = Standard Deviation

Table J2

Second Round Likert Results

Likert Scale Questions	Very Important	Important	Neutral	Not Important	Irrelevant/ Should not be included	Total Responses	*M*	*SD*	Variance	Consensus Level
A "timeout" for interrupted handoff	2	8	3	0	0	13	2.08	0.62	0.38	77%
Patient Ident Info	5	3	4	0	1	13	2.15	1.17	1.36	62%
Allergies	9	4	0	0	0	13	1.31	0.46	0.21	100%
Procedure/Surgery	9	3	0	1	0	13	1.46	0.84	0.71	92%
Anesthesia Technique	7	6	0	0	0	13	1.46	0.5	0.25	100%
Anesthesia Provider	1	7	3	1	1	13	2.54	1.01	1.02	62%
Pertinent Medical History	11	2	0	0	0	13	1.15	0.36	0.13	100%
Intraoperative Course and Complications	12	1	0	0	0	13	1.08	0.27	0.07	100%
Medications Given: Analgesics	7	6	0	0	0	13	1.46	0.5	0.25	100%
Medications Given: Antiemetic	2	9	2	0	0	13	2	0.55	0.31	85%
Medications Given: Antibiotics	0	8	4	1	0	13	2.46	0.63	0.4	62%
Medications Given: Sedative	4	7	1	1	0	13	1.92	0.83	0.69	85%
Medications Given: Neuromuscular Reversal	4	8	1	0	0	13	1.77	0.58	0.33	92%
Intake & Output Including EBL (Estimated Blood Loss)	7	5	1	0	0	13	1.54	0.63	0.4	92%
Lines/Vascular Access	4	8	1	0	0	13	1.77	0.58	0.33	92%
Pertinent Lab Result	4	9	0	0	0	13	1.69	0.46	0.21	100%
Labs Needed to Recheck	6	6	1	0	0	13	1.62	0.62	0.39	92%
Postoperative Order Entry	1	8	2	0	2	13	2.54	1.15	1.33	69%
High alert Postoperative Concerns	10	3	0	0	0	13	1.23	0.42	0.18	100%
Opportunity for Questions	8	5	0	0	0	13	1.38	0.49	0.24	100%

M = Mean; SD = Standard Deviation

Appendix K

Revised OR to PACU Anesthesia Handoff Checklist

<table>
<tr><td colspan="2">☐ Time-out</td></tr>
<tr><td>Patient sticker (Name, DOB/Age, MRN)</td><td>☐ Allergies:</td></tr>
<tr><td>☐ Procedure:</td><td>☐ Anesthesia provider:</td></tr>
<tr><td>☐ Pertinent medical history:</td><td>Anesthesia technique:
☐ General anesthesia
☐ Monitored Anesthesia Care
☐ Peripheral nerve block
☐ Spinal</td></tr>
<tr><td rowspan="2">Intraoperative course:
☐ Difficult intubation:

☐ Intraoperative complications:

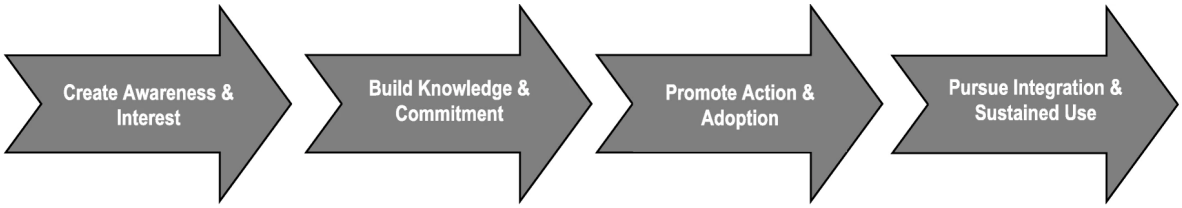
Medications:
☐ Sedative: _____
☐ Analgesia: _____
☐ Antiemetic: _____
☐ Antibiotic: _____
☐ Reversal: ☐ Sugammadex
☐ Neostigmine
☐ Other: _____</td><td>Intake:
☐ Fluids: _____
☐ Blood products: _____

Output:
☐ EBL:_____
☐ UO:_____</td></tr>
<tr><td>Lines:
☐ PIV(s)
☐ CVC
☐ Arterial line</td></tr>
<tr><td>☐ Pertinent labs:</td><td>☐ Labs to recheck:</td></tr>
<tr><td>☐ Postoperative orders entered?</td><td>☐ High alert postoperative concerns:</td></tr>
</table>

Do you have any questions or concerns?

Appendix L

Iowa Implementation for Sustainability Framework



Connecting with Clinicians, Organizational Leaders and Key Stakeholders	• Highlight advantages* or anticipated impact* • Highlight compatibility* • Continuing education programs* • Sound bites* • Journal club* • Slogans & logos • Staff meetings • Unit newsletter • Unit inservices • Distribute key evidence • Posters and postings/fliers • Mobile 'show on the road' • Announcements & broadcasts	• Education (e.g., live, virtual or computer-based)* • Pocket guides • Link practice change & power holder/stakeholder priorities* • Change agents (e.g., change champion*, core group*, opinion leader*, thought leader, etc.) • Educational outreach or academic detailing* • Integrate practice change with other EBP protocols* • Disseminate credible evidence with clear implications for practice* • Make impact observable* • Gap assessment/gap analysis* • Clinician input* • Local adaptation* & simplify* • Focus groups for planning change* • Match practice change with resources & equipment • Resource manual or materials (i.e., electronic or hard copy) • Case studies	• Educational outreach/academic detailing* • Reminders or practice prompts* • Demonstrate workflow or decision algorithm • Resource materials and quick reference guides • Skill competence* • Give evaluation results to colleagues* • Incentives* • Try the practice change* • Multidisciplinary discussion & troubleshooting • "Elevator speech" • Data collection by clinicians • Report progress & updates • Change agents (e.g., change champion*, core group*, opinion leader*, thought leader, etc.) • Role model* • Troubleshooting at the point of care/bedside • Provide recognition at the point of care *	• Celebrate local unit progress* • Individualize data feedback* • Public recognition* • Personalize the messages to staff (e.g., reduces work, reduces infection exposure, etc.) based on actual improvement data • Share protocol revisions with clinician that are based on feedback from clinicians, patient or family • Peer influence • Update practice reminders
Building Organizational System Support	• Knowledge broker(s) • Senior executives announcements • Publicize new equipment	• Teamwork* • Troubleshoot use/application* • Benchmark data* • Inform organizational leaders* • Report within organizational infrastructure* • Action plan* • Report to senior leaders*	• Audit key indicators* • Actionable and timely data feedback* • Non-punitive discussion of results* • Checklist* • Documentation* • Standing orders* • Patient reminders* • Patient decision aids* • Rounding by unit & organizational leadership* • Report into quality improvement program* • Report to senior leaders* • Action plan* • Link to patient/family needs & organizational priorities • Unit orientation • Individual performance evaluation	• Audit and feedback* • Report to senior leaders* • Report into quality improvement program* • Revise policy, procedure or protocol* • Competency metric for discontinuing training • Project responsibility in unit or organizational committee • Strategic plan* • Trend results* • Present in educational programs • Annual report • Financial incentives* • Individual performance evaluation

* = Implementation strategy is supported by at least some empirical evidence in healthcare