

IMPROVING HOSPITAL-WIDE INPATIENT
I-PASS HANDOFF

A DNP SCHOLARLY PROJECT

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Abstract

In line with The Joint Commission on Accreditation of Healthcare Organization (JCAHO) as well as The Accreditation Council for Graduate Medical Education's (ACGME) priorities for accreditation, our institution identified handoffs as an essential factor to consider in preventing risk to patients and process failure. Effective communication between caregivers can help reduce medical inpatient errors and preventable deaths due to miscommunication. Our electronic medical record system, EPIC, includes I-PASS handoff. I-PASS is one of the standardized tools for handoffs. This mnemonic stands for Illness severity, Patient summary, Action list, Situation awareness, and Synthesis by the receiver. This QI project's primary objective was to improve the hospital-wide inpatient I-PASS handoff rate from 40% to 65% within two months following the interventions and improve provider satisfaction in using I-PASS handoffs in EPIC. Interventions included: education, tool modification, team meetings, and improving provider satisfaction in the use of I-PASS handoffs in EPIC. After our interventions, our results showed an increase in user satisfaction in the use of I-PASS. Our I-PASS percentage of handoffs also showed an increase from 40% to 50%, two months after implementation. There was also a notable improvement in the percentage of handoff numbers for both the surgical and medical side. The team also learned that we needed more buy-in from the institution's leaders for this QI project to be more successful.

Keywords: I-PASS, I-PASS handoff, inpatient I-PASS handoff, improving I-PASS handoff

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Improving Hospital-Wide Inpatient I-PASS Handoff

Section I

Introduction to the Problem

Background

There are estimates that every year, miscommunication between clinicians contributes to one-third of the serious medical inpatient errors and results in the preventable deaths of 250,000 patients annually in the United States (Parent et al., 2018). The Joint Commission on Accreditation of Healthcare Organizations (JCAHO), 2017 identified handoff communication as one of the national quality improvement and patient safety efforts' key targets. Handoff is the real-time process of passing patient-specific information from one caregiver to another or from one team of caregivers to another team. Handoff is a transfer and acceptance of responsibility for patient care obtained through effective communication. Effective handoff ensures continuity of patient care and patients' safety (The Joint Commission, 2017).

There are several tools used for handoffs, and I-PASS is one of those tools. I-PASS is a mnemonic that stands for Illness severity, Patient summary, Action list, Situation awareness, and Synthesis by the receiver. The Joint Commission recognizes I-PASS as a helpful and effective tool. More than 50 hospitals have adopted this program. Previous studies from nine medical centers that implemented the program showed a decrease in preventable adverse events by 30%. The institution I work for started using I-PASS for handoffs about three years ago when the Electronic Privacy Information Center (EPIC) system replaced our previous Electronic Medical Record (EMR) system.

Our institution provides comprehensive services for cancer patients. Different services are under primary care during the day. However, at night, the Nocturnal Department is responsible for both medical and surgical services. The Nocturnal Department under surgical service includes Gynecology Oncology, Head and Neck Surgery, Neurosurgery, Surgical Oncology, Thoracic Surgery, and Urology. The medical service covers both liquid and solid services. Leukemia, Lymphoma, Stem Cell transplantation, and Cellular Therapy are liquid services. Genitourinary (GU) oncology, Sarcoma medical oncology, General

Internal Medicine (GIM) Hospitalist, Melanoma, Investigational Care Therapy (ICT), and Breast medical oncology are all solid services. Before I-PASS was available in EPIC, our Nocturnal Department depended on the electronic handoffs from Microsoft SharePoint. The Primary Team received these email handoffs in the morning.

The necessity of having an effective tool for handoff to save time in emergent circumstances can make the difference between life and death in some situations for patients. The Primary Team needed to learn to give Nocturnal handoffs effectively and efficiently. Handoffs via I-PASS using EPIC began in 2018. The handoff tool was introduced to the surgical and medical teams a few services at a time. By 2020, all of the primary teams received an introduction to I-PASS handoff in EPIC.

Initially, the primary teams agreed to do handoffs only for their sickest patients to the Nocturnal Service via I-PASS in EPIC. The intent was that the Nocturnal APPs would know to check on these patients at night. However, compared to the number of patients, there were very few handoffs given to Nocturnal Service, and the number of handoffs given was not consistent. On the other hand, after learning of I-PASS handoff in EPIC and as part of their department's quality improvement (QI) project, the GIM Service trained their healthcare providers (including their APPs, residents, and MDs) to do a handoff for every patient on their list. It was clear that performing handoffs the current way for the other services was not sustainable. The way GIM was doing handoffs for their service increased those handoffs to the Nocturnal Service. GIM created a handoff for every patient as part of their daily routine and patient rounds.

In 2018, our institution did a patient culture survey and compared it to the Agency for Healthcare Research and Quality's (AHRQ) benchmark. The AHRQ established the Hospital Survey on Patient Safety Culture comparative database. The purpose of this database was to allow hospitals to compare the results of their surveys on patient safety culture with those of other hospitals (AHRQ, March 2016). The survey showed that the institution was less than 20% below AHRQ's benchmark for hospital handoffs and transitions. A GIM Services survey in 2019 also demonstrated the utility of I-PASS by providers of different services in our institution to be 40% (calculated using the number of handoffs over the number

of days admitted). The goal of this QI project was to increase the utility of I-PASS handoffs by 25% within two months of implementation.

Improving I-PASS handoff included picking champions from each service, who would be instrumental in leading the I-PASS handoff implementation in their respective services. Developing a learning module was another critical part, and this included assistance from our education and training support at our institution. Our champions assisted with training across all services. Providers in all services were trained, including faculty MDs, residents, APPs, physician assistants, and nurse practitioners. Educating providers on how to do handoffs the way it has worked for GIM Service was a part of the new process. We intended for the new process to improve the hospital-wide inpatient use of I-PASS handoff in EPIC by educating every service to put a handoff for every patient as part of their routine and daily rounds.

Using I-PASS handoffs for all patients, each patient had an identified level-of-illness severity, including stable, watcher, or unstable. Primary services were to have the option of creating an "action list" portion of I-PASS with a "Nocturnal" element and a "Team" element. The procedure helped the Primary Team involved with the patient's care to determine if something needed to be followed up—specifically by the Nocturnal at night or by the Primary Team only during the day. By instilling the habit on all the providers of placing a handoff via I-PASS for every patient, every time, was intended to ingrain the practice and eventually become part of the provider's daily patient care.

Poor communication and inadequate handoffs can lead to uncertainty, which in turn could lead to work or re-work, such as ordering repeated or unnecessary tests. In other cases, this could lead to patient harm (Arora et al., 2007). This project was vital because it helped increase patient safety through better handoff from the Primary team to the Nocturnal Team and vice-versa. This project was essential for the Primary teams because they can communicate important information about their patients' specific care. It was also crucial for the Nocturnal team because it helped expedite proper patient care during urgent or emergent situations. With proper handoffs, the Nocturnal Team did not have to dig through tons of patient information in the electronic medical records. The team was able to focus on urgent patient care issues.

Project Question

At a large cancer institution, what are the effects of education, tool modifications, and team meetings on improving hospital-wide inpatient I-PASS handoff rate and I-Pass handoff user satisfaction?

Needs Assessment**Strengths, Weaknesses, Opportunities, Threats (SWOT) Analysis**

A SWOT analysis can help an organization identify and understand their position before deciding on a new project or strategy. SWOT can help an organization understand what is working and what is not working for them and help them identify what they can use to their organization's advantage. By recognizing that SWOT stands for Strengths, Weaknesses, Opportunities, and Threats, an organization can understand and eliminate things that could hamper its success (MindTools, n.d.).

Some of the identified strengths were: (a) support from the administration, (b) engaged champions from different services, (c) experienced members of the leadership task force regarding the use of I-PASS handoff, (d) access to a helpful Information Technology (IT) Department, and (e) a good education support team. The I-PASS handoff is a part of the Institutional Operational Priority. I-PASS has support from the administration and the institution's leadership (the University of Texas, MD Anderson Cancer Center [UT MDACC], 2020).

For weaknesses, since the institution is large, getting several services' champions on the same schedule to meet can be difficult. Another issue was that medical and surgical services have different requests regarding how the I-PASS works in our EMR system, EPIC. We needed to have several additional meetings with IT to understand which requests were doable or not and find a happy medium for everyone. This detailed approach required more steps and a lot more effort. We tried to satisfy every request and meet every service need. This approach assisted in improving satisfaction in the use of I-PASS handoffs in EPIC and increased compliance.

There were several identified opportunities. The most important achievement was to increase patient safety by improving communications between providers regarding patient care by using I-PASS handoffs in EPIC. The institution is also building a dashboard into EPIC that will give us real-time

numbers for handoffs in every service. By establishing the dashboard, the available data will be sufficient to monitor I-PASS handoff compliance closely.

For threats, COVID-19 has changed the way we meet, and sometimes this makes it more difficult if there are technical issues. The drop in patient numbers and low staffing for all services could also affect handoff, making the providers more stressed. Stress could lead to their feeling that they do not have enough time to write handoffs for all their patients. Another threat is the primary teams’ resistance to change since most service providers have been comfortable not using a standardized way of handoff such as I-PASS but prefer emails. The cost could have been an issue as we had to produce educational videos and campaign for I-PASS handoffs.

