

DNP Final Project:

Implementation and Evaluation of a Standardized Provider Handoff  
Tool, I-PASS, within a Cardiothoracic Surgical Intensive Care Unit

Megan Hanna

University of Alabama

Capstone College of Nursing

Faculty Advisor: Dr. Todd Smith

Clinical Advisor: Dr. Marcia Johansson

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## **Abstract**

### **Introduction and Purpose**

Communication in healthcare is imperative to providing safe and effective care. Patients within the intensive care unit (ICU) are unique and complex, posing challenges in care. The Joint Commission on Accreditation of Healthcare Organizations (JACHO) 2020 national patient safety goals for hospitals is to improve the effectiveness of communication among healthcare providers. A level one urban hospital in the southeastern United States cardiothoracic surgical ICU lacks a structured, standardized handoff processes. Implementation and utilization of a standardized handoff communication process, I-PASS, within a cardiothoracic surgical ICU can improve communication failures and increase patient safety.

### **Methods**

The illness severity, patient summary, action list, situational awareness and contingency planning, and synthesis by the receiver (I-PASS) handoff communication tool was implemented among providers within a cardiothoracic surgical ICU over the course of a six-week period. Completion and compliance with both verbal and written communication were audited daily. A pre and post survey was conducted among provider participants which evaluated provider intent to change their handoff communication processes.

### **Results**

Six healthcare providers participated in the implementation of the I-PASS communication handoff tool within the cardiothoracic surgical ICU. 488 written provider handoffs were completed resulting in the mean illness severity inclusion of 97%, the mean patient summary inclusion of 99%, the mean action list inclusion of 99%, the mean situation awareness and contingency planning inclusion of 99%, and synthesis by the receiver was not

measured. 352 verbal provider handoffs were completed resulting in a mean illness severity inclusion of 96%, the mean patient summary inclusion of 91%, the mean action list inclusion of 100%, the mean situation awareness and contingency planning inclusion of 98%, and synthesis by the receiver of 94%. 11 questions in the CPD survey measuring the healthcare provider's clinical behavior's pre and post project implementation of the intervention tool, I-PASS, resulted in intention to utilize the tool, identified the I-PASS as a useful and beneficial tool, providers intending to change their handoff process.

### **Discussion**

Similar to findings in the literature, the outcomes of this PI project showed an increase in handoff completeness post intervention. Measurement of healthcare provider's clinical behavior's intent has not been previously analyzed with the I-PASS handoff. Limitations of the study included a small participant sample size, lack of I-PASS completeness prior to tool implementation, and limited staffing. Implementing practice change with the use of the I-PASS tool and conducting further projects/studies has the potential to improve patient outcomes by improving communication failures, decreasing length of stay, improving healthcare costs, and increasing patient safety.

**Keywords:** handoff, critical care, intensive care unit, cardiothoracic surgery, I-PASS, communication, and care transition

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### **Introduction**

Up to 70% of serious errors and sentinel events in hospitals are caused by communication errors (Starmer et al., 2017). Communication in healthcare is crucial in providing effective, efficient, and safe patient care (Vermeir et al., 2015). Intensive care unit (ICU) patients pose complex challenges given their medical complexity. The ICU hosts an unstable patient population within acute, busy environment prone to multiple interruptions. Therefore, implementation of an organized clinical provider handoff process, providing concise information during shift changes is imperative in the ICU environment (Hoskote et al., 2017). There are numerous designs of clinical handoffs, although there is no specific handoff for clinical providers within the ICU (Karamchandani et al., 2018).

### **Background**

A leading cause of adverse events in hospitals is miscommunication among healthcare professionals (Walia et al., 2016). One of The Joint Commission's (2020) national patient safety goals for hospitals is to improve the effectiveness of communication among healthcare providers. Implementing and optimizing provider handoff processes can improve overall communication and help to meet patient safety goals (Walia et al., 2016). The term "handoff" can be defined as the transfer of patient information, responsibility, and accountability from one healthcare provider to another (Chatterjee et al., 2019). The Accreditation Council for Graduate Medical Education (ACGME) has emphasized the importance of teaching, assessing, and inclusion of handoff competencies in medical education (Heilman et al., 2016).

A structured handoff process is a collaborative effort that should involve key stakeholders, provide meaningful benefits, and address the clinical needs of the patients (Chatterjee et al., 2019). Due to the complexity and fragility of the vulnerable patient population within the ICU, incomplete provider handoffs have the most potential for patient harm (Cochran, 2018). Currently, there is no universal or standardized provider handoff tool, protocol, or checklist specifically for an intensive care unit setting. The I-PASS Handoff Bundle is an evidence-based, standardized approach to the handoff process derived from a multicenter study initiated from Boston Children's Hospital. I-PASS is a mnemonic for illness severity, patient summary, action list, situational awareness with contingency planning, and synthesis by the receiver (Walia et al., 2016). Implementation of I-PASS has resulted in handoff related communication failures, improved patient safety, and has aided in decreasing medical errors (Starmer et al., 2017).

