

**IMPLEMENTATION AND EVALUATION OF AN EVIDENCE BASED HANDOFF
TOOL FOR USE IN THE POST ANESTHESIA CARE UNIT AT UPHS MARQUETTE**

by

BRIAN RECKKER

A research report submitted in partial fulfillment of the
requirements for the degree of
DOCTOR OF NURSING PRACTICE

2022

Oakland University

Rochester, Michigan

ACKNOWLEDGEMENTS

Thank you to my DNP chair Dr. Hranchook for the continuous guidance and support for this project. Your leadership and knowledge have helped shape this project in many positive ways.

DEDICATION

This paper is dedicated to my family and friends who have supported me throughout this journey. This would not have been possible without all the support I received.

Abstract

Providing a thorough handoff to another health care provider during transfer of care is an important task that all must share responsibility for. Handoff provides the opportunity to communicate important information, outcomes, and future interventions for a patient. During this critical time there is the potential for information to be missed and forgotten when providers are busy, stressed, or apathetic. Without the use of a tool to aid in this process, there is a higher chance that missed information will occur. Incorporating a handoff tool into practice has the potential to reduce these risks and also provide a more comprehensive handoff. The purpose of this DNP Project was to answer the following questions: (1) Does the incorporation of a handoff tool improve handoff quality? and (2) Does a handoff tool improve healthcare worker satisfaction?

Currently at Upper Peninsula Health System Marquette, there is no formal standardized handoff tool in use during transfer of care between providers in the anesthesia department and post anesthesia recovery unit. This paper describes a quality improvement project that employed a pretest/posttest design to answer the project questions. A pre-intervention and post-intervention survey was launched to gauge CRNA satisfaction with the handoff process, willingness to adopt a standardized handoff tool and preferences for characteristics to include in a handoff tool. Findings from this project revealed that satisfaction with the handoff process increased following implementation of the handoff tool (pre-intervention 9.1% agree/ strongly agree; post-intervention 87.6% agree/strongly agree). In addition, CRNAs reported that the new handoff process was less likely to lead to mistakes (pre-intervention 90.9 % agreed/strongly agreed; post-intervention 6.3%).

Keywords: handoff, transfer of care, standardized handoff tool, patient safety, checklist

Table of Contents

Background and Significance..... 1

Purpose Statement 1

Picot 2

Literature Review 2

Literature Search 2

Handoff Adverse Events 2

Handoff Tools Decrease Missed Information..... 3

Improved Satisfaction 4

Theoretical Framework..... 5

Perioperative Patient Focused Model..... 5

Project Methodology 6

Project Design and Approvals..... 6

Evaluation: Plan–Do–Study–Act Design..... 7

Sample and Setting..... 7

Key Personnel and Stakeholders..... 7

Recruitment and Data Collection Strategy..... 8

Instruments..... 8

Intervention 8

Plan or Phase I:..... 9

Do or Phase II: 10

Study or Phase III:..... 10

Act or Phase IV:..... 11

Data Analysis 11

Benefit Cost Analysis..... 11

Results 12

Discussion..... 16

Limitations and Barriers..... 18

Conclusion..... 19

References 20

APPENDIX A: IRB LETTER 24

APPENDIX B: PRE-INTERVENTION SURVEY 1..... 25

APPENDIX C: POST INTERVENTION SURVEY 2 28

APPENDIX D: HANDOFF TOOL CREATED FOR UPHS MARQUETTE.....30

Background and Significance

The transfer of essential information and responsibility for care of the patient from one health care provider to another is an integral component of communication in health care. This critical transfer point is known as a handoff. The Joint Commission defines a handoff as:

“The transfer and acceptance of patient care responsibility achieved through effective communication. It is a real time process of passing patient specific information from one caregiver to another for the purpose of ensuring the continuity and safety of the patient’s care” (Joint Commission, 2017).

The operating room is considered a complex work environment in health care. Checklists or transfer of care tools remind providers to complete relevant tasks or communicate essential information. Because the OR team is multidisciplinary, the individuals that comprise it are more likely to differ in their understandings of the situation at hand. Checklists and handoff tools compel them towards the establishment of a *shared mental model* that enables each team member to better anticipate and plan his/her own role. An effective handoff supports the transition of critical information and continuity of care and treatment. Currently at UPHS Marquette Hospital there is not a transfer of care handoff tool that is used between Certified Registered Nurse Anesthetists (CRNAs) and post anesthesia recovery unit (PACU) registered nurses (RNs).

Purpose Statement

The purpose of this quality improvement DNP project is to create and implement a standardized handoff tool at UPHS Marquette for use by anesthesia providers and PACU RNs. The handoff tool will incorporate evidence-based recommendations for a design that will result in thorough, high-quality handoffs.

Picot

In the transfer of care of perioperative patients at UPHS Marquette, does the use of a standardized handoff tool compared to no standardized handoff tool, improves handoff quality and healthcare worker satisfaction?