Table 1

SWOT Analysis for the QI Project

Strengths	Weaknesses
<ul style="list-style-type: none"> • Support from the administration • Engaged champions from different services • Experienced members of the task force about I-PASS handoff use • Access to IT and education support 	<ul style="list-style-type: none"> • Difficulty in getting together with other services to meet with champions due to conflict in schedules • Multiple different primary services with different needs and preferences • Inconsistent attendance in meetings of task force members due to busy schedules
Opportunities	Threats
<ul style="list-style-type: none"> • Potential for increasing patient safety • Potential for decreasing errors from lack of standardized communication between services • Potential for adding access to I-PASS on handheld devices such as institutional iPhone for providers • Potential for measuring real-time numbers for handoff on the EPIC dashboard 	<ul style="list-style-type: none"> • Covid-19 is changing the ways we meet. • Increase in stress in providers due to rising patient numbers and low staffing • Primary teams are resistant to change. • Cost toward making educational videos for the institutional I-PASS handoff

Root Cause Analysis (RCA)

RCA is the process used to identify root causes of undesired outcomes of an event. The purpose of RCA is to develop corrective actions. The RCA process helps an organization understand what happened, why it happened, and what needs to be changed to improve performance. The steps for conducting an RCA include Quality Improvement and Performance Improvement (QAPI, n.d.):

1. Identifying the event and gather information about it
2. Picking a team facilitator and team members
3. Describing what happened
4. Identifying factors that contributed to the event
5. Identifying the root causes
6. Designing changes to implement that will eliminate the root causes
7. Measuring the success of changes made

An RCA in 2019 occurred with a patient seen in the emergency center (EC) for increasing shortness of breath and agitation. As reported by the patient's son and sister, the patient had been short of breath at home but did not report it. The patient's family stated that the patient expressed her desire not to be resuscitated or put on life support. After a lengthy discussion with the patient and her family members, the EC doctor made the patient's code status as "Do not resuscitate" (DNR). The Primary Team came by and called a Supportive Care consult. Because it was already late in the day, they made recommendations to an APP by 'phone. However, they could not see the patient or write orders.

The patient was agitated and in pain. The EC MD gave additional pain medications and ordered to put the patient on non-violent restraints. Then, the patient was transferred to the floor. Early in the morning, the Medical Emergency Rapid Intervention Team (MERIT) was called, as well as the Nocturnal Service APP, to come to the bedside to evaluate the patient. The patient was placed on Bilevel Positive Airway Pressure (BiPAP) to assist with her breathing issues and given pain medications. The patient was kept on restraints as she was still agitated.

The next day, the Primary Team gave pain medications to help the patient relax and removed the restraints. There was a call for the Supportive Care Service to help with the pain and agitation. She was put on a pain pump and, later in the day, expired peacefully. When the Primary Team spoke with the family, the patient's sister was upset and angry. She said they witnessed the patient suffering while on restraints. Besides, the patient had a DNR designation.

Timeline and Contributing Factors

1. The patient was admitted for shortness of breath and agitation and identified as DNR.

Contributing Factors: 1

- The patient's family said that she had been short of breath for days but did not want to do anything about it.
- The patient's family stated that the patient did not want to be resuscitated or placed on life support. Consequently, she was designated DNR by the EC MD.

2. The patient was given pain medicine and also put on non-violent restraints by the EC MD.

Contributing Factor: 2

- The patient was very agitated despite receiving medication for pain.

3. The Rapid Response Team and the Nocturnal were both called for the patient. The patient was given morphine and put on BiPAP.

Contributing Factors: 3

- The patient was transferred to the floor and noted by the bedside RN as agitated and short of breath. MERIT was called as well as Nocturnal APP to assess the patient and to intervene.
- The MERIT team noted that the patient was DNR and was put on BiPAP.
- Nocturnal came to bedside and gave more pain medication.
- There was no handoff written from the Primary Team to the Nocturnal Team.
- The patient was left on restraints as she was still agitated.

4. The next day, the Primary Team saw the patient and called Supportive Care for symptom control.

Contributing Factors: 4

- The patient needed better pain control and medications to help with agitation
- Supportive Care did not see the patient the day before as the consult was considered late and non-emergent. The patient could have been seen that evening, but only if the consult had been called in as emergent and if done by an MD (i.e., as a doctor-to-doctor consult).

5. The patient expired. The family members, especially the patient's sister, were very angry.

Contributing Factors: 5

- The sister was with the patient all night.
- The sister witnessed the patient suffering and on non-violent restraints all night despite being DNR.

Identifying the Root Cause and Action Items

1. Root cause: Supportive Care was not consulted earlier to help take care of the patient's symptoms.

The EC doctor took significant time trying to talk to the patient (who was agitated) and the family members regarding code status. The conversation did end with the patient being made DNR. However, the EC MD did not consult Supportive Care or Palliative Care for symptom management and pain control.

Action Items: 1

- EC doctors need education regarding DNR, comfort care, and symptom management.
- Order sets could also be made for the EC Department to help DNR patients with pain control issues.

Responsible Individual: Dr. W

Completion deadline: May 30, 2020

2. Root cause: There was a lack of communication and handoff between the EC MD, the Primary Team, and Nocturnal Service.

The Primary Team could have placed a written report on I-PASS handoff in EPIC and left instructions for the intended follow-up. Had the Primary team used I-PASS handoff, they could have left a contingency plan for the patient.

The EC could also have called the Nocturnal Team covering for the service and updated them on necessary follow-up actions.

Action Items: 2

There is a need to re-educate the primary teams and EC MDs about the importance of putting I-PASS handoffs into EPIC for Nocturnal.

- Primary Teams and EC MDs also need to be re-educated regarding the use of the on-call system for Nocturnal coverage so they will know whom to page.

Responsible Group: Nocturnal Department

Completion deadline: May 31, 2020

Purpose, Aim(s), and Objective

The JCAHO and The Accreditation Council for Graduate Medical Education (ACGME) identify effective communication between caregivers as part of their accreditation requirements. The AHRQ has also made improving handoffs a nationwide effort in improving patient safety and is considered a priority by Fryman et al. (2017). In line with these agencies' priorities, our institution identified handoffs as an essential factor to consider in preventing risk to patients and process failure. Our electronic medical record system, EPIC, includes I-PASS handoff. The Nocturnal Department reached out to every department in the institution regarding its use. However, there were very few handoffs from the Primary team. There was no consistency in use. The GIM Hospitalist service, as part of their own QI project, educated their providers and required each one to place a handoff using I-PASS for every patient on the list. This effort showed improvement and consistency in the use of I-PASS handoffs, with up to 90% (calculated using the number of handoffs over the number of days admitted).

The purpose of this project was twofold: (a) To improve the hospital-wide inpatient handoffs using I-PASS in EPIC by promoting the use of I-PASS handoff consistently for every patient for all of the

services, and (b) to improve provider satisfaction in its use. I-PASS's improved the vulnerability to handoff-related communication failures and led to better handoff compliance and sustainability. Improved user satisfaction could also lead to an increase in the use of I-PASS handoffs.

Our institution is a recognized large cancer center. We take care of a vulnerable population diagnosed with different types of cancer. Most of our patients are immunocompromised and elderly. This project was approved by the institution as a quality improvement project (see Appendix A for a copy of the email approval message) and helped improve provider practice and patient safety. We are standardizing handoffs by using I-PASS throughout the hospital. Our institution upholds healthcare quality dimensions, including safety, efficacy, efficiency, equity, timeliness, and patient-centered care (Agency for Healthcare Research and Quality [AHRQ], n.d.).

Theoretical Framework (Conceptual Framework)

The theoretical framework I used is Lewin's Change Theory, which includes three stages: Unfreeze, Change, and Refreeze. Unfreeze was the project's first stage. It is devoted to the preparation of those who will be impacted by the change. Unfreeze involves breaking down the status quo that existed before building up a new way of operating. Unfreeze is the most difficult and stressful part but is key to this stage to ensure strong support from senior management. A compelling message of why change must occur must be communicated clearly (Mind Tools, n.d.). For this project, Unfreeze included meeting with every service to present issues with the current I-PASS handoff numbers and why their improvement is necessary. We showed recent handoff numbers, requirements from credentialing bodies, and the institution's safety goal.

The project's second stage was Change. During this stage, people eventually accept the need for change, and they begin looking for new ways to do things. The Change stage did not happen overnight, and people took their time to accept a new direction, especially once they understand how the change would benefit them. We ensured that the providers continued to do handoffs with frequent meetings with the I-PASS champions for each service and consistent observation and monitoring of I-PASS handoff numbers and compliance. We knew when there was a need for re-education and reminders.

The project's third and final stage was Refreeze. Refreeze is the time to embrace changes, institutionalize changes, and incorporate those changes into everyday practice (Mind Tools, n.d.). Refreeze is the stage that we attempted to reach for this project. The intent was to improve the use of I-PASS handoff, improve user satisfaction in its use, and make it a part of all providers' daily routine.

Section II

Literature Review

A search for project-related literature used the CINAHL, Pubmed, and Google Scholar databases. Keywords used in the search included I-PASS handoff, standardized handoff, patient safety, patient outcomes, medical error, and electronic handoff. Of the 110 articles that addressed handoff and patient safety, only 25 articles addressed standardized handoff using I-PASS (2007–2019); of those 25 articles, 10 were selected as most relevant to the project and addressed improving I-PASS handoff.

Common themes in the literature review addressed handoff-related medical errors; Joint Commission and other agencies that require handoff as a priority in patient safety; barriers and facilitation to change in handoff; and sustaining change.

Critical Appraisal of Evidence

In my literature search, because my project was to improve inpatient hospital-wide I-PASS handoff, I focused mainly on I-PASS handoff literature related to inpatient settings. Articles included that focused on provider-to-provider or service-to-service handoffs. Articles that focused on a standardized handoff, specifically, the use of I-PASS, were included. I picked articles that described improving standardized handoff in their institution. I also looked for articles that mentioned improving patient safety or decreasing preventable medical errors using the I-PASS standardized handoff. The articles picked were mostly from 2017–2018, although I do have one article from 2007.

I critically appraised each of the 10 articles I chose. Based on their evidence level, I found only one article that was Level I in the strength of evidence as a randomized clinical trial study. I had three articles that were Level II, four that were Level III, one Level IV, and one that was Level V evidence. Most of the articles were moderately high in their evidence strength (*Evidence Based Practice Toolkit for Nursing*, n.d.). Though I strived to gather a high or moderately high level of evidence, it was sometimes difficult to find such articles for my project. I had to use some literature considered weaker evidence.