### **Problem Statement**

Currently, a level one urban hospital in the southeastern United States cardiothoracic surgical ICU does not have a standardized provider handoff process. The purpose of this Doctor of Nursing Practice (DNP) scholarly project is to implement and evaluate the use of a standardized provider handoff tool, I-PASS, within a cardiothoracic surgical ICU to improve quality of patient information transfer among healthcare providers.

### **Organizational "Gap" Analysis of Project Site**

Most research on handoff communication has been configured around nursing and the peri-operative acute phase of patient care. Standardized handoffs amongst providers, specifically working within the cardiothoracic surgical ICU, seems to be overlooked. There are no standardized handoff processes utilized among providers working within the intensive care units

at a level one urban hospital in the southeastern United States. Individualized, non-standardized communication handoff processes lack structure and can lead to communication failures. The Centers for Medicare and Medicaid Services (CMS) 2016 Quality Strategy goals included promotion of effective communication and coordination of care. Ideally, evidenced-based standardized health care provider handoffs will be implemented and utilized within the ICU's at the level one trauma center and urban hospital in the southeastern United States. This will in turn promote communication within the hospital, between acute and post-acute care settings, improving healthcare disparities, healthcare costs, and patient outcomes (Centers for Medicare and Medicaid Services, 2016).

### **Data Sources**

A search of MEDLINE, CINAHL, and PubMed databases was completed using dates from January 1, 2014 to May 26, 2021 for the following medical subject heading (MeSH) terms: handoff, critical care, intensive care unit, cardiothoracic surgery, I-PASS, communication, and care transition. English language and peer-reviewed articles were exclusively included.

### **Review of Literature**

The Society of Thoracic Surgeons Workforce on Critical Care recently published a systemic review of the literature to evaluate whether a structured handoff process was beneficial during care transition from the operating room (OR) to the ICU for cardiothoracic surgery patients (Chatterjee et al., 2019). This systemic review was comprised of 21 studies with a total of 4,568 patients across all studies. The studies included measured handoff completeness, prevention of adverse events, process measure compliance, and provider satisfaction. Study settings included within the review were those within an adult cardiothoracic surgery, congenital cardiothoracic surgery, or surgical critical care setting. Eighteen of the twenty-one studies

included measured handoff completeness. Through examination of process measures and completeness of information transfer, it was found that implementation of a structured handoff improved the overall process in each included study within this systemic review (Chatterjee et al., 2019). Hall et al. (2017) evaluated preventable complications, including cardiac arrest, prolonged hypotension, line complications, allergic reactions, drug errors, and pneumothoraces. Study conclusions noted that after implementing a structured handover process a significant reduction in preventable complications, 5.3%, was observed. Overall, the systemic review completed by the Society of Thoracic Surgeons Workforce on Critical Care presented evidence-based findings that supported the use of a structured OR to ICU handoff process that improved process compliance, patient outcomes, and team satisfaction; however, no universal or standardized tool was utilized (Chatterjee et al., 2019).

In a prospective study design by Starmer et al. (2017) implementation of an I-PASS nursing handoff bundle included educational training, I-PASS implementation, and visual aid materials. Direct handoff observation and handoff times were assessed with focus on measurement of handoff quality, including interruption frequency, presence of key elements, and handoff duration. The study findings were associated with improvements in verbal handoff communication, including illness severity, patient summary, task list, and ability to ask questions, without negatively impacting workflow (Stramer et al., 2017).

Another study by Gleicher, Mosko, and McGhee (2017) completed a time-series evaluation within an adult cardiac surgery center with an aim to improve quality of patient handover from the cardiovascular operating room (CVOR) to the cardiovascular intensive care unit (CVICU). This study was completed over a 4-month period with 37 handovers observed. Outcomes measured included the quality of handovers and handover duration. The primary

measured outcome was the quality of handoff communication with use of the Handover Score, which included handover content, teamwork, and patient care planning. Results of the study showed a mean handover score increased from 6.5 to 14.0 with a max Handover Score of 18. Findings following implementation of a standardized handover protocol were associated with decreased interruptions during the handover, increased reliability of the transfer of information content, and improved patient care planning (Gleicher, Mosko, and McGhee (2017).

A descriptive study, completed in a university-affiliated community teaching hospital on a pediatric floor and in the newborn nursery, pediatric resident physicians implemented the I-PASS handoff tool. One hundred resident handoffs were analyzed in 3 phases with a total of 600 handoffs assessed. Phases included pre-intervention assessment, I-PASS initiation and education, and implementation of the handoff tool with use of the electronic medical record. Findings of this study demonstrated components of a standardized handoff system improved clarity of transfer and organization of information provided (Walia et al., 2016).

In another study conducted by Stramer et al. (2014), a prospective systems-based intervention study was completed within an inpatient setting in the United States and Canada. Participants, including nine pediatric residency programs, implemented the I-PASS Handoff Bundle, on various non-intensive care units. Medical errors and adverse event outcomes were measured through review of medical records and incident reports. Results of the study demonstrated a 23% reduction in overall medical-error rates across all study sites as compared to the pre-intervention handoff process where there was no standardized program in place. Resident workflow and satisfaction were also measured through time-motion observations during the pre- and post-intervention period. Overall there was no significant change in the time spent on

workflow or the handoff process. This study verified that implementation of the I-PASS Handoff Bundle can improve patient safety.