Literature Review**Literature Search**

To obtain articles related to transfer of care and anesthesia handoffs, three main domain sites were searched: CINAHL, Google Scholar, and PubMed. Keywords used to conduct the search included handoff, hand-off, handoff tool, anesthesia handoff, PACU handoff, nursing handoff, anesthesia communication tool, handoff reporting, checklist, standardized tool, protocol, and patient safety. Professional practice guidelines from The Joint Commission and AORN were also reviewed. Inclusion criteria was restricted to articles that addressed the development, implementation, and evaluation of perioperative handoff tools and those that were published between 2011-2021. Exclusion criteria consisted of articles not pertaining to handoff and articles that were greater than ten years of age from publication. Articles that met criteria were then analyzed for the level of evidence based on *The Centre for Evidence-Based Medicine - Levels of Evidence* (2009). A total of 23 articles were identified, and 15 articles that best answered the clinical question were reviewed and included as evidence for the development and evaluation of this project.

Handoff Adverse Events

It was estimated by the Joint Commission that around 80% of errors that occur with patients, happen when a substandard handoff between healthcare providers occurs (Joint Commission, 2012; Robins & Dai., 2015). The transfer of care or “handoff” process involves

both senders and receivers. Senders are caregivers transmitting patient information and transitioning the care of a patient to the next clinician. Receivers are caregivers accepting the patient information and assuming the care of that patient (Joint Commission, 2012). In addition to causing patient harm or even death, inadequate hand-offs can lead to delays in treatment, inappropriate treatment, and increased length of stay in the hospital (Joint Commission, 2012).

The Institute of Medicine states that “it is in inadequate handoffs that safety often fails first” (Institute of Medicine, 2001, p.45). Furthermore, miscommunication between healthcare providers is a leading cause of patient adverse events contributing to an estimated 44,000-80,000 patient deaths that occurred in 1999 due to a patient safety error (Institute of Medicine, 2001). The issue of handoffs has become so prominent that the Joint Commission introduced a national patient safety goal on handoffs in 2008 (Joint Commission, 2008). The patient safety goal required health care organizations to “implement a standardized approach to “handoff” communications, including an opportunity to ask and respond to questions. A lack of a standardized hand off leads to information loss which contributes to poor patient outcomes (Robins & Dai., 2015). Without a standardized tool in place, one study showed the total amount of information recalled after a handoff was only 27% (Dowding, 2010).

Handoff Tools Decrease Missed Information

A large portion of unsuccessful handoffs occur as a result of important information being missed when handoff occurs. When a standardized tool was put into place, 103 handoffs were observed, the mean number of items missed per anesthesia decreased from 2.02 to 1.28 which was significant ($p < .01$) (Petrovic et al., 2015). Another study performed by Nagpal et al. (2013) showed similar results to the previously mentioned study, with the number of omissions per handover reduced from 9 to 3 ($p < .001$). With the increase in technology and the evolving

complexity of surgical cases occurring, there are more opportunities for errors to be made in practice and thus the need for a standardized handoff tool should be emphasized (Robins & Dai., 2015). Without a standardized tool, one study showed that PACU nurses said handoff reports were defective with items being missed 60% of the time. With the incorporation of a standardized tool, the number of items missed was reduced to 30% of the time (Lambert & Adams., 2018). With the continued use of a handoff tool, nurses will be able to provide quality handoffs and more accurately recall vital information that should be passed on. Another study compared the amount of information passed off at handoff at pre intervention phase, three weeks, and three months. There was a significant increase at each time interval in the amount of information being passed along at handoff using the standardized tool (Halladay et al., 2018). Educating staff on the importance of a proper handoff can also lead to decreased items missed. With incorporation of a handoff tool and staff education, there was a significant decrease in number of items missed during handoff along with less interventions needed in the recovery area six hours after the patient had been admitted to that area (Breuer et al., 2015).

Improved Satisfaction

Use of a standardized tool during handoff formalizes the transfer of care process and provides structure and consistency in the information transmitted between sender and receiver. A handoff tool also organizes information in one location which assists with recall. These are among some of the factors identified in the literature that can lead to improved provider satisfaction. In a study conducted by Burns, Parikh, and Schuller (2018), nurses reported increased satisfaction because they were only able to initiate direct patient care without having to look additional information up 60% of the time pre intervention, compared to post intervention where they could initiate patient care 96% of the time when the handoff checklist was used to

guide the process. Thus, PACU nursing satisfaction improved by 36% (95% CI 19.76%–52.24%) ($p < 0.0001$) (Burns et al., 2018). With the introduction of a handoff tool between the OR and ICU, satisfaction scores among ICU nurses increased from 61% to 81%. The items evaluated included the following: “I could hear all of the report”, “I received anticipatory guidance”, “I received information on follow up” and “I received information about potential problems” (Petrovic et al., 2012). Funk et al., (2016) measured patient care team member satisfaction with the handover process using an ISBARQ handover checklist (Introductions, Situation, Background, Assessment, Recommendations, & Questions). A two-sample t test revealed a significant increase in provider satisfaction from pre-implementation ($M = 23.03 \pm 2.48$) to postimplementation ($M = 25.70 \pm 3.06$), $t(112) = -5.71$, $P < .01$). Incorporating additional team members into the handoff process has also been shown to improve satisfaction because this ensures that accurate information on all aspects of patient care is correctly transferred (Nagpal et al., 2013).

Theoretical Framework

Perioperative Patient Focused Model

The Perioperative Patient Focused Model is a conceptual framework for perioperative nursing practice that is patient centered (Van Wicklin, 2020). The model depicts the relationship between the patient, patient’s family, and nursing care delivered by RNs. The patient is at the center with the concentric rings around the patient representing domains of nursing care. The model incorporates four major domains including patient safety, physiological responses, behavioral responses, and health systems.