I used the Critical Appraisal Skills Program (CASP) to appraise critically the articles I chose. The CASP checklist uses 10 questions to address three general issues assessed when evaluating articles (*CASP*

Checklists, n.d.). The first question asks whether the study results are valid; then, what are the results and whether the results will help locally (see. Appendix F, Evidence Table, for details.)

Themes

Common themes in the literature review addressed handoff-related medical errors; Joint Commission and other agencies that require handoff as a priority in patient safety; barriers and facilitation to change in handoff; and sustaining change.

Arora et al. (2007)

The article by Arora et al. presented issues with the current handoff at their institution and discussed ways on how to improve it. The authors recommended a formal education for I-PASS handoff using a theoretical framework and competency-based approach. Although this article's evidence level is low because it was based on a case study, the article was useful for my project. It dealt with the improvement of I-PASS and the difficulties that the institution encountered in the process. It also addressed educating trainees in learning about using I-PASS handoff, which was an important part of our interventions for improving I-PASS at our institution.

Ransom and Winters (n.d.)

Ransom and Winters' articles a systematic review protocol and should be a Level IV in the level of evidence (*Evidence Based Practice Toolkit for Nursing*, n.d.). The review's objective was to identify I-PASS handoff's effect on hospitalized patients for medication errors, transfer delays, treatment delays, and mortality. The steps for gathering data, the specific study selection, and detailed data extraction plans are mentioned and discussed. However, the results of the study were not addressed. The article helped provide a great deal of background on using the I-PASS mnemonic, why it stands out among other standardized handoff tools and was useful to my project.

Shahian et al. (n.d.)

The article by Shahian et al. is Level III evidence since it is a non-experimental study (*Evidence Based Practice Toolkit for Nursing*, n.d.). The article is about the large-scale implementation of I-PASS handoff in an academic medical center. This article is very similar to what

my project was also about. The study results are valid as the methods are clear, and the sample size is large, including over 6,000 doctors, therapists, and nurses. The results of the comprehensive I-PASS implementation were successful in its phase I. The authors focused on the importance of sustaining their initial success. The study identifies significant improvements in using I-PASS handoff after several interventions, most notably, large-scale training and support from administrative and clinical leadership. I think the steps used in this study are certainly applicable to any hospital or health institution that wish to start I-PASS handoff on a large scale.

Parent et al. (2018)

The article by Parent et al. is a Level I evidence study because it is a randomized, step-wedged controlled clinical trial (RCT) (*Evidence Based Practice Toolkit for Nursing*, n.d.). The study addressed a straightforward question regarding the effect of a standardized handoff curriculum in the intensive care unit (ICU). Although the primary aim was to assess the overall effect of I-PASS handoff on their interclinician communication, they also studied its effect on the ICU's workflow process, including the length of stay in ICU, number of days on mechanical ventilation, and reintubation in 24 hours. The sample size was right as 30 attending physicians, 63 residents, and advance practice providers, and 13 fellows who participated in the study. The results showed that I-PASS standardized handoff improved intensive care provider-preparedness and workflow. I think the study results apply locally to different hospital settings.

The Joint Commission (2017)

The article by The Joint Commission is Level IV evidence literature (*Evidence Based Practice Toolkit for Nursing*, n.d.). The article focused on the issue of inadequate handoff communication among healthcare professionals. It also provided clear guidelines for improving handoff communication and focusing on I-PASS's usefulness and effectiveness for standardization of handoff. Although this article may be considered a Level IV evidence study, it was still essential for me to include this as part of the articles to support my project. The Joint Commission is one of the accrediting bodies that requires handoff communication between healthcare providers to promote patient safety.

Fryman et al. (2017).

The article by Fryman et al. is a Level II quasi-experimental study (*Evidence Based Practice Toolkit for Nursing*, n.d.). The study is about testing the effectiveness and feasibility of standardized handoff and comparing it to the conventional handoff method in an internal medicine residency program at a university hospital. I believe that the study is valid. The sample size is sufficient. The results showed that compared to the conventional method, the I-PASS handoff method resulted in significantly lower adverse events reported. The method of handoff was then mandated at the university hospital to be changed entirely to I-PASS. The authors found that six months after implementation, the number of handoffs dropped. The push for a sustainability model was created and improved the number of compliances once again. This study's results apply to any other hospital with the same handoff changing issues and planning for sustainability.

O'Toole et al. (2018)

The article by O'Toole et al. is a Level II study (*Evidence Based Practice Toolkit for Nursing*, n.d.). An I-PASS mentored-implementation guide used in 32 sites across North America served as a reference for mentoring in the use of I-PASS handoff. The authors found that most of the respondents felt that the guide's quality was good and considered an essential resource for any institution looking to implement a large-scale I-PASS handoff program. Leaders for each site that used the implementation guide often reference it. They found it very useful, especially during the early part of implementing the program in their areas. The study is valid as it has an adequate sample size, and recommendations are based on an extensive literature review. This article was beneficial for my project as it described much background of I-PASS handoff and how to implement it. It also discussed the importance of handoff observation and sustainability that will, I think, apply to any institution that wants to implement I-PASS handoff.

Pandaya et al. (2019)

Pandaya et al.'s study was about implementing an Electronic Medical Record-Based Tool for Improved Cancer Treatment Handoffs and is a Level III study (*Evidence Based Practice Toolkit for*

Nursing, n.d.). The authors discuss how using a standardized handoff in their EMR to help optimize communication between nurses and clinics led to reduced medical errors. I think that this study is valid as it has a sufficient sample size and definitive conclusions. The study could be used for any hospital that wants to improve handoffs using their EMR. I found this article useful as the setting is also in a cancer center, and handoffs were implemented using their electronic medical record.

Starmer et al. (2017)

The article by Starmer et al. is a Level II study (*Evidence Based Practice Toolkit for Nursing*, n.d.). The author discussed disseminating, adapting, and implementing the I-PASS program for better handoff and safer care by integrating research, quality improvement, and medical education. The authors developed and tested I-PASS initially with pediatric residents but then started to implement it in different units and settings in other medical specialties. They found that I-PASS is broadly applicable to different types of transitions in care and health settings. They also showed that the use of I-PASS is associated with significant reductions in medical errors.

Rosenbluth et al. (2018)

Rosenbluth et al.'s article is about campaigning for the I-PASS handoff program to effect transformational change. This article is a Level III evidence study (*Evidence Based Practice Toolkit for Nursing*, n.d.). The authors discussed how educational interventions and change management to address barriers, plus a substantial campaign led to a transformational change using I-PASS handoff in nine different study sites from 2011 to 2013. With the successful implementation of I-PASS at these sites, the authors also noted a decrease in rates of preventable adverse events and medical errors (Rosenbluth et al., 2018). This article is beneficial for anyone who wants to implement I-PASS handoff in their institution since it provides some step-by-step guidance.

Section III

Methodological Framework (Methods for Quality Improvement)

The Plan-Do-Study-Act (PDSA) model was the methodological framework selected for this QI project. PDSA is a well-known problem-solving model that is useful in implementing a change or improving a process. There are four stages to each PDSA cycle. By building on each four-stage cycle, I attempted to answer the following questions: (a) What are we trying to accomplish? (b) How will we know that a change is an improvement? (c) What changes can we make that will lead to improvements (Institute for Healthcare Improvement [IHI], n.d.)?

Objective

This QI project's primary objective was to improve the hospital-wide inpatient I-PASS handoff rate from 40% to 65% within two months following the interventions. The interventions included education, tool modification, team meetings, and improving provider satisfaction in the use of I-PASS handoffs in EPIC.

PDSA: Plan

The Plan stage included planning the test and planning the collecting data (IHI, n.d.). The QI Project Gantt Chart (see Appendix B) shows the project's timeline.

Questions and Predictions

I-PASS is a mnemonic for the standard structure used for handoffs. This particular use of handoffs has been in existence at our institution since 2017. However, despite evidence of being an effective way to do handoffs, I-PASS has not been extensively used by all the primary teams (Starmer et al., 2017).

Are the primary teams resistant or hesitant to use handoffs via I-PASS? Why?

- The number of healthcare providers using I-PASS handoffs should increase by meeting with every Primary Team department and finding department champions to help educate and remind their service about using handoff I-PASS. In meeting with each team, we can teach them how to use I-PASS handoffs properly for all patients on their patient list. Equally important, we can

listen to what they think of using the I-PASS handoff in EPIC and listen to their suggestions and address their questions and concerns.

Who, what, where, and when?

- Our Nocturnal Team has both a medical team and a surgical team. The Primary Team originally sent reports to the Nocturnal Team by email or via SharePoint. These reports were separate from EPIC records. After installing EPIC, the introduction of I-PASS handoffs for both the Medical and Surgical inpatient teams followed. The use of I-PASS handoffs on the surgical side began with one service, Gynecology Oncology. After the process was successful in that service, the introduction of I-PASS handoff to other surgical services occurred, including Head and Neck Surgery, Neurosurgery, Surgical Oncology, Thoracic Surgery, and Urology. On the medical side, the process began with liquid services, particularly Stem Cell Transplant. Other services on the liquid side followed, including Leukemia and Lymphoma. I-PASS handoff was subsequently taught to the solid services, first with Sarcoma, GU Oncology, and GIM. The last group of services introduced to I-PASS handoff this year was Melanoma, Breast Medical Oncology, and ICT. Unfortunately, even after introducing I-PASS handoff to all the primary teams, these groups continued to provide very few and inconsistent handoffs. An exception was the GIM Service that decided to start making every provider place a handoff for each patient for their own QI project. The GIM Service also chose to identify the "Action List" part and include a note telling either the Nocturnal Team or the Primary Team what to do.
- The goal for this QI project was to improve handoffs using I-PASS throughout the inpatient hospital. The intent was to educate all the primary teams' providers to put a handoff for each patient on their patient list. Education on using I-PASS handoff properly and for every patient was to occur for new providers during their orientation. The orientation was to include all residents and APPs. This education was also to be available and required for all providers through the institution's education center.
- Another goal was to maintain or improve user satisfaction by using I-PASS for handoffs.