### **Evidenced-based Practice: Verification of Chosen Option**

The evidenced-based practice project implementation evaluates the use of a standardized handoff tool, I-PASS, within a cardiothoracic surgical ICU to improve quality of patient information transfer amongst providers. Additionally, this project evaluated provider intent to change their handoff communication processes pre and post standardized handoff implementation.

### **Theoretical Framework**

Theories assist the field of nursing by describing a studied phenomenon, explaining and predicting clinical outcomes (Butts & Rich, 2018). Middle range theories differ from grand theories, as they are more focused on concrete concepts and relationships, directly linking nursing research to nursing practice (Smith & Leibr, 2014). Acceptance of change is challenging, although inevitable and necessary for continued growth and progression, particularly in the field of nursing. Implementation of change requires change agents, which include doctoral prepared nurses. Behavioral scientist Kurt Lewin pioneered the middle range change theory in an attempt to address how and why things occur (Mitchell, 2013). In his efforts, Kurt Lewin identified three stages a change agent must utilize prior to change occurring. The first stage of Lewin's change theory is unfreezing, which includes identifying old behaviors and unlearning or discarding those behaviors in order to advance the driving force of change (Butts & Rich, 2018). The second stage of Lewin's change theory is moving, which requires action from individuals to make change occur towards more acceptable behaviors. The third and final stage of Lewin's change theory is refreezing, which makes the change(s) more permanent and establishes a new way of thinking or

behavior. Although planned changes are vulnerable to failure, understanding and planning with use of the middle range change theory can assist change agents and increase the likelihood of success (Mitchell, 2013).

Theory aides the healthcare practitioner in answering clinical questions, seeking meaningful answers in order to build logical structure (Butts & Rich, 2018). Implementation of evidence-based practices must include early involvement of key stakeholders throughout the various phases of change (Manchester et al., 2014). Using Kurt Lewin's change theory model, one can implement the I-PASS handoff tool by unfreezing old handoff communication practices, moving current communication practices towards standardized practice behaviors, and refreezing the communication handoff process. Evaluation of the implemented standardized handoff, I-PASS, can be completed through a post interventional survey. Utilization of middle range theories, such as the change theory, offers the potential to develop and standardize ICU provider handoff communication, thus closing the theory practice gap.

### **Goals, Objectives, and Expected Outcomes**

The communication handoff process among healthcare providers should include key components necessary to provide continuous, safe, and effective care. A standardized handoff tool, I-PASS, was implemented and utilized amongst providers during patient communication handoffs within a level one urban hospital in the southeastern United States cardiothoracic surgical ICU. Clinical provider handoffs occur during shift change within the cardiothoracic surgical ICU twice a day, at 7am and 7pm. This new handoff communication process was implemented for 6 weeks. Pre-project implementation, two (2) twenty-minute power point educational sessions regarding the DNP project objectives and I-PASS standardized handoff processes were presentenced virtually via Microsoft teams to all potential participants. Time was

allotted for questions and answers following the educational sessions. Consent forms were emailed to all potential participants who joined the educational sessions. Completeness of both the verbal and written handoff was measured daily by the principle investigator, whom did not participate in the project. Pre-and post-surveys were sent out to participants to evaluate provider intent to implement the standardized handoff communication process. Evaluation of provider intent to change their handoff process was measured post intervention. Understanding the participating cardiothoracic surgery ICU providers behavioral intentions to change and utilize the new standardized handoff communication tool, I-PASS, and identifying barriers to implementation was an expected outcome of the DNP project.

### **Methods**

A discussion with key stakeholders, including the medical director for the cardiothoracic surgical ICU, the advanced practice provider lead, the intensivist clinical provider team, and the professional investigator, was had regarding the current handoff process and the need for a standardized handoff process. A thorough literature review was complete to support the DNP project design. Following project proposal submission and approval to the University of Alabama's Institutional Review Board (IRB) (see Appendix D), the DNP project was implemented.

The intervention implemented consisted of the I-PASS handoff bundle, including educational training, verbal and written handoff I-PASS communication, and visual aid materials to provide compliance and sustainability. The primary utilization tool was the I-PASS handoff template within EPIC, the hospitals electronic medical record (EMR) system. This includes illness severity, patient summary, action list, situation awareness and contingency planning, and synthesis by the receiver. I-PASS infographic templates were provided to participants for badge

reference (see Appendix A). Two educational training sessions for the provider participants was conducted in the virtual form via Microsoft teams prior to project implementation. Each project education session lasted approximately 20 minutes utilizing a power point presentation for meeting content. Time for questions from participants was allotted and project questions were answered following the educational presentation. Consent of participants was obtained following the educational session, obtained via email, prior to project implementation.