In this quality improvement project, the use of a standardized handoff tool during transfer of care from the operating room to the recovery room, fits into the domain of safety. Nurse

anesthetists and PACU RNs play an important role as patient advocates overseeing the patient's perioperative care. The use of a standardized tool will assure continuity of care and transfer of vital information to assure provision of appropriate, safe care.

The Health System domain represents the structural data elements that exist in the perioperative environment. In this project, the Health System domain includes processes and data collection methods such as the use of standardized handoff tool that will most likely eventually be incorporated into an electronic health record.

The inter-relationships of these domains provide a model of perioperative care that guides nursing practice and provides a framework for testing and validating interventions. Using the Perioperative Patient Focus Model as a framework for this project helps to guide the development of a standardized handoff tool for patients that are being transitioned from the operating room to the post anesthesia care unit. With this transition, it is paramount that the handoff provided incorporates all key aspects of the patient and procedure to provide the best and safest outcome for the patient. In this model, the use of a handoff tool will fall into multiple domains previously listed which will help shape what items will be needed to be included in the creation of the handoff tool.

Project Methodology

Project Design and Approvals

The method chosen to be utilized in this evidence-based practice (EBP) project is a pretest/posttest quality improvement design. The project was implemented and evaluated using the Plan Do Study Act model. Methods used to obtain data for this project included quantitative and qualitative items incorporated in a survey format.

Evaluation: Plan–Do–Study–Act Design

According to the Institute for Healthcare Improvement (2021), Plan Do Study Act (PDSA) is an instrument to assist in process improvement and documenting a test of change.

There is one cycle per each individual test of change, each cycle consisting of:

Plan – an idea developed to test change

Do – implementing the change

Study – assessing and evaluating the consequences

Act – determining what modifications should be made to the original idea

This quality improvement project incorporated the PDSA model.

Sample and Setting

This project took place at UPHS Marquette. This is a level II trauma hospital that has 307 beds. The project specifically took place during transfer of care between the anesthesia department and the Post Anesthesia Care Unit which consists of 12 beds staffed by PACU nurses. The surgical specialties performed at UPHS Marquette include orthopedic, neurosurgery, cardiovascular, vascular, urology, and elective procedures. A convenience sample of CRNA's and PACU RNs working at UPHS Marquette were included in the sample.

Key Personnel and Stakeholders

Key personnel include the author, Brian Reckker, RN, SRNA; UPHS Chief CRNA; and the UPHS Chief of Anesthesiology. The stakeholders include the CRNAs working in the department of anesthesia and RNs working in the PACU as well as the patients and families hospitalized at UPHS Marquette.

Recruitment and Data Collection Strategy

On October 7, 2021, UPHS Marquette's Institutional Review Board deemed this project to not be research and thus to not require further review. Participants were recruited via one of two methods: direct mail with a letter explaining the purpose of the project and how to reach the author to participate or directly through face-to-face meetings with CRNAs and PACU RNs. Those that agreed to participate were sent an email with an embedded link to the surveys launched through Qualtrics®.

Instruments

The pre-intervention and post-intervention surveys employ a mixed method and are an adaption of several instruments published in the literature for examining transfer of care processes in anesthesia practice (Canale, 2018; Moon et al, 2015; Wright, 2013). The pre-intervention survey consists of 13 questions that include a combination of categorical and open-ended questions (Appendix B). The post-intervention survey also consists of 11 questions that include categorical and open-ended questions (Appendix C).

Intervention

The project plan followed the PDSA methodology. This quality improvement method consists of working in a team to identify a plan for improvement, testing change, collecting, and analyzing data to understand the problem and identify if change or progress occurred. This DNP Project underwent a pre-intervention stage and a post-intervention stage.

The pre-intervention stage consisted of identifying an inter-professional team of stakeholders to assist in developing, implementing, and evaluating a standardized hand-off tool. Data from a pre-intervention survey was used to guide the development of the tool. The post-intervention stage included launching a second survey to evaluate participant satisfaction and

perceptions of the tool's functionality and effectiveness in assisting with providing consistent, thorough transfer of care communication. The data from the second survey will guide future revisions to the hand-off tool. The entire PDSA cycle is presented as follows:

Plan or Phase I:

The "Plan" phase includes identifying a team, developing a problem statement, determining a goal/s for improvement and a plan for how to measure if progress or change occurred. The plan phase began in June of 2021 with the selection of an inter-professional team. Through collaboration with the Chief CRNA, Head of Anesthesiology and PACU manager, an initial meeting was held to discuss the project idea and pathway envisioned. The following problem statement was identified:

Without a current standardized handoff tool at UPHS Marquette, information is being missed or not included in handoff. This can potentially lead to patient harm or injury.

The main objective of this quality improvement project is to develop and implement a standardized handoff tool to optimize patient information transfer between anesthesia providers and PACU nurses in a rural hospital in Marquette, Michigan. The specific objectives include:

1. Develop an evidence-based handoff tool for use during patient transfer of care between anesthesia providers and PACU nurses.
2. Educate the anesthesia and recovery room staff on the use of the tool.
3. Implement use of the tool.
3. Compare pre-implementation and post-implementation data regarding:
 - a. the completeness and accuracy of patient information transfer during the handoff
 - b. anesthesia provider and PACU nurse satisfaction with the handoff tool and

process

In July of 2021, a short presentation was provided to all staff to share evidence-based recommendations from the Joint Commission and other bodies such as AORN. The project goals and plan for improvement were presented.