Plan for Collecting Data

- There was a count of I-PASS handoffs every week during the two months after the project “went live,” which was after the interventions had taken place. Interventions included the following: (a) reinforcing teaching on the proper use of I-PASS handoffs, (b) streamlining I-PASS in EPIC, and (c) meeting with every service and the I-PASS champions. The IT Department created a dashboard. The dashboard helped in gathering real-time data about the number of I-PASS uses per service. The information needed for this project came from the EPIC dashboard. There was a comparison of the number of I-PASS handoffs before and after the interventions. A survey assessed users' satisfaction with using the I-PASS handoffs.

PDSA: Do

During the Do stage, the procedure was to try out the plan on a small scale. Then, I described what happened, collected data, and recorded my observations (New York State, n.d.).

Following the I-PASS handoff introduction to the Primary Team, I-PASS handoffs were few and inconsistent. GIM, executing their own QI project, required all their healthcare providers (including MDs, fellows, residents, and APPs) to place a handoff on every patient admitted in the service. Their data shows a 90% handoff rate from their service. On the other hand, a survey for the institution regarding the number of I-PASS handoffs showed an average of 40% compliance. Part of the teaching for this QI project emphasized that an I-PASS handoff must occur for every patient on the list; then, as necessary, updates should occur. The date to “go live” was scheduled. All of the services were encouraged to place handoffs for all of the patients on the list. A survey was also sent to providers by email to determine provider satisfaction with I-PASS handoffs.

The data collected determined the number of I-PASS handoffs for the institution after the following interventions: (a) teaching each service to place a handoff for each patient, (b) streamlining of I-PASS handoffs in EPIC, and (c) meeting with each Primary Team and I-PASS handoff champions. The utility of I-PASS handoffs was evaluated before and after the intervention. There was also a survey for clinicians to compare their satisfaction using I-PASS handoffs in EPIC.

PDSA: Study

The Study stage included completing data analysis and comparing it with the predictions (IHI, n.d.). Data were analyzed, both from the number of I-PASS handoffs for the institution and the survey results from the healthcare providers who used I-PASS. There will be data analysis for both the pre- and post-interventions of teaching, streamlining I-PASS handoffs in EPIC, and multiple meetings with the primary care teams and champions.

Based on the data interpretation, we determined if changes or improvements occurred. The goal was to increase the use of I-PASS handoffs for inpatient services to at least 25% from the baseline two months after initiating “go live.” The IT Department created an I-PASS handoff dashboard. The dashboard provided real-time numbers of I-PASS handoffs in the institution via EPIC. The weekly results of I-PASS handoffs for the institution from the outcomes data were interpreted and analyzed. Then, they were illustrated using a control chart. Final results and analysis of the data, including any unexpected findings, were presented to the stakeholders.

PDSA: Act

During the Act stage, I determined what modifications, if any, should occur and whether to adapt, adopt, or abandon (New York State, n.d.).

Based on the study-phase information, positive changes were noted. There was an improvement in provider participation and satisfaction using I-PASS handoffs. We began the process to maintain the change. The change process included closely monitoring each department’s handoffs. Champions assigned to each service continued to observe how providers entered handoff details and monitored the handoff numbers and compliance. Inpatient medical directors, made up of physicians and APPs for each service, also worked with the I-PASS champions in each department to help sustain positive changes. Monthly meetings and presentations identified I-PASS handoff rates for each of the Services.

I-PASS handoff teaching was part of the orientation requirement for each new employee who is a provider, including MDs, residents, fellows, and APPs. Completion of I-PASS handoff online education will be mandatory for all providers. EPIC's I-PASS dashboard will provide information about all

providers' I-PASS handoff rates. Compliance with I-PASS handoffs could become a factor in yearly employee evaluation.

Business Case

There are estimates that every year, miscommunication between clinicians contributes to one-third of serious medical inpatient errors and results in the preventable deaths of 250,000 patients annually in the United States (Parent et al., 2018). The Joint Commission identified handoff communication as one of the national quality improvement and patient safety efforts' key targets (The Joint Commission, 2017).

In 2018, our institution conducted a patient culture survey. A comparison of the survey's results to AHRQ's benchmark occurred. The AHRQ established the Hospital Survey on Patient Safety Culture comparative database. This database allowed hospitals to compare their survey results on patient safety culture with other hospitals (AHRQ, March 2016). The survey showed that the institution was less than 20% below the AHRQ benchmark for hospital handoffs and transitions. A survey conducted by the GIM Service in 2019 also showed the utility of I-PASS by providers of different services in our institution to be 40% (calculated using the number of handoffs over the number of days admitted). The goal of this project was to increase the utility of I-PASS handoff to 65%, two months post-implementation.

The AHRQ has made improving handoffs a nationwide effort in improving patient safety and is considered a priority by Fryman et al. (2017). The JCAHO and The ACGME identify effective communication between caregivers as part of their accreditation requirements. ACGME also recognizes the role of handoff failures in medical errors. Programs in the United States are now required to teach resident physicians' handoff skills and monitor the handoff's quality. Our institution identified handoffs as an essential factor to consider in preventing risk to patients and process failure, in line with these agencies' priorities.

Handoff is the real-time process of passing patient-specific information from one caregiver to another or from one team of caregivers to another team. Handoff is a transfer and acceptance of responsibility for patient care obtained through effective communication. Effective handoff ensures continuity of patient care and patients' safety (The Joint Commission, 2017). There are several tools used

for handoff. I-PASS is one of the tools used for the standardization of handoff. I-PASS is the mnemonic for Illness severity, Patient summary, Action list, Situation awareness and contingency planning, and Synthesis by the receiver (The Joint Commission, 2017).

Project Question

At a large cancer institution, what are the effects of education, tool modification, and team meetings on improving hospital-wide inpatient I-PASS handoffs and user satisfaction?

Goal

- To increase the use of I-PASS handoffs from a baseline of 40% to 65% two months after implementation and to improve provider satisfaction in using I-PASS handoff

Possible Costs

- Education aids such as Pocket cards and manuals: \$35,000.00
- Campaign materials such as printing posters and strategic communication fees: \$15,000.00
- Possible total costs \$50,000.00 (Franco Vega et al., 2019)

Primary Outcomes Expected

- Improvement of I-PASS handoff rates from 40% to 65%, two months post-implementation
- Improvement of provider perceptions in the quality of handoffs, efficiency of I-PASS handoffs in helping avoid adverse events and medical errors resulting from mistakes in handoffs

Management and Organization

- Sponsors are the administrative champions for the project. Sponsors provide high-level support and assist the I-PASS task force in making handoffs an institutional priority. They obtain funds if needed and help address obstacles faced by the task force. They include executive and operational priority sponsors (Franco Vega et al., 2019).
- The Core I-PASS task force included users and non-users of I-PASS from different services. Division of the tasks resulted in team assignments that included the: Education Team, Data Reporting Team, I-PASS Campaign Team, and I-PASS Written Handoff Team (Franco Vega et al., 2019).

Evaluation Plan

The outcomes to be measured for this project were (a) the number of I-PASS handoffs for the whole institution and (b) the satisfaction of the providers who use I-PASS handoffs. Calculation of the I-PASS handoff rate per service will use the following relationships: The numerator was (the number of I-PASS handoffs per service). The denominator was (the number of patient days admitted). Measurement details are in Appendix C. The rate of I-PASS handoffs was available from the I-PASS dashboard in EPIC. The institution's IT department created the dashboard, and data were collected weekly for two months. Then, two months after going live with the QI project, the providers were asked to complete a survey based on collected I-PASS handoff data. There was a comparison of the rates pre-intervention and survey results post-intervention. The interventions were: (a) educating all of the primary services, (b) streamlining I-PASS handoffs, and (c) meeting with different services and requesting them to put a handoff for each of the patients on their patient list. A control chart identified the handoff rates to help illustrate the changes that occurred after the interventions. Data were analyzed and interpreted to help guide the next steps. The focus was on sustaining the practice. The goal was for data analysis to show evidence of at least a 25% improvement rate for handoffs. That level of improvement would indicate a 65% I-PASS handoff rate and improved provider satisfaction in the use of I-PASS handoffs.

Part of the plan to sustain the change was for each champion to continue close monitoring of each department's I-PASS handoffs. Inpatient medical directors made up of physicians and APPs for each service, along with the champions assigned to each service, continued to observe how providers put in I-PASS handoffs. They also monitored I-PASS handoff numbers and compliance. Both worked together with the I-PASS handoff task force in sustaining positive changes. There were monthly meetings and a presentation of I-PASS handoff rates for each service.

I-PASS handoff teaching was also part of each new employee's orientation requirement to ensure change sustainability. In the future, there will be mandatory education for all providers, including MDs, residents, fellows, and APPs. Through the I-PASS dashboard on EPIC, one can extract data on any provider's I-PASS handoff rates; and an element of the yearly employee evaluation could include compliance with I-PASS handoffs.

Section IV

Data Analysis and Results

In reviewing the findings and results of this QI project, a review of the project question and goals are helpful. The project question was: At a large cancer institution, what are the effects of education, tool modification, and team meetings on improving hospital-wide inpatient I-PASS handoffs and user satisfaction? This QI project aimed to increase I-PASS handoffs from a baseline of 40% to 65% two months after implementation and improve provider satisfaction using I-PASS handoffs.

Findings and Results

One of the outcomes measured for this project was provider satisfaction for I-PASS handoffs in the institution. During the first week of August, there was an email pre-survey of user satisfaction. The I-PASS task force leadership team decided that the top two highest institutional users of I-PASS would receive the surveys, i.e., the Nocturnal Department and the GIM Hospitalist service. The I-PASS task force leadership group created the survey questions with the I-PASS champions' consensus, the larger institutional task force group.