A pre-intervention continuing professional development (CPD) reaction questionnaire survey, evaluating provider intent to change their communication handoff processes was disseminated via Qualtrics for participants to complete. Answers were submitted in a Likert Scale format. Following completion of the pre-intervention survey by participants, interventional data was collected over the course of 6 weeks during the ICU handoff time of 7pm. Following the 6-week intervention data collection, the post-intervention CPD reaction questionnaire survey, evaluating provider intent to change their handoff communication processes, was disseminated via Qualtrics for participants to complete. Once the post-intervention survey results were received, all interventional data was analyzed and processed. Interpretation of outcomes was disseminated via power point presentation to the applicable clinical provider group of the cardiothoracic surgical ICU, as well as key stakeholders. Additional data, including provider participants demographic data, such as gender, age, years of professional experience, and professional specialization were provided within the survey questionnaire. I-PASS handoff completeness, both verbal and written, was evaluated daily for the six-week period. A paired t-test was completed post intervention utilizing the data from the pre-and post CPD questionnaire survey responses. The researcher also analyzed the demographic data of the participant population and I-PASS handoff completeness data.

## **Project Design**

The DNP project design implemented was a process improvement (PI) measure utilizing a standardized communication handoff tool, I-PASS, among providers treating a unique patient population within the cardiothoracic surgical ICU. Quantitative methods were used to obtain the necessary data to evaluate project outcomes. Quantitative data collected for the DNP project included the CPD reaction questionnaire pre and post project implementation results to evaluate provider intent to change their handoff communication processes. Evaluation of the quantitative data will provide whether the implementation of a standardized handoff communication process will be utilized by the providers serving the subspecialized patient population following project completion. Additional, quantitative data collected included completeness of the both the written and the verbal handoff process within the I-PASS format. Completeness of the handoff process data was collected once daily. Participant demographic data, including participant provider age, gender, professional specialty, and years of practice were also collected.

## **Project Site and Population**

This scholarly project was implemented within a level one, not for profit, inpatient urban hospital in the southeastern United States. The hospital is in a city with an approximate population of 400,000 persons. The specific setting was held within an 18-bed cardiothoracic surgical intensive care unit (ICU). The cardiothoracic surgical ICU contained a variety of patients, including post cardiac surgical, heart transplant, lung transplant, and heart failure patients requiring mechanical support devices. In addition, the cardiothoracic surgical ICU contained overflow patient populations, such as medical and non-surgical ICU patients. Those deemed ICU overflow patients were excluded from the project.

A discussion with key stakeholders, including the medical director for the cardiothoracic surgical ICU, the advanced practice provider lead, the intensivist clinical provider team, and myself was had regarding the current handoff process and the need for a standardized handoff process. Participants of the project included the project investigator, as well as other advanced practice providers that worked within the cardiothoracic surgical ICU. The participant total was 6 advance practice providers, including a physician assistant and nurse practitioners. The rounding pulmonary intensivists and pulmonary critical care fellow providers were included in the project but did not participate as they did not sign consent.

### **Measurement Instruments**

The primary DNP project implementation tool is I-PASS, a validated standardized handoff communication tool established from a multicenter study. I-PASS, a mnemonic for illness severity, patient summary, action list, situational awareness with contingency planning, and synthesis by the receiver, is a standardized provider handoff initiated from Boston Children's Hospital that has been shown to decrease handoff related communication failures, improve patient safety, and decrease medical errors (Stramer et al., 2017). Permission to utilize this tool for purposes of the DNP project was obtained from the I-PASS study group (see Appendix B). To measure the quantitative outcomes of this project, including provider handoff content completeness and clinical provider intent to change, two different tools were utilized. When measuring quantitative data and I-PASS handoff completeness content, the measurement tool to be used is a I-PASS handoff content rubric checklist (see Appendix C). The handoff rubric tool is designed to measure content completeness, both written and verbal. The project investigator was responsible for evaluating/observing and completing the I-PASS handoff content rubric checklist during communication handoff once daily. Quantitative data, inclusive of clinical

provider behavioral intent to change their current handoff practices with utilization of the I-PASS handoff, was measured. Providers completed the CPD reaction questionnaire (see Figure 1). The CPD questionnaire is a validated tool designed to assess the extent of health professional's behavioral intentions in regards to change and can aid in identifying barriers to future implementation of a standardized handoff communication tool (Legare et al., 2017). The CPD questionnaire will measure intent, social influence, capability beliefs, ethics, and consequence beliefs with the intended behavioral change, implementing a standardized communication tool, I-PASS. The questionnaire was administered via Qualtrics electronic survey utilizing a Likert Scale scoring system (see Figure 2). Participants were also asked to provide demographics, such as gender, age, subspecialty profession, and number years of provider experience within this survey.

### **Data Analysis**

The quantitative data analysis of this project, assessing handoff completeness and provider participant demographic data, was completed utilizing descriptive statistical analysis, including measures of central tendency and variation. This data helps identify an overall picture of the independent variable and outcome variables from the I-PASS handoff completeness collected over the six-week intervention period. Additionally, it helps evaluate the study participant population. The quantitative data analysis, assessing the results of the healthcare provider CPD survey pre and post project intervention questionnaire results, was completed utilizing a paired *t*-test. Completing a paired *t*-test, also known as a dependent sample *t*-test, will help examine the same sample questions twice. The paired *t*-test analysis will help identify any statistically significant results the DNP project intervention, the I-PASS handoff tool, may have on the measured outcome.

### **Cost Analysis**

Financial costs of the DNP project implementation and evaluation for the institution and professional investigator was not a factor.