Do or Phase II:

In September of 2021, pre intervention and post interventions surveys were created. The pre intervention survey was designed to assess the transfer of care process and provider satisfaction at baseline before development and implementation of a new handoff process and tool. The survey includes questions asking respondents to identify characteristics of a handoff tool that would lead them to adopt it. The post-implementation survey was designed to evaluate the handoff process as well as user satisfaction after development and implementation of a new handoff tool.

The project underwent review by UPHS Marquette Hospital's IRB and was deemed to not be research in October of 2021 (Appendix A). The pre-intervention survey was launched on November 16th of 2021 and was open for a period of one month.

Using data from the pre-intervention survey, a new handoff tool was developed (Appendix D). The new handoff tool was patterned after the mnemonic "I PUT PATIENTS FIRST" (Moon et al., 2015). Prior to launching the new tool, an educational presentation was given to staff. The tool was trialed for a period of 2 weeks in the spring of 2022.

Study or Phase III:

The "Study Phase" of PDSA began with the launch of the post-interventional survey in May of 2022. The survey was open for a period of 2 weeks. The Study phase consisted of analyzing and comparing the data obtained from the pre and post-interventional surveys using

IBM SPSS® statistical software. A combination of descriptive statistics were used to analyze quantitative data and a qualitative approach was used to identify themes from the open-ended responses.

Act or Phase IV:

Data was shared with the department of anesthesia and the inter-professional team at a department meeting. Data from these surveys and feedback from the inter-professional team meetings will be used to guide any further changes to the hand-off tool.

Data Analysis

Data obtained through categorical and open-ended questions from pre-intervention and post-interventional surveys were analyzed using IBM® SPSS® data software. A descriptive analysis of survey responses was conducted.

Benefit Cost Analysis

The Benefit – Cost Ratio (BCR) is the ratio of the present value of benefits to the present value of costs. It can be measured in monetary or qualitative terms. The ratio should be greater than 1.0 for a project to be considered viable (Investopedia, 2022: <https://www.investopedia.com/terms/b/bcr.asp>).

The projected benefit-cost analysis was calculated using data available online regarding the annual orthopedic surgical volume at UPHS Marquette (Leapfrog Rating, 2022), the current average CRNA average hourly rate in Michigan (2022) and the estimated cost for printing paper in hospitals ((Haefner, 2018)). The time savings per handoff is an estimate and will need to be verified in future analysis. The estimated BCR for this project was over 200 times the acceptable minimum value of 1.0 for orthopedic surgical cases alone and thus demonstrates the potential for

the new handoff tool to be of great value to UPHS Marquette and thus be a sustainable practice change.

Table I. Benefit Cost Ratio CHM Handoff Tool

Benefits	Calculation	
A. Reduction in time spent during handoff	minutes X annual cases X CRNA hourly rate/min	5 min X 1,104 surgeries annually = 5,520 minutes X \$1.58/min = \$8,721.60
B. Reduction in number of follow up calls to clarify missed information	minutes X annual cases X CRNA hourly rate/min	5 min X 10% of all handoffs = 110 X 5 = 550 minutes X \$1.58 = \$869.00
C. Reduction in cost of medical errors due to missed information	hospital data not available for closed claims	unknown
I. Total benefits from A + B + C		\$9589.60 *
Costs		
Printing of handoff tool	cost per printed sheet X 14,000 surgeries annually	0.04 cents X 1,104 = \$44.16
II. Total costs		\$44.16
Benefit/cost ratio	I / II	217.15

Results

A total of 11 participants answered the pre-intervention survey and 16 answered the post-intervention survey. The number of years employed at UPHS Marquette is displayed in Figure 1. below.