A previous GIM department survey was the foundation for the questions. The survey also reflected what the I-PASS taskforce group providers considered influential in their satisfaction in using I-PASS handoffs in EPIC. There were six questions created for the survey to evaluate the providers' satisfaction with using I-PASS for handoffs, and they were:

1. Do you think the use of I-PASS had improved the quality of the content in handoff?
2. Do you think that the use of I-PASS has improved the time spent on handoff every day?
3. Do you think the use of I-PASS has improved communication with the Nocturnal Team/primary team?
4. Do you think the use of I-PASS has improved the seamless transition of care to the Nocturnal or primary team service?
5. Do you think the use of I-PASS has improved timeliness in providing care at the beginning of your shift?
6. How easy is it to navigate the I-PASS tool in EPIC?

Excel entries recorded the number of respondents and their survey responses. Each of the results included a calculated percentage. Excel generated bar graphs showed comparisons of the pre- and post-surveys for each team. In this case, bar graphs are useful to provide a visual representation of the responses from pre- and post-survey results. Bar graphs also make it easier to interpret whether there was an improvement in handoff satisfaction post interventions (*Bar Graph, n.d.*). Data from the General Internal Medicine Hospitalist (GIM) survey showed 27 respondents for the pre-survey and 23 for the post-survey.

For the first question, the results were the same for pre-and post-survey. For the pre-survey, 19 out of 27 (70%) of the respondents agreed that I-PASS had improved the handoff quality. In the post-survey, 16 out of 23 (70%) of the respondents agreed to the same question.

For the second question, 17 out of 27 (63%) on the pre-survey agreed that I-PASS had improved the time spent daily on handoffs. Compared to the pre-survey responses, the second survey showed a higher number, where 70% of the respondents agreed that I-PASS improved the time spent on handoffs every day.

The third question showed that 24 out of 27 respondents (89%) agreed that I-PASS had improved communication with the Nocturnal/primary service for the pre-survey. This number went down a little for the post-survey, i.e., 20 out of 23 (87%) respondents agreeing.

The fourth question showed the same results for the pre- and post-surveys, where both had 70% agreeing that I-PASS has helped make the transition of care to the Nocturnal/primary team service seamless. The fifth question showed an increase from the pre- to post-survey by 74% to 83%. These respondents agreed that I-PASS helped improve timeliness in providing care at the beginning of their shifts.

The last question was about the difficulty or ease of using I-PASS in EPIC. Most respondents answered that it is very easy, with 21 out of 27 (78%) in the pre-survey. And in the post-survey, the numbers improved, with 19 out of 23 (83%) respondents finding I-PASS in EPIC very easy to navigate.

In looking at GIM numbers, 63% to 89% of the pre-survey answers agreed that the I-PASS handoffs improved communication between Nocturnal and the primary team. It has also helped them improve their handoffs' content quality and reduce their time on handoffs every day. The responses also show that most of the respondents found I-PASS in EPIC very easy to navigate. Using it helped them improve timeliness in providing care at the beginning of the shift and seamlessly transitioned the care between teams.

Figures 1 through 6 are bar graphs illustrating the pre- and post-survey results from the GIM Service. Each figure shows the percentage of pre- and post-survey responders who agreed, disagreed, or were neutral to each of six questions. For a detailed comparison, see Appendix D.

Figure 1

Did the Use of I-PASS Help Improve the Content in Handoff (GIM)?

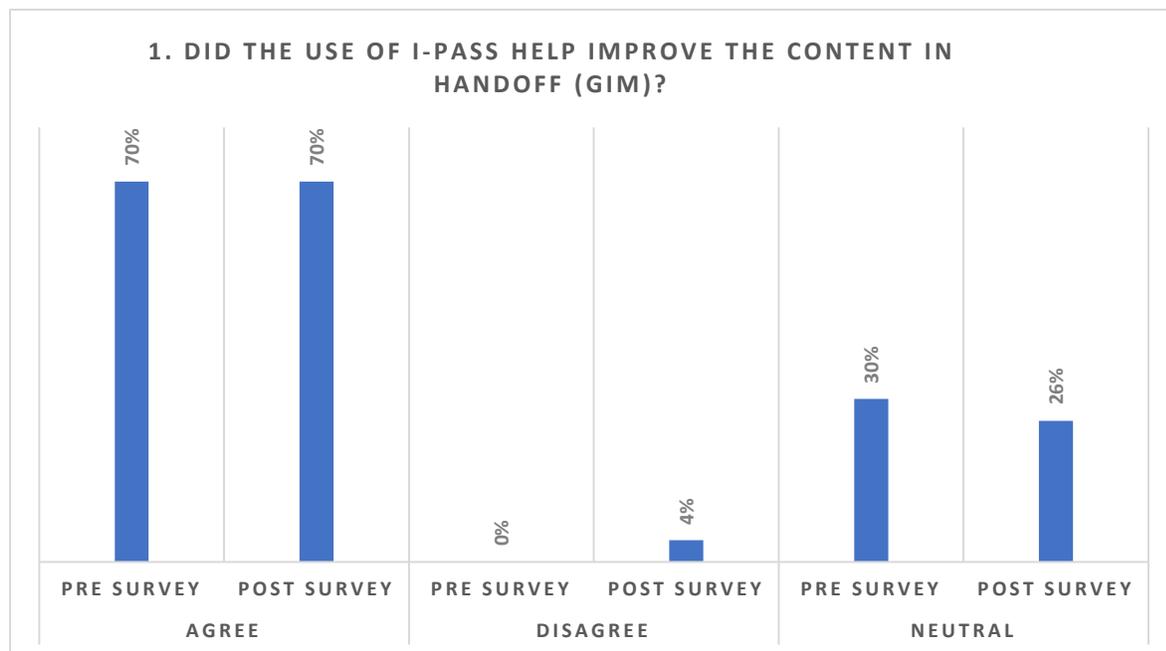


Figure 2

Did the Use of I-PASS Handoff Improve Time Spent on Handoff Every Day?

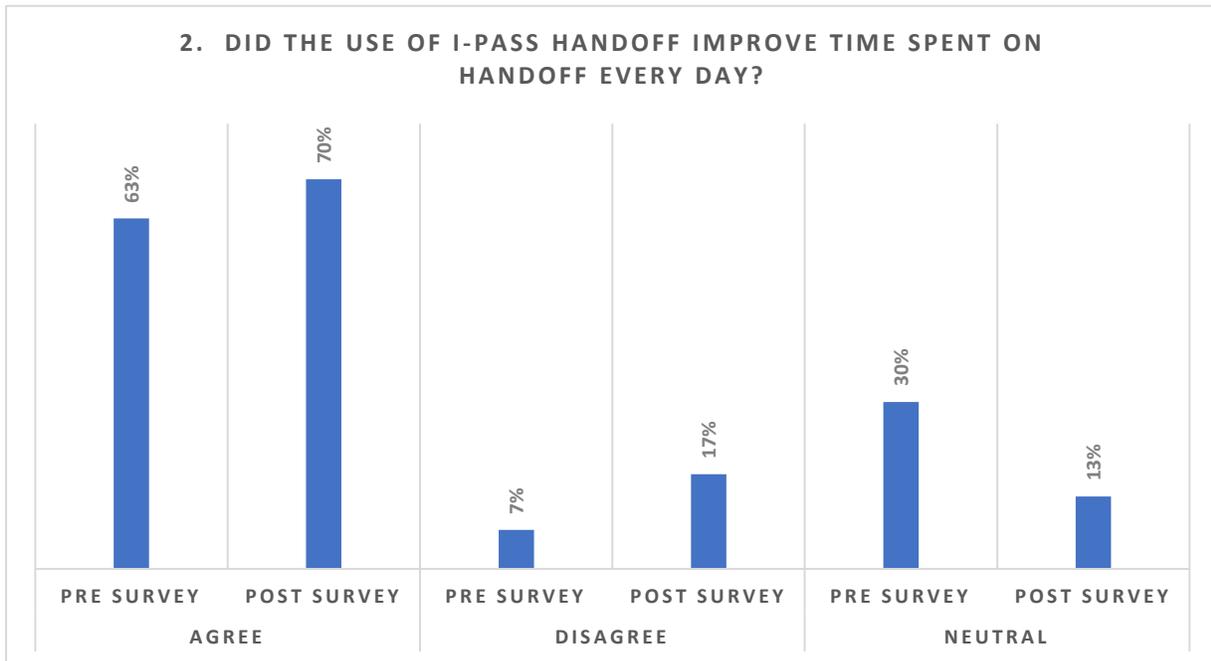


Figure 3

Did the Use of I-PASS Handoff Improve Communication with Nocturnal/Primary Team (GIM)?