### **Timeline**

The DNP project proposal was submitted and the assigned University of Alabama (UA) faculty advisor approved the project proposal September of 2020. Initial Institutional Review Board (IRB) protocol submission occurred in September of 2020. IRB board submission occurred in February of 2021 with complete IRB project approval received March of 2021. Educational sessions were scheduled within the first two weeks of IRB approval. Emailed pre-interventional surveys were sent out to participants immediately following the educational sessions. Interventional data, including implementation of the I-PASS health care provider handoff and handoff completeness, both written and verbal, was collected over the course of 6 weeks. Interventional project data collection concluded May of 2021. Data analysis was completed May of 2021 with interpretation of outcomes and dissemination of findings concluding the project in June of 2021. Completion timeline of the DNP project, from proposal to completion, was ten months (see Table 1).

### **Ethical Considerations**

The UA IRB approval was obtained prior to initiating this DNP project (see Appendix D). Participation in this project study and surveys is voluntary. No punitive action or coercion will be implemented if the provider chooses to not participate in the project study. All study data obtained will be stored within a password protected computer system. There are no known conflicts of interest. Participant identifiers will be stripped so that data cannot be linked to participants. All patient information shared amongst the provider participants study was protect

by the Health Insurance Portability and Accountability Act (HIPAA) of 1996 which protects the privacy of patients' health information (Modifications to the HIPAA Privacy, Security, Enforcement, and Breach Notification Rules, 2013). Additionally, standards of care for practice were carefully followed. All information collected as a part of evaluating the impact of this project was aggregated data from the consented project participants, the cardiothoracic surgical ICU healthcare providers, and did not include any potential patient identifiers.

### **Results**

A total of six providers, one physician assistant and five nurse practitioners, caring for patients within the cardiothoracic surgical ICU consented to participate in the DNP project implementation of the I-PASS communication handoff tool. Of the project participants, all were female with a mean age of 31-40 years. Three of the nurse practitioners had 0-5 years of professional experience, one nurse practitioner had 6-10 years of professional experience, one nurse practitioner had 16-20 years of professional experience, and the physician assistant had 11-15 years of professional experience. Over the course of the six week I-PASS handoff communication tool implementation, 488 written handoffs and 352 verbal handoffs were completed within the cardiothoracic surgical ICU. The mean patient census and patient handoffs completed within the cardiothoracic surgical ICU on a daily basis 10.41. Evaluation of the written handoff I-PASS completeness resulted in the mean illness severity inclusion of 97%, the mean patient summary inclusion of 99%, the mean action list inclusion of 99%, the mean situation awareness and contingency planning inclusion of 99%, and synthesis by the receiver was not measured. Data analysis of variance measurements when evaluating the I-PASS written handoff completeness demonstrated the most compliance with patient summary, action list, and situation awareness and contingency planning, with a standard deviation (SD) of 0.02. Less

compliance was seen with illness severity, a SD of 0.05. Evaluation of the verbal handoff I-PASS completeness resulted in mean illness severity inclusion of 96%, the mean patient summary inclusion of 91%, the mean action list inclusion of 100%, the mean situation awareness and contingency planning inclusion of 98%, and synthesis by the receiver of 94%. Analysis of variance measurements with the verbal I-PASS handoff completeness showed a SD of zero for compliance with action list, a SD of 0.03 with situation awareness and contingency planning, a SD of 0.06 with illness severity and patient summary, and a SD of 0.09 with synthesis by the receiver.

Of the six project participants, all providers completed the pre and post project implementation CPD questionnaire. There was a total of 11 questions in the CPD survey measuring the healthcare provider's clinical behavioral intent to utilize the studies intervention, the I-PASS handoff (see Figure 1). The pre and post survey questions were the same, however, the pre questionnaire was assessed prior to the project intervention and the post questionnaire was assessed following the project intervention. A 7-point Likert scale was used to answer each survey question (see Figure 2). Reviewing data results of the paired samples statistics (see Appendix F), survey question number 10 data correlation and  $t$  could not be computed given the standard error of the difference was zero. Question 10 analyzed the belief of participants capabilities to utilize the I-PASS handoff tool. Each participant reported pre and post implementation that they strongly agreed they could utilize the I-PASS handoff tool if desired. Upon data analysis utilizing the paired samples  $t$ -test (see Appendix E), with a statistically significant  $p$ -value of 0.012, question number seven asked project participants what their perception, based on percentage, of the I-PASS handoff communication tool utilization was completed by their colleagues. On average, participants reported that their colleagues would

utilize the I-PASS handoff communication tool 61-80% ( $M=3.38$ ,  $SE=0.167$ ) of the time pre project implementation and 81-100% ( $M=4.83$ ,  $SE=0.167$ ) of the time post project implementation ( $t=-3.873$ ). Survey question number eight, evaluating social influence, asked participants if they thought a respected professional co-worker utilized the I-PASS handoff communication tool. The paired samples  $t$ -test showed a statistically significant  $p$ -value of 0.031, with participants reporting a mean of “sometimes” ( $M=2.50$ ,  $SE=0.342$ ) pre intervention and “most of the time” ( $M=4.17$ ,  $SE=0.307$ ) post intervention ( $t=-2.988$ ). Question number 11 asked participants if there was difficulty using the I-PASS handoff tool, resulting in a  $p$ -value of 0.175 ( $t=-1.58$ ). Pre project intervention, the participant average response was “somewhat easy” ( $M=4.33$ ,  $SE=0.211$ ), and post project intervention was “extremely easy” ( $M=4.67$ ,  $SE=0.211$ ).