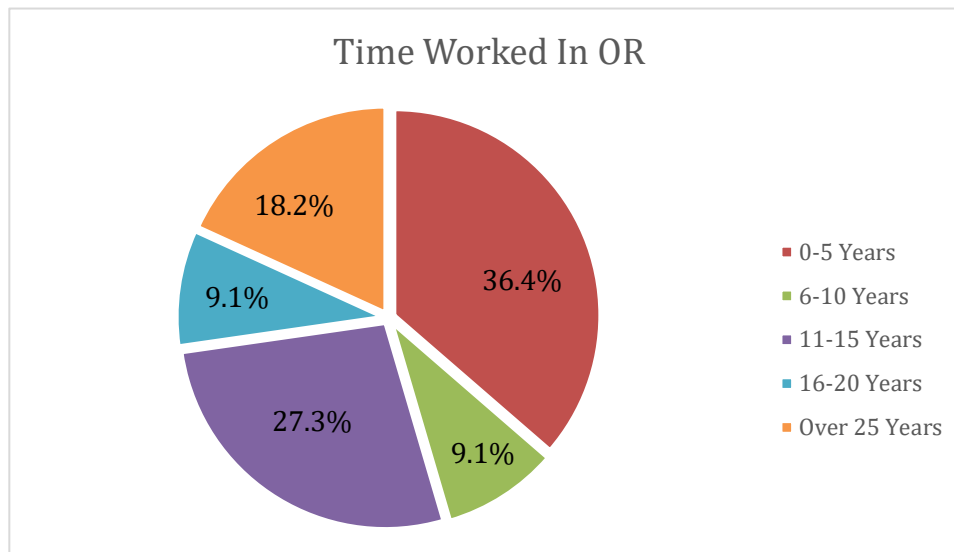


Figure 1. Demographics for survey 1

Pre-intervention Survey Data

When asked if they were currently using a standardized handoff process prior to the implementation of the new tool, 82% ($n = 11$) said no. Participants were asked to identify 8 items from a list of 16 that they felt was most important to be included in a handoff tool. Those surveyed selected pain medications (12.4%), allergies (11.2%), patient ID (9%), surgical procedure (7.9%), fluids administered (7.9%), surgical events (7.9%), airway (6.7%), and type of anesthetic delivered (6.7%) as the top 8 items to include.

Respondents were also asked to identify characteristics of a handoff tool that would lead them to adopt it. The top 4 items selected include: improves patient safety (19.6%), organized (19.6%), easy to use (15.7%) and purposeful (15.7%). The top two barriers to adopting a new handoff tool selected were: time consuming (47.6%) and too difficult to use (38.1%).

Comparison of Pre and Post-intervention Survey Data

Both the pre-intervention and post-intervention surveys included six parallel questions that asked the respondent to evaluate the pre-intervention and post-intervention aspects of the

handoff process. The following questions were asked on both surveys and were answered with a Likert scale where 1=Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree and 5 = Strongly Agree:

1. I am satisfied with (survey 1: the current handoff process; survey 2: the standardized handoff tool) when giving/receiving information on the patient.
2. The (survey 1: current handoff process; survey 2: standardized handoff tool process) lends itself to mistakes.
3. The (survey 1: current handoff process; survey 2: standardized handoff tool) is comprehensive.
4. The (survey 1: current handoff process: survey 2: standardized handoff tool) provides an adequate way to communicate important information about the patient.
5. The (survey 1: current handoff process: survey 2: standardized handoff tool) is efficient and not time consuming.

The following tables depict the results of the pre-intervention (survey1) and post-intervention (survey 2) data comparisons.

Table 2. Are you currently satisfied with the current handoff process?

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Survey 1					
Pre-intervention	0	4	6	1	0
% Pre-intervention	0%	36.4%	54.5%	9.1%	0%
Survey 2					
Post-Intervention	0	0	2	9	5
% Post-Intervention	0%	0%	12.5%	56.3%	31.3%

Table 3. The current handoff process lends itself to mistakes.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Survey 1					
Respondents Pre-Intervention	0	0	1	10	0
% Of Responses Pre-Intervention	0%	0%	9.1%	90.9%	0%
Survey 2					
Respondents Post-Intervention	6	4	5	1	0
% Of Responses Post-Intervention	37.5%	25.0%	31.3%	6.3%	0%

Table 4. The current handoff process is comprehensive.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Survey 1					
Respondents Pre-Intervention	0	6	4	1	0
% Of Responses Pre-Intervention	0%	54.5%	36.4%	9.1%	0%
Survey 2					
Respondents Post-Intervention	0	1	0	8	7
% Of Responses Post-Intervention	0%	6.3%	0%	50%	43.8%

Table 5. The current handoff process is efficient and not time consuming.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Survey 1					
Respondents Pre-Intervention	0	2	4	5	0
% Of Responses Pre-Intervention	0%	18.2%	36.4%	45.5%	0%
Survey 2					
Respondents Post-Intervention	1	0	3	7	5
% Of Responses Post-Intervention	6.3%	0%	18.8%	43.8%	31.3%

Discussion

Despite the work that has been done and compelling evidence in the literature supporting implementation of a standardized handoff procedure for transfer of care of the perioperative patient, it is known that handoffs are often informal or brief. This quality improvement DNP Project seeks to relay the experience of one institution's attempt to develop and implement a standardized handoff tool to optimize patient information transfer between anesthesia providers and PACU nurses in a rural hospital in Marquette, Michigan. Pre and post implementation data were compared to assess participant perceptions of completeness and accuracy of data transfer and satisfaction with the handoff and process. The findings of the present project are similar to those reported in the literature which relate improvement in scores related to satisfaction, errors, and comprehensiveness and completeness of the process following the implementation of a handoff tool intervention (Petrovic et al., 2012; Burns et al., 2018; Funk et al., 2016).

When comparing pre and post-implementation data, it is evident that the CRNAs and PACU nurses were not satisfied with providing handoffs with only oral communication and no standardized tool. When asked to rate their satisfaction with the current handoff process prior to implementation of the handoff tool on a Likert scale where 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree, only one respondent (9%) selected “agree” and no one selected “strongly agree” ($M = 2.5$). Following implementation of a standardized handoff tool, 56.3% selected “agree” and another 31.3% selected “strongly agree” ($M=4.2$). The increase in satisfaction is most likely multifactorial. Both CRNAs and PACU RNs were able to contribute to designing the new handoff tool which may have increased acceptance. Another factor may be that the use of a handoff tool streamlined communication and decreased workload. Prior to implementation, the CRNA giving report may have been stopped many times to answer questions causing them to lose their focus and forget to report important information. Information may also have been inadvertently omitted without a tool to serve as a mental map leading to an inadequate report.