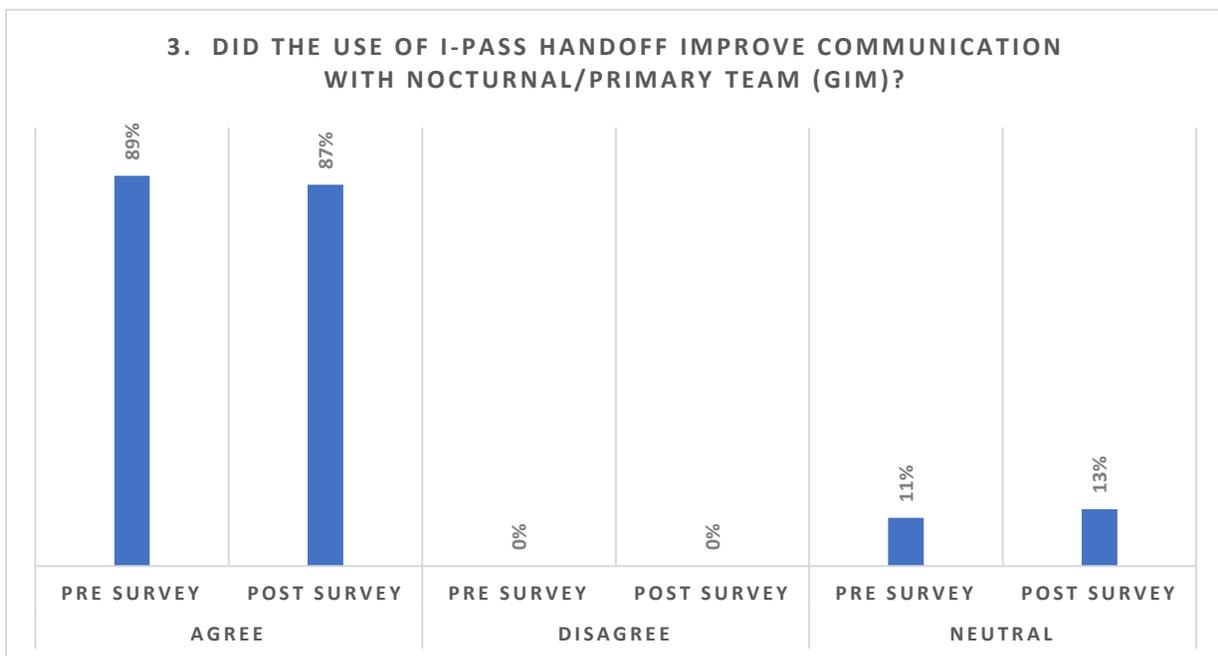


Figure 4

Did the Use of I-PASS Handoff Create a Seamless Transition of Care to the Nocturnal Covering Service/Primary Service (GIM)?

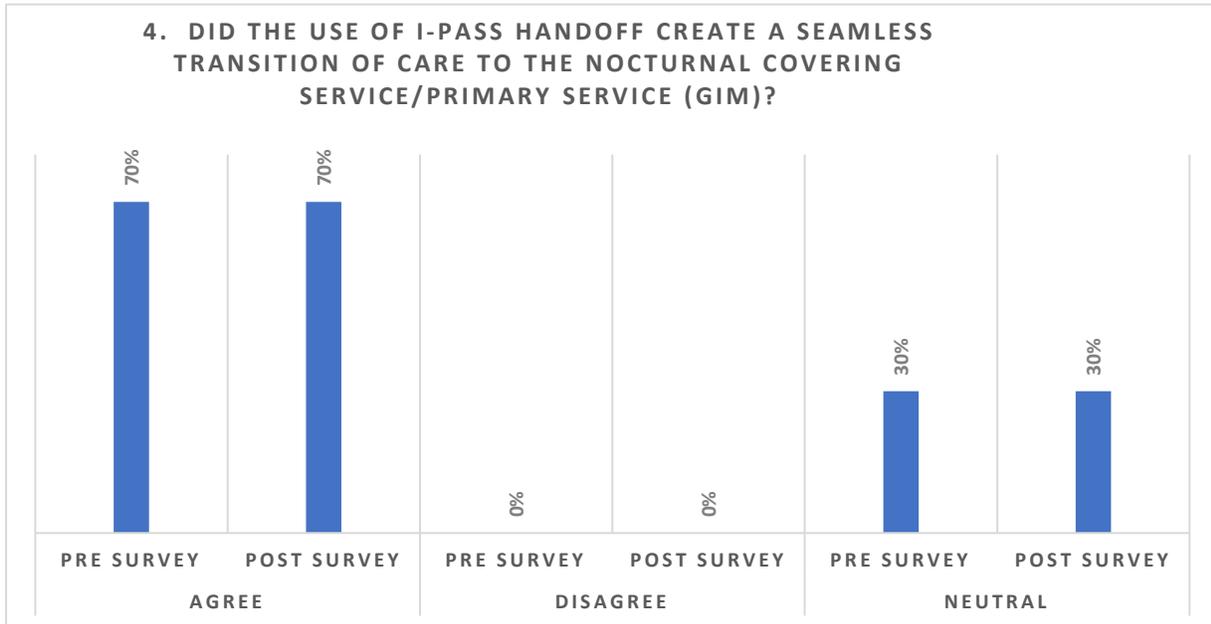


Figure 5

Did the Use of I-PASS Handoff Help in Providing Timely Patient Care at the Beginning of Your Shift (GIM)?

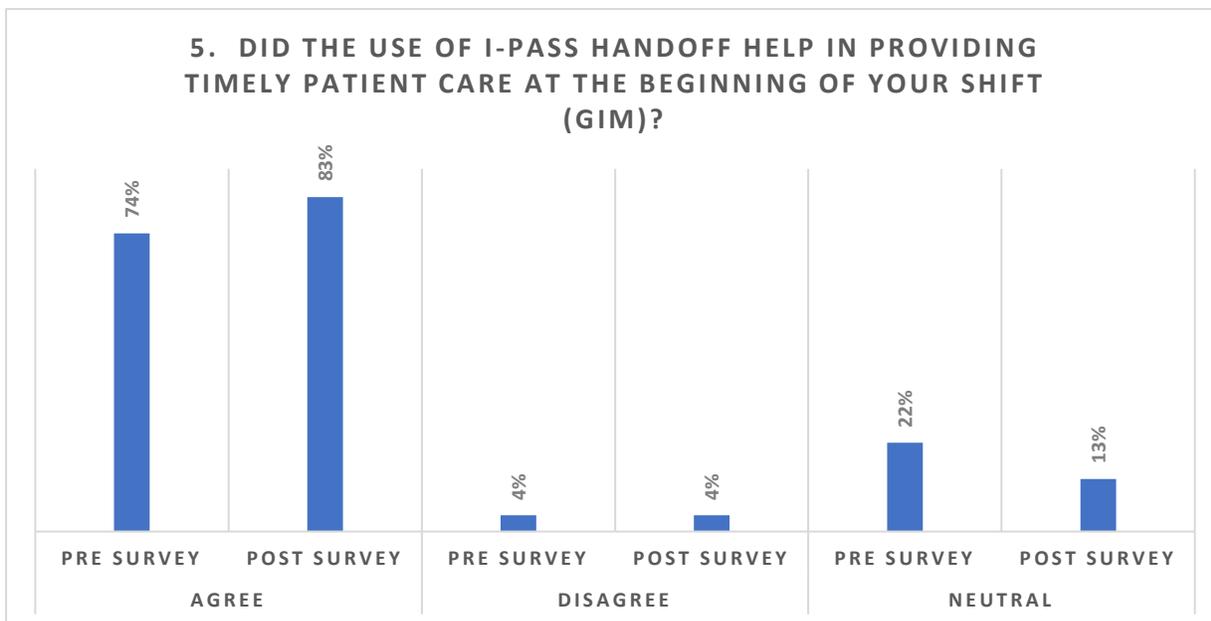
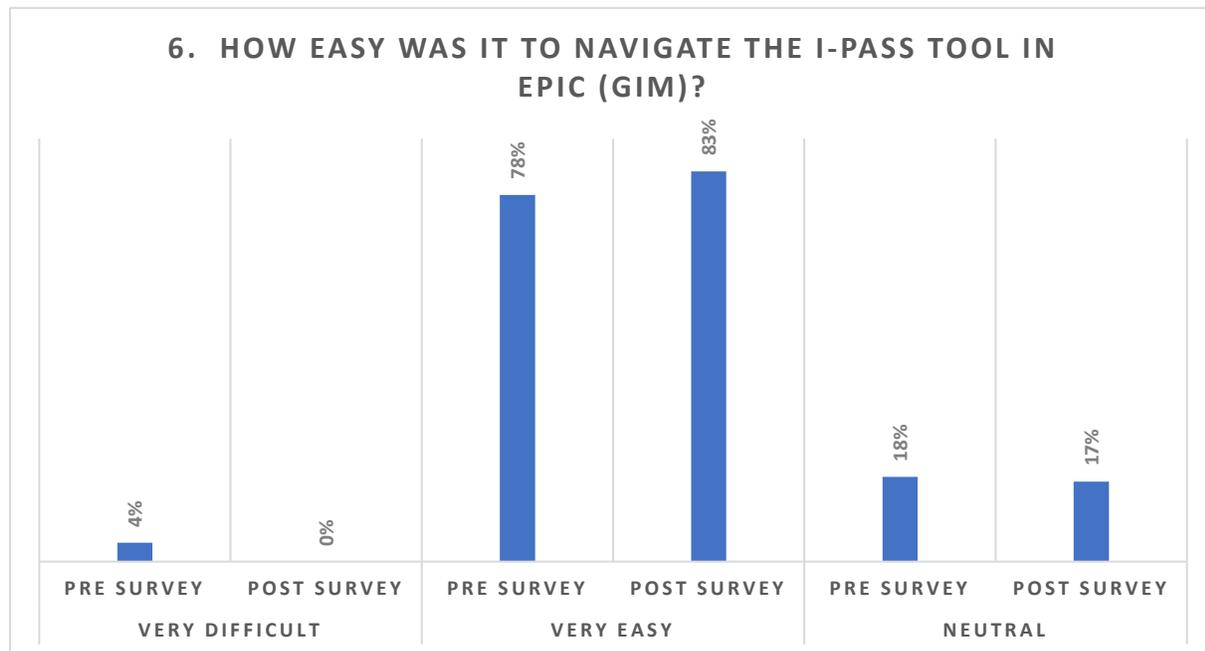


Figure 6

How Easy Was it to Navigate the I-PASS Tool in EPIC (GIM)?



Nocturnal pre- and post-implementation survey provider satisfaction data were examined. The first question showed that most respondents for the pre-survey, 8 out of 15 (53%), agreed that I-PASS had improved handoff content quality. The post-survey even showed some improvement, with 13 out of 20 (65%) of the respondents agreeing that I-PASS improved the handoff content's quality.

For the second question, most pre- and post-survey respondents agreed that I-PASS reduced the time spent on handoffs every day. The pre-survey showed 7 out of 15 (46%) agreed with this statement. There was also an improvement for the post-survey showing the numbers to be 14 out of 20 (70%). There was a 24% increase between the pre- and post-survey, showing a higher satisfaction in using I-PASS to reduce the time spent on handoffs every day.