When assessing moral norms of the CPD questionnaire, question number 14 asked participants if it is acceptable to utilize the I-PASS handoff tool communication process ( $p$ -value=0.178,  $t=1.633$ ). The mean response pre intervention was “strongly agree” ( $M=1.40$ ,  $SE=0.245$ ) and the post response, being unanimous, was “strongly agree” ( $M=1.00$ ,  $SE=0.000$ ). Question’s 15 and 16 of the CPD questionnaire explored participant responses about consequences. Question 15 asked participants if utilizing the I-PASS handoff communication tool would be useful. Data analysis of question 15 showed a mean pre intervention response of “somewhat useful” ( $M=4.00$ ,  $SE=0.775$ ) and a mean post intervention response of “useful” ( $M=5.00$ ,  $SE=0.000$ ),  $p$ -value 0.266,  $t=-1.291$ . Question 16 asked participants if utilizing the I-PASS handoff communication tool would be harmful versus beneficial. Data analysis of question 16 resulted in a mean pre intervention ( $M=4.80$ ,  $SE=0.200$ ) and post intervention ( $M=5.00$ ,  $SE=0.000$ ) response of “beneficial.” Question’s four and five surveyed participants intentions regarding the use of the I-PASS handoff communication tool. Question four asked if the participant intended to change

their handoff communication process with the use of I-PASS ( $p$ -value=0.178,  $t$ =1.633). Pre implementation survey results showed a mean response of “somewhat agree” ( $M$ =1.40,  $SE$ =0.245) and post implementation survey results showed a mean response of “strongly agree” ( $M$ =1.00,  $SE$ =0.000). Question six asked participants if they intend to use the I-PASS communication tool as part of the handoff process ( $p$ -value,  $t$ =). Pre implementation the results demonstrated a mean response of “somewhat agree” ( $M$ =1.40,  $SE$ =0.245) and a post implementation mean response of “strongly agree” ( $M$ =1.20,  $SE$ =0.200).

### **Discussion**

Similar to findings in the literature, the outcomes of this PI project showed an increase in handoff completeness post intervention. Starmer et al.’s (2017) study showed improvements in verbal handoff communications post intervention with an illness severity completeness of 67%, a patient summary completeness of 95%, action list completeness of 100%, and synthesis by the receiver completeness of 73%. Overall, I-PASS tool compliance of the verbal communication handoff process of the current PI project was 96% with illness severity, 91% with patient summary, 100% with action list, 98% with situation awareness/contingency planning, and 94% with synthesis by the receiver. There were compliance inconsistencies in the verbal handoffs given the limitations of staffing overnight and lack of provider coverage within the ICU by the nurse practitioner and physician assistant participants. Another possible factor contributing to variation with I-PASS tool utilization during verbal and written handoff communication was continuum of provider care.

Gleicher, Mosko, and McGhee (2017) implemented a standardized handoff process between the CVOR and the CVICU amongst caregivers which resulted in improvements in content received and patient care planning >95%. The current PI project showed similar

completeness of content of the verbal handoff (96%) and the written handoff (99%). Overall, providers of the current PI project perceived that by utilizing the standardized handoff communication tool, I-PASS, would be useful. Additionally, providers perceived I-PASS as being a beneficial tool for handoff communication. One limitation to this PI project is there was no other standardized handoff structure to compare to the implemented I-PASS communication tool.

Assessment of health professional's behavioral intentions utilizing the CPD questionnaire with implementation of the I-PASS tool has not been known to be researched prior to this DNP project. Thus, results of the presented DNP project offer fresh insights to the intention, social influence, beliefs, capabilities, moral norms, and consequences of healthcare providers utilizing the standardized handoff communication tool, I-PASS, within a cardiothoracic surgical ICU. Overall, it seems that the healthcare provider participants of the DNP project perceive that the intervention tool is useful and expressed intentions to utilize I-PASS. Given these findings of the project, sustainability of the standardized communication handoff process amongst providers within the cardiothoracic surgical ICU is high.

Several limitations to the PI project were identified. The participant sample size was small, yielding only six healthcare providers. Additionally, the healthcare provider participants were limited to the advance practice provider profession. The handoff completion process was not analyzed prior to the standardized I-PASS handoff tool implementation, further limiting the overall findings of the project.

Further projects can be conducted to determine the impact of such process outcomes using the theoretical framework, Lewin's change theory. Unfreezing, moving, and refreezing change behaviors has the potential to further improve the I-PASS handoff communication tool

implementation process and outcomes. Implementing practice change with the use of the I-PASS tool and conducting further projects/studies has the potential to improve patient outcomes by improving communication failures, decreasing length of stay, improving healthcare costs, and increasing patient safety.