Participants were also asked if the current handoff process led to mistakes. Again, answering on a Likert scale where 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree, a very high percentage of providers (90.9%) selected “agree” that the handoff process lends itself to mistakes without a tool ($M = 3.9$) compared to only 6.3% once the tool was implemented ($M = 2.1$). Again, this could be acknowledgement on the part of those surveyed that there is potential for missed or omitted information without a tool for guidance. It should also be noted that one of the respondents commented in an open-ended question that the handoff tool was very effective for use in long complex cases. This finding is similar to the findings of a study performed by Petrovic et al., (2015). They reported that a handoff tool can

greatly assist with transfer of care when a patient is critically ill and there are lots of lines and monitors to be exchanged. In another study, the use of a handoff tool was shown to decrease information loss and the number of callbacks made for forgotten information (Burns et al., 2018).

When asked if the current handoff process is comprehensive, 93.8% selected either “agree” or “strongly agree” ($M = 4.3$) after implementation of a standardized handoff tool compared with only 9.1% selecting “agree” and no one selecting “strongly agree” without the use of a handoff tool ($M = 2.4$). Respondents were also asked if using a standardized handoff tool was an efficient way to communicate information. The response was positive with 100% of providers selecting “agree” ($M = 4$).

When asked if the current handoff process is efficient and not time-consuming, 75.1% selected “agree” or “strongly agree” ($M = 3.8$) after implantation of a handoff tool compared to 45.5% selecting “agree” and no one selecting “strongly agree” without the use of a handoff tool ($M = 3.3$). The closeness of the mean scores may reflect some ambivalence on the part of those surveyed with changing the current practice.

Limitations and Barriers

The author acknowledges the following limitations: the use of a small convenience sample in a single institution. Barriers that were faced include inconsistent adherence to the tool, on boarding of new staff during the tool trial and implementation, and rapid turnover times experienced by some providers. Once the tool was implemented, it took several days for people to start using it. Staff were not accustomed to using a handoff tool and thus it was not part of their regular routine leading them to forget to use it. Steps were taken to overcome this by placing the tool in a highly visual area to remind staff to use it. Some staff reported that it was

challenging to use the tool in a fast turn over room. Finally, throughout this project new staff were being hired requiring frequent education regarding the project purpose and use of the tool.

Conclusion

The Joint Commission is a global driver of quality improvement and patient safety in health care. Through analysis of reportable medical errors, they identify and stratify root causes. From 1995 to 2004, the Joint Commission analyzed 3,548 sentinel events and identified communication as the top contributing factor to medical errors during this time period. This information coupled with studies revealing that the majority of avoidable adverse events are caused by lack of effective communication spurred a national movement to improve communication within and between health care teams by establishing standardized handoff procedures. The need for the development and implementation of a standardized handoff tool for use between anesthesia and the PACU was identified at UPHS Marquette.

This EBP quality improvement project demonstrated that the quality of transfer of information, perceptions of patient safety, and healthcare worker satisfaction improved at UPHS Marquette through the implementation of a standardized transfer of care hand-off tool. Further work is needed to revise the tool and gain final approval for permanent adoption. The post-intervention survey results are promising and reveal that CRNAs and PACU RNs are willing to adopt this new change.

References

- Association of perioperative Registered Nurses. Patient hand off tool kit.
<http://www.aorn.org/PracticeResources/ToolKits/PatientHandOff-ToolKit/> .Accessed November 14, 2021.
- Breuer, R. K., Taicher, B., Turner, D. A., Cheifetz, I. M., & Rehder, K. J. (2015). Standardizing postoperative PICU handovers improves handover metrics and patient outcomes: *Pediatric Critical Care Medicine*, *16*(3), 256–263.
<https://doi.org/10.1097/PCC.0000000000000343>
- Burns, S., Parikh, R., & Schuller, K. (2018). Utilization of a checklist to standardize the operating room to post-anesthesia care unit patient handoff process. *Perioperative Care and Operating Room Management*, *13*, 1–5. <https://doi.org/10.1016/j.pcorm.2018.10.002>
- Canale, M. L. (2018). Implementation of a Standardized Handoff of Anesthetized Patients. *AANA Journal*, *86*(2), 137–145.
- Dowding, D. (2010). Examining the effects that manipulating information given in the change of shift report has on nurses' care planning ability. *Journal of Advanced Nursing*, *33*(6), 836–846. <https://doi.org/10.1046/j.1365-2648.2001.01723.x>
- Funk, E., Taicher, B., Thompson, J., Iannello, K., Morgan, B., & Hawks, S. (2016). Structured handover in the pediatric postanesthesia care unit. *Journal of PeriAnesthesia Nursing*, *31*(1), 63–72. <https://doi.org/10.1016/j.jopan.2014.07.015>
- Haefner, M. (2018, April 20). The average 1,500-bed hospital prints 96m pages each year - at a cost of \$3.8m. Becker's Hospital Review. Retrieved July 25, 2022, from

<https://www.beckershospitalreview.com/finance/the-average-1-500-bed-hospital-prints-96m-pages-each-year-at-a-cost-of-3-8m.html>

Halladay, M. L., Thompson, J. A., & Vacchiano, C. A. (2018). 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>

Institute of Medicine 2001. *Crossing the Quality Chasm: A New Health System for the 21st Century*. Washington, DC: The National Academies Press.
<https://doi.org/10.17226/10027>.