The third question showed a high number of respondents picked "agree." Twelve out of 15 (80%) pre-survey and 15 out of 20 (75%) agreed I-PASS improved communication between the Nocturnal and primary teams. This number is still high, even with a drop of 5% from the pre- to the post-survey.

Figures 7 through 12 are bar graphs illustrating the pre- and post-survey results from the Nocturnal Service. Each figure shows the percentage of pre- and post-survey responders who agreed, disagreed, or were neutral to each of six questions. For a detailed comparison, see Appendix D.

Figure 7

Did the Use of I-PASS Help Improve the Content in Handoff (NOCTURNAL)?

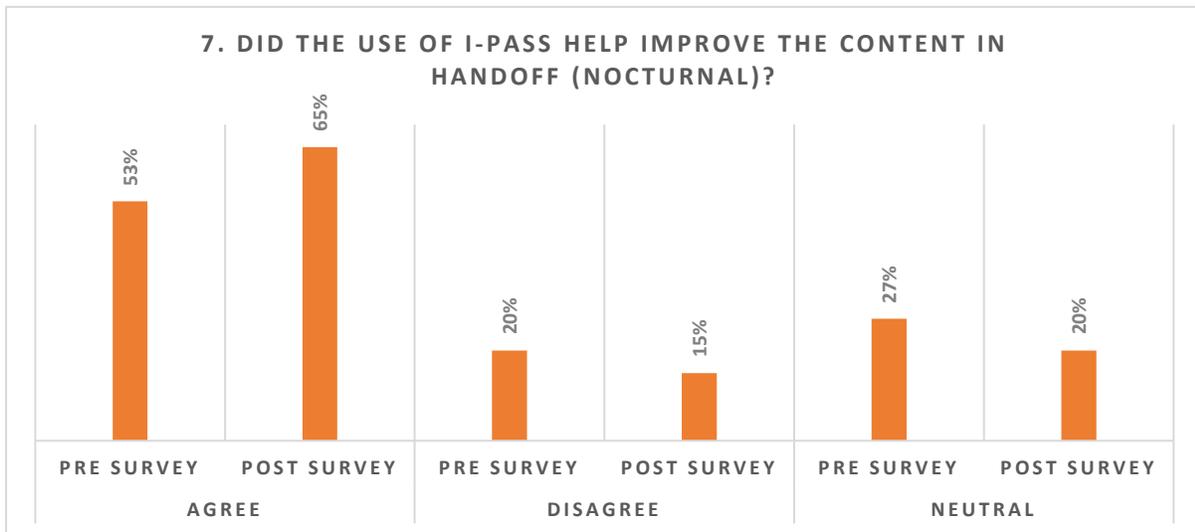


Figure 8

Did the Use of I-PASS Handoff Improve Time Spent on Handoff Every Day (NOCTURNAL)?

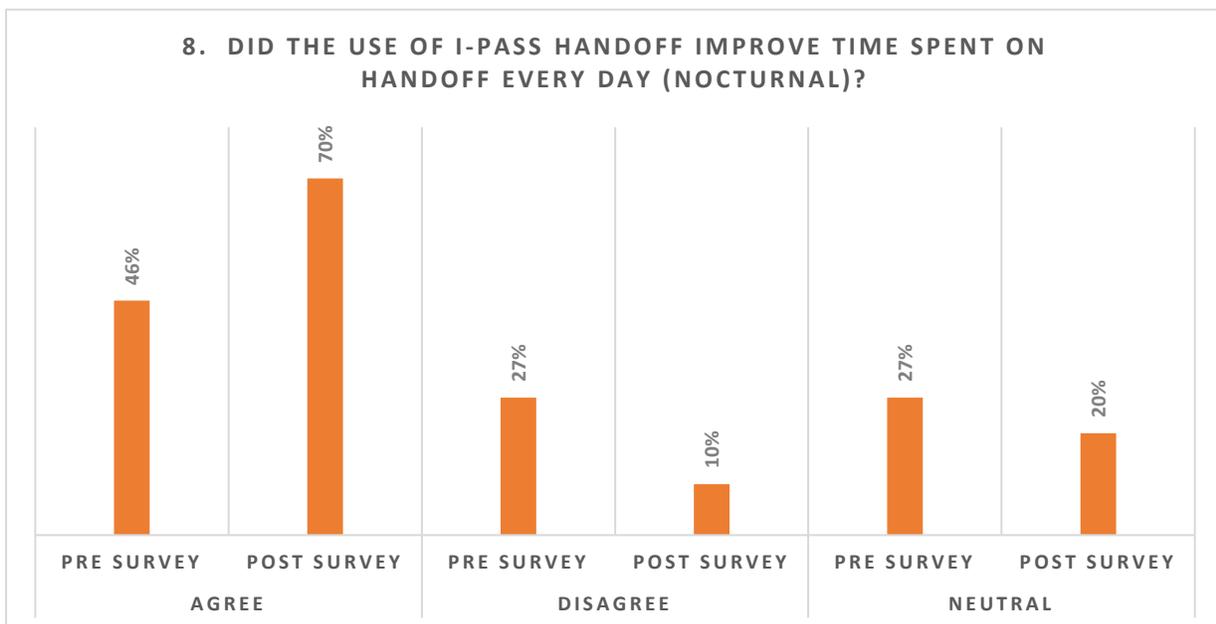


Figure 9

Did the Use of I-PASS Handoff Improve Communication with Nocturnal/Primary Team (NOCTURNAL)?

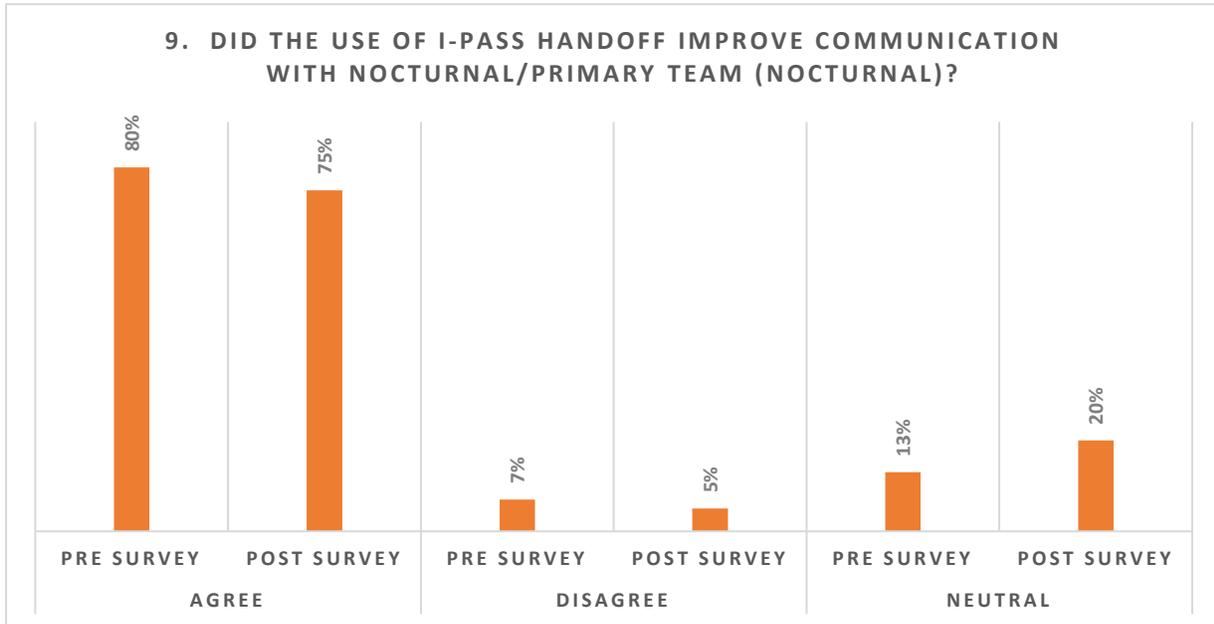


Figure 10

Did the Use of I-PASS Handoff Create a Seamless Transition of Care to the Nocturnal Covering Service/Primary Service (NOCTURNAL)?

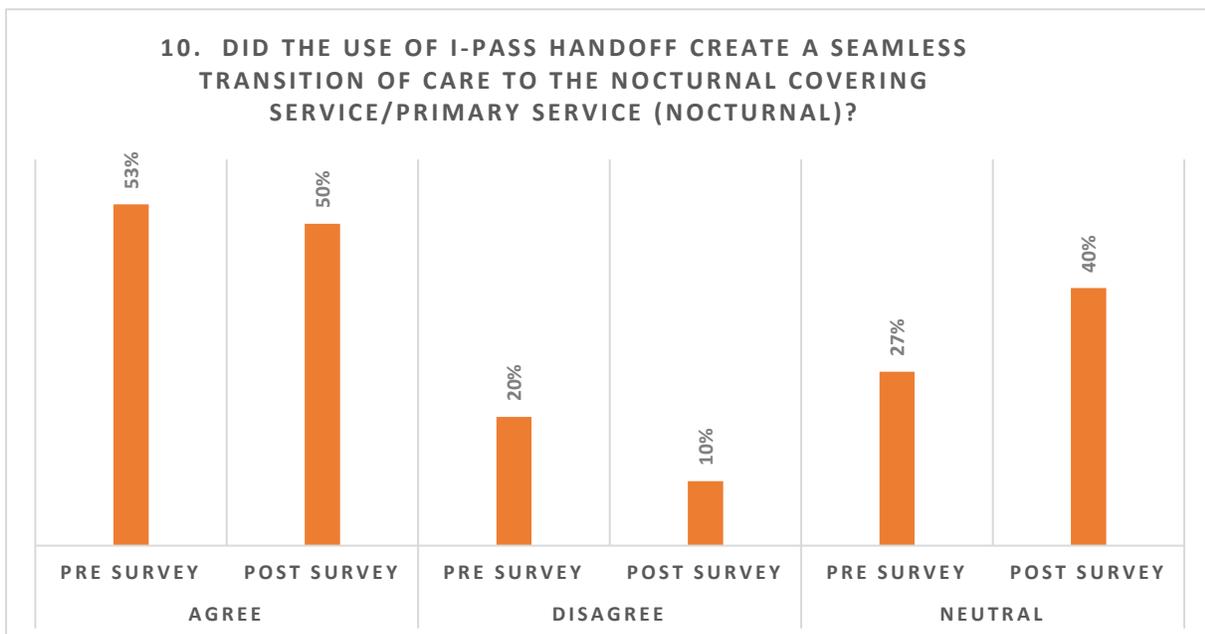


Figure 11

Did the Use of I-PASS Handoff Help in Providing Timely Patient Care at the Beginning of Your Shift (NOCTURNAL)?