### **Conclusion**

In review of the literature and handoff processes within a level one urban hospital in the southeastern United States cardiothoracic surgical ICU, implementation of the I-PASS bundle has the potential to standardize the handoff process, improve provider satisfaction, and improve quality of patient information transfer. Assessing healthcare provider's behavioral intent to change will aid in identifying barriers to address in order to facilitate change and implementation a standardized handoff process. Promotion of standardized communication within the complex setting of the ICU can help to decrease patient harm and lead to improved patient outcomes.

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**Figure 1**

*Summary of CPD-Reaction questionnaire scores on items and constructs*

Construct Scale	Item Number	Items	Responses Choices	Pre-Coded Item Value	Final Item Score	Score by Construct
Intention	I1	I intend to utilize the I-PASS handoff	Strongly disagree/agree	1 to 7	1 to 7	(I1+I7)/2
	I7	I plan to utilize the I-PASS handoff	Strongly disagree/agree			
Social Influence	I2	To the best of my knowledge, the percentage of my colleagues who will utilize I-PASS is...	0-20%	1	1.4	(I2+I6+I9)/3
			21-40%	2	2.8	
			41-60%	3	4.2	
			61-80%	4	5.6	
			81-100%	5	7	
	I6	Now think about a co-worker whom you respect as a professional. In your opinion, does he/she utilize the I-PASS handoff?	Never/Always	1 to 7	1 to 7	
	I9	Most people who are important to me in my profession utilize the I-PASS handoff.	Strongly disagree/agree	1 to 7	1 to 7	
Beliefs about capabilities	I3	I am confident that I could utilize the I-PASS handoff.	Strongly disagree/agree	1 to 7	1 to 7	(I3+I5+I11)/3
	I5	For me, utilizing the I-PASS handoff would be...	Extremely difficult/easy	1 to 7	1 to 7	

	I11	I have the ability to utilize the I-PASS handoff.	Strongly disagree/agree	1 to 7	1 to 7	
Moral norm	I4	Utilizing the I-PASS handoff is the ethical thing to do.	Strongly disagree/agree	1 to 7	1 to 7	(I4+I10)/2
	I10	It is acceptable to utilize the I-PASS handoff.	Strongly disagree/agree	1 to 7	1 to 7	
Beliefs about consequences	I8	Overall, I think that for me the I-PASS handoff is...	Useless/Useful	1 to 7	1 to 7	(I8+I12)/2
	I12	Overall, I think that for me the I-PASS handoff will be...	Harmful/Beneficial	1 to 7	1 to 7	

- a) Item number (e.g., I1=Item 1)
- b) Pre-coded item value is a Likert scale assigned value (See figure 2)
- c) Final item score is the score by the item for each participant (possible range scale=1 to 7)
- d) Score construct=mean score by construct (possible range scale=1 to 7)

Note: for constructs with two items, no imputed values are possible. For constructs with three items, the raw score of the scale is missing if two or more items are missing. In case of one missing item, the missing item is imputed from the mean of two other item. (Légaré et al, 2017)

**Figure 2**

*7-Point Likert Scale*

Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
1	2	3	4	5	6	7

**Table 1***DNP Project Timeline*

<b>DNP Project Steps</b>	<b>Completion Timeline</b>
<b>DNP Project Proposal Submission</b>	September 2020
<b>IRB Initial Submission</b>	September 2020
<b>IRB Board Submission</b>	February 2021
<b>IRB Board Project Approval</b>	March 2021
<b>Project Educational Sessions/Consents</b>	March 2021
<b>Interventional Data Collection</b>	April through May 2021
<b>Data Analysis</b>	May 2021
<b>Interpretation and Dissemination of Outcomes/Findings</b>	June 2021

Appendix A

I-PASS Badge Card



## The I-PASS Mnemonic

<b>I</b>	<b>Illness Severity</b>	<ul style="list-style-type: none"> <li>Stable, “watcher,” unstable</li> </ul>
<b>P</b>	<b>Patient Summary</b>	<ul style="list-style-type: none"> <li>Summary statement</li> <li>Events leading up to admission</li> <li>Hospital course</li> <li>Ongoing assessment</li> <li>Plan</li> </ul>
<b>A</b>	<b>Action List</b>	<ul style="list-style-type: none"> <li>To do list</li> <li>Timeline and ownership</li> </ul>
<b>S</b>	<b>Situation Awareness and Contingency Planning</b>	<ul style="list-style-type: none"> <li>Know what’s going on</li> <li>Plan for what might happen</li> </ul>
<b>S</b>	<b>Synthesis by Receiver</b>	<ul style="list-style-type: none"> <li>Receiver summarizes what was heard</li> <li>Asks questions</li> <li>Restates key action/to do items</li> </ul>

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## Appendix B

### I-PASS Copyright Permission



300 Longwood Ave  
Boston, MA 02090

March 4, 2021



HARVARD MEDICAL SCHOOL  
TEACHING HOSPITAL

To whom it may concern:

I am writing this letter to express our support of Megan Hanna's DNP project entitled "Implementation and Evaluation of a Standardized Provider Handoff Tool, I-PASS, within a Cardiothoracic Surgical Intensive Care Unit". We are in support of her academic evaluation of the implementation of I-PASS using the curricular tools available on MedED Portal and/or the I-PASS Study Group website.