The Joint Commission. *The Joint Commission’s Annual Report on Quality and Safety*. (2007).
http://www.jointcommission.org/Improving_Americas_Hospitals_The_Joint_Commission_n_Annual_Report_on_Quality_and_Safety_-_2007/ . Published November 20, 2007.
 Accessed July 10, 2011

Joint Commission. *Facts about the 2008 National Patient Safety Goals*. (2008).
https://www.patientsafety.va.gov/docs/TIPS/TIPS_JanFeb08.pdf. Accessed July 10, 2021.

Joint Commission. *Joint Commission introduces new, customized tool to improve hand-off communications*. (2012). https://www.jointcommission.org/-/media/deprecated-unorganized/imported-assets/tjc/system-folders/blogs/tst_hoc_persp_08_12pdf.pdf?db=web&hash=BA7C8CDB4910EF6633F013D0BC08CB1C. Accessed July 10, 2021

- Lambert, L.H., & Adams, J.A. (2018). Improved anesthesia handoff after implementation of the Written Handoff Anesthesia Tool (WHAT). *American Association of Nurse Anesthetist*, 86(5), 361-370
- Moon, S.T., Gonzales, M.X., Woods, A. P. (2015). A Mnemonic to Facilitate the Handover from the Operating Room to Intensive Care Unit: "I PUT PATIENTS FIRST." *Journal of Anesthesia & Clinical Research*, 06(07). <https://doi.org/10.4172/2155-6148.1000545>
- Nagpal, K., Abboudi, M., Manchanda, C., Vats, A., Sevdalis, N., Bicknell, C., Vincent, C., & Moorthy, K. (2013). Improving postoperative handover: A prospective observational study. *The American Journal of Surgery*, 206(4), 494–501.
<https://doi.org/10.1016/j.amjsurg.2013.03.005>
- Petrovic, M. A., Aboumatar, H., Baumgartner, W. A., Ulatowski, J. A., Moyer, J., Chang, T. Y., Camp, M. S., Kowalski, J., Senger, C. M., & Martinez, E. A. (2012). Pilot implementation of a perioperative protocol to guide operating room-to-intensive care unit patient handoffs. *Journal of Cardiothoracic and Vascular Anesthesia*, 26(1), 11–16.
<https://doi.org/10.1053/j.jvca.2011.07.009>
- Robins, H.-M., & Feng Dai. (2015). Handoffs in the postoperative anesthesia care unit: Use of a checklist for transfer of care. *AANA Journal*, 83(4), 264–268.
- Saager, L., Hesler, B. D., You, J., Turan, A., Mascha, E. J., Sessler, D. I., & Kurz, A. (2014). Intraoperative transitions of anesthesia care and postoperative adverse outcomes. *anesthesiology*, 121(4), 695–706. <https://doi.org/10.1097/ALN.0000000000000401>

UP Health System – Marquette. (July, 2022). LEAPFROG.

<https://ratings.leapfroggroup.org/facility/details/23-0054/up-health-system---marquette-marquette-mi>

Van Wicklin, S. A. (2020). The Perioperative Patient Focused Model: A literature review.

Perioperative Care and Operating Room Management, 18, 100083.

<https://doi.org/10.1016/j.pcorn.2019.100083>

Wright, S. M. (2013). Examining transfer of care processes in nurse anesthesia practice:

Introducing the PATIENT protocol. *AANA Journal*, 81(3), 225-232.

APPENDIX A: IRB LETTER



October 8, 2021

Brian Reckker
UPHS-M
850 West Baraga Ave
Marquette, MI 49855

RE: CRNA HAND OFF PROJECT; *Implementation and Evaluation of an Evidenced Based Hand Off Tool for use in the Post Anesthesia Care Unit at UPHS-Marquette*

Submission: NEW PROJECT REVIEW
UPHS-M IRB #: 0933-2021
Decision: Project is Not Research
Original IRB Review Date: October 7, 2021

Dear Mr. Reckker,

Review of the above-referenced study by the UP Health-System Marquette's Institutional Review Board (IRB) was completed on October 7, 2021. Documentation specifically reviewed was the following:

- Project Summary for *Implementation and Evaluation of an Evidenced Based Hand Off Tool for use in the Post Anesthesia Care Unit at UPHS-Marquette*

The UPHS-Marquette Institutional Review Board (IRB) Chairman, Dr. Jeff Conklin has reviewed the above within the required regulations and per 45 CFR 46. Under the requirements of the U.S. Department of Health and Human Services regulations at 45 CFR part 46 and found the project to be Not Research.

The IRB thanks you for your partnership in research oversight and wishes you much success with your project.

Sincerely,

A handwritten signature in black ink, appearing to read 'Jeff Conklin'.

Jeff Conklin, MD
Chairman UPHS-M IRB
OHRP IRB #00001757
JC/ssh

APPENDIX B: PRE-INTERVENTION SURVEY 1

1. How long have you been working as a licensed professional?

0-5 Years	6-10 Years	11-15 Years	16-20 Years
21-25 Years	Over 25 Years		

2. Are you currently using a systematic process for the transfer of vital information during the transfer of care from one provider to the next in the PACU?