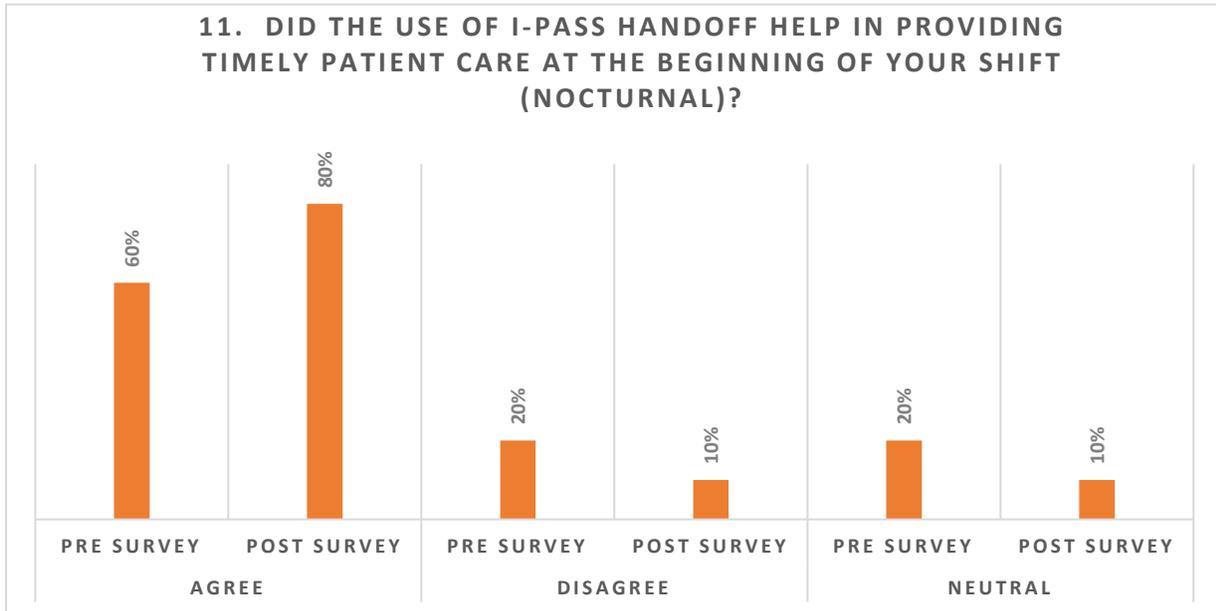
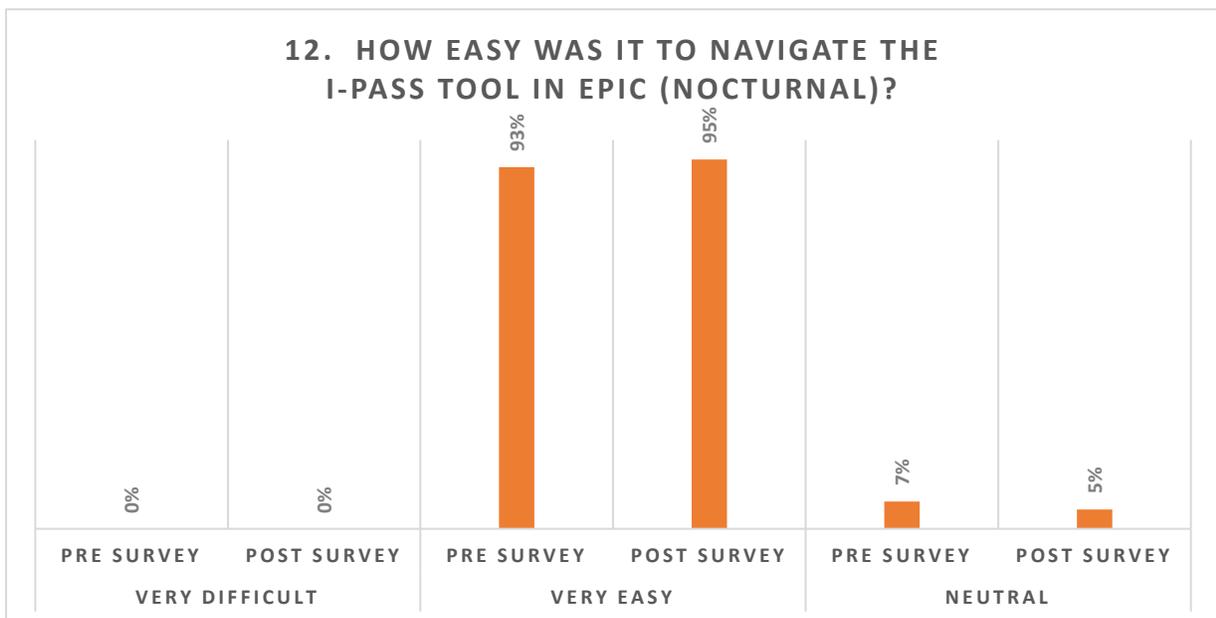


Figure 12

How easy was it to Navigate the I-PASS Tool in EPIC (NOCTURNAL)?



The fourth question showed that most of the respondents agreed that I-PASS helped make care transition to the primary service/Nocturnal seamless. The pre-survey showed that 8 out of 15 (53%) agreed with the question. The post-survey showed a small drop when 10 out of 20 (50%) agreed.

The fifth question showed that many of the respondents agreed that I-PASS had helped improve timeliness in providing care at the beginning of the shift. There was an improvement between the pre- and post-surveys. The pre-survey showed that 9 out of 15 (60%) respondents agreed. The post-survey showed that 16 out of 20 (80%) respondents agreed.

The final question showed most providers found it easy to navigate I-PASS in EPIC, with 14 out of 15 (93%) for the pre-survey and 19 out of 20 (95%) post-survey.

Overall, the pre-and post-survey for Nocturnal shows that most providers feel that the I-PASS has improved the quality of the content in handoffs with a rise from pre-survey to post-survey from 53% to 65%. They also agreed that I-PASS reduced the time spent on handoffs every day with an improvement in numbers from 46% pre-survey to 70% post-survey. The results also showed that Nocturnal Department providers agreed that I-PASS helped improve the timeliness for providing care at the beginning of the shift. The numbers showed an improvement from pre- and post-survey that increased from 60% to 80%. Although the results for questions 3 and 4 showed numbers dipped from the pre- to post-survey, the numbers were still very high. Overall, the results showed increased satisfaction in the use of I-PASS handoffs.

Results of Institutional I-PASS Handoff Utility Rate

Another outcome we measured for this project was the rate of institutional handoffs. Based on the GIM Hospitalist service study in 2019, the whole institution's baseline handoff utility rate showed a 40% utility rate for handoff days. This rate calculation used the number of handoffs divided by the number of patient days. Our goal for this QI project was to increase the handoff rate post-intervention from 40% to 65%.

The institutional I-PASS handoff dashboard provided numbers for weekly handoff days and patient days. Week one was June 7, 2020, through June 13, 2020, Monday through Sunday. We collected

consecutive weekday numbers for both handoff days and patient days from October 18, 2020, through October 24, 2020. Each week's calculation of percentage for handoff days used the number of handoff days as the numerator and the number of patient days as the denominator.

I used Statistical Process Control (SPC) to determine the process variation over time. To help define the expected variation in the process, I used a control chart instead of a run chart. A control chart determines the two significant sources of variation. The first is common-cause variation. This type of variation is inherent in the process. It is necessary to change the process to reduce common-cause variation. The second type is special-cause variation. This type of variation is associated with things that do not typically occur in the process. A process is only considered in statistical control when there are no special-cause variations (McNeese, n.d.). Control charts are also useful in determining strategy and scope of improvement and could also help determine the next PDSA focus (Provost, n.d.)

The control chart I selected was the p-chart because we are dealing with attribute data and proportion. The p-chart assumptions include binary events, which means that an event can only have two states. In our situation, each patient day could have a handoff or no handoff from the primary team. Another p-chart assumption is that there must be a constant underlying probability of the event occurring. The third p-chart assumption is that events are independent [of each other] (Mohammed et al., 2008). To plot a p-chart for our data, we used the percentage of handoff days on the y-axis and the time (weekly) on the x-axis. The central line calculation used the number of handoff days divided by the number of patient days (.464). The upper and lower limits were then plotted after calculations using the limits formula (see Appendix E). Because I have a variable sample size, my lower control limit (LCL) and my upper control limit (UCL) also vary. However, the differences are very small (Mohammed et al.) [see Appendix E, P-chart Data].

After creating our p-chart, the next step was to identify likely special-cause variations. For our control chart, we first looked for any single data point outside of the control limits. Data points 3, 4, and 12 were plotted beyond the LCL, and data points 15 and 18 were plotted beyond the UCL. Any points falling above the UCL or falling below the LCL are an indication that a special cause is present in the process. Action should then occur to find and remove the special cause from the process (McNeese, n.d.). Another common rule is to

identify special-cause variation would be checking for the number of runs. If there are eight consecutive points above or below the central line, this would be considered a run and a likely special-cause variation. Our p-chart does not have a run in its pattern