Sincerely,

On behalf of the I-PASS Study Group

Amy Jost Starmer, MD, MPH  
Director of Primary Care Quality Improvement  
Associate Medical Director of Quality, Department of Pediatrics  
Boston Children's Hospital / Harvard Medical School

### Appendix C

#### I-PASS Handoff Content Rubric

			<b>Included</b>	<b>Omitted</b>
<b>I</b>	Illness Severity	Noted whether the patient was Stable vs “Watcher” vs Unstable		
<b>P</b>	Patient Summary	Described a Brief Hospital Course Summary: Code Status; Allergies; Complications;		
<b>A</b>	Action List	Reported the To Do List		
<b>S</b>	Situation Awareness and Contingency Planning	Described What is Happening; What is the Plan		
<b>S</b>	Synthesis By the Receiver	Summarized the Handoff; Restated the Plan		

## Appendix D

### Institutional Review Board Approval

**From:** rscompliance@research.ua.edu  
**Sent Date:** Friday, March 12, 2021 14:30:02 PM  
**To:** mhanna2@crimson.ua.edu, tbsmith3@ua.edu  
**Cc:**  
**Bcc:**  
**Subject:** IRB Protocol Approved: 20-09-3913, Hanna, Megan  
**Message:**

IRB has approved the protocol with the following details.

A copy of the official signed approval letter and approved stamped documents may be found within the attachments section of the application.

Protocol ID: 20-09-3913  
Principal Investigator: Hanna, Megan  
Department: Nursing  
Protocol Title: Implementation and Evaluation of a Standardized Provider HandoffTool, I-PASS, within a Cardiothoracic Surgical Intensive Care Unit  
Review Type: FULLBOARD  
Approval Date: March 09, 2021

## Appendix E

### Paired T-Test Results

#### Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Pre Survey Question 5 – Post Survey Question 5	.167	.753	.307	-.623	.957	.542	5	.611
Pair 2	Pre Survey Question 6 – Post Survey Question 6	.167	.753	.307	-.623	.957	.542	5	.611
Pair 3	Pre Survey Question 7 – Post Survey Question 7	-1.000	.632	.258	-1.664	-.336	-3.873	5	.012
Pair 4	Pre Survey Question 8 – Post Survey Question 8	-1.667	1.366	.558	-3.100	-.233	-2.988	5	.031
Pair 5	Pre Survey Question 9 – Post Survey Question 9	1.000	1.095	.447	-.150	2.150	2.236	5	.076
Pair 7	Pre Survey Question 11 – Post Survey Question 11	-.333	.516	.211	-.875	.209	-1.581	5	.175
Pair 8	Pre Survey Question 12 – Post Survey Question 12	-.167	.408	.167	-.595	.262	-1.000	5	.363
Pair 9	Pre Survey Question 13 – Post Survey Question 13	.833	.983	.401	-.198	1.865	2.076	5	.093
Pair 10	Pre Survey Question 14 – Post Survey Question 14	.333	.516	.211	-.209	.875	1.581	5	.175
Pair 11	Pre Survey Question 15 – Post Survey Question 15	-.833	1.602	.654	-2.515	.848	-1.274	5	.259
Pair 12	Pre Survey Question 16 – Post Survey Question 16	-.167	.408	.167	-.595	.262	-1.000	5	.363

## Appendix F

## Paired Samples Statistics

## Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pre Survey Question 5	1.50	6	.548	.224
	Post Survey Question 5	1.33	6	.816	.333
Pair 2	Pre Survey Question 6	1.50	6	.548	.224
	Post Survey Question 6	1.33	6	.516	.211
Pair 3	Pre Survey Question 7	3.83	6	.408	.167
	Post Survey Question 7	4.83	6	.408	.167
Pair 4	Pre Survey Question 8	2.50	6	.837	.342
	Post Survey Question 8	4.17	6	.753	.307
Pair 5	Pre Survey Question 9	2.33	6	.816	.333
	Post Survey Question 9	1.33	6	.516	.211
Pair 6	Pre Survey Question 10	1.00 <sup>a</sup>	6	.000	.000
	Post Survey Question 10	1.00 <sup>a</sup>	6	.000	.000
Pair 7	Pre Survey Question 11	4.33	6	.516	.211
	Post Survey Question 11	4.67	6	.516	.211
Pair 8	Pre Survey Question 12	1.17	6	.408	.167
	Post Survey Question 12	1.33	6	.516	.211
Pair 9	Pre Survey Question 13	2.17	6	.983	.401
	Post Survey Question 13	1.33	6	.516	.211
Pair 10	Pre Survey Question 14	1.33	6	.516	.211
	Post Survey Question 14	1.00	6	.000	.000
Pair 11	Pre Survey Question 15	4.17	6	1.602	.654
	Post Survey Question 15	5.00	6	.000	.000
Pair 12	Pre Survey Question 16	4.83	6	.408	.167
	Post Survey Question 16	5.00	6	.000	.000

a. The correlation and t cannot be computed because the standard error of the difference is 0.