Yes	No
-----	----

3. If yes, please explain.

4. I am satisfied with the current state of handoff when giving/receiving information on the patient.

1-Strongly Disagree	2-Disagree	3-Neutral	4-Agree	5-Strongly Agree
---------------------	------------	-----------	---------	------------------

5. The current handoff process lends itself to mistakes.

1-Strongly Disagree	2-Disagree	3-Neutral	4-Agree	5-Strongly Agree
---------------------	------------	-----------	---------	------------------

6. The current handoff process is comprehensive.

1-Strongly Disagree	2-Disagree	3-Neutral	4-Agree	5-Strongly Agree
---------------------	------------	-----------	---------	------------------

7. The current handoff process provides an adequate way to communicate important information about the patient.

1-Strongly Disagree	2-Disagree	3-Neutral	4-Agree	5-Strongly Agree
---------------------	------------	-----------	---------	------------------

8. The current handoff process is efficient and not time consuming.

1-Strongly Disagree	2-Disagree	3-Neutral	4-Agree	5-Strongly Agree
---------------------	------------	-----------	---------	------------------

9. Patient Identity is confirmed upon arrival to PACU between providers

1-Strongly Disagree	2-Disagree	3-Neutral	4-Agree	5-Strongly Agree
---------------------	------------	-----------	---------	------------------

10. From the list provided below, pick the top 8 items you feel are important to be included in a handoff:

Patient ID

Surgical procedure

Medical/Surgical History

Urine Output

Blood Loss

Type of Airway Used

Fluids Administered

Status of paralysis/TOF/Tetanus

Reversal of NMB

Pain Medications Administered

Antibiotic Given

IV Sites

Temperature Management

Intra-op

Antiemetic Meds

Allergies

Type of Anesthesia Used

Past Medical Hx

Baseline Vitals

MDA Following Case

Most Recent Labs

Surgical Events

Airway/Intubation Conditions

Ventilation

11. Please list any items you feel are important not included in list:

12. Of the characteristics listed, select the ones you think would lead you to adopt a new handoff tool:

Brevity

Purposeful

Comprehensive

Has a Written Component

Easy to Use

Improves Patient Safety

Organized

Includes Patient Info

Provides Pain Meds Given

13. Of the characteristic listed, select ones you think would be barriers to preventing adoption of a new handoff tool:

Time consuming

Takes attention away from patient

Too difficult

No Interest

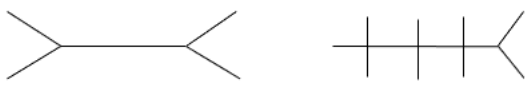
None of above (Adoption of new tool should occur)

APPENDIX C: POST INTERVENTION SURVEY 2

6. Over the past 2 weeks, how many times did you use the handoff tool when giving or receiving report?
- 0
- 1-5
- 6-10
- 11-15
- 15
7. I am satisfied with the standardized handoff tool when giving/receiving information on the patient.
- 1-Strongly Disagree 2-Disagree 3-Neutral 4-Agree 5-Strongly Agree
8. The standardized handoff tool process lends itself to mistakes.
- 1-Strongly Disagree 2-Disagree 3-Neutral 4-Agree 5-Strongly Agree
9. The standardized handoff tool is comprehensive.
- 1-Strongly Disagree 2-Disagree 3-Neutral 4-Agree 5-Strongly Agree
10. The standardized handoff tool provides an adequate way to communicate important information about the patient.
- 1-Strongly Disagree 2-Disagree 3-Neutral 4-Agree 5-Strongly Agree
11. The standardized handoff tool is efficient and not time consuming.
- 1-Strongly Disagree 2-Disagree 3-Neutral 4-Agree 5-Strongly Agree
12. If you have used the standardized handoff tool in the past two weeks, please list any positive aspects to the process.
13. If you have used the standardized handoff tool in the past two weeks, please list any suggestions for improvement/barriers to use.

14. Are there any items that should be included or deleted from the tool?
15. If you chose not to use the handoff tool in the past two weeks, please explain why.
16. Additional Comments:

APPENDIX D: HANDOFF TOOL CREATED FOR UPHS MARQUETTE

Patient Information	
Patient's Sticker Procedure: Age: Weight: MDA: Allergies:	<p style="text-align: center;"><u>Pre-operative Vitals</u></p> BP: P: R: T: ASA:
<p style="text-align: center; border: 1px solid black;">Anesthetic</p> GA MAC Spinal Epidural Regional Mask	<p style="text-align: center; border: 1px solid black;">Labs</p> 
<p style="text-align: center; border: 1px solid black;">Pertinent History</p>	<p style="text-align: center; border: 1px solid black;">I/O</p> Crystalloid Amount: Colloid Amount: Blood Products: ABX: EBL: U/O:
<p style="text-align: center; border: 1px solid black;">Intra-op Meds</p> Pain Meds: Anti-Emetics: Reversal: Easy Airway: Y/N	<p style="text-align: center; border: 1px solid black;">Lines</p> IV Sites: Arterial line site: Central Line site: Swan: Foley: Yes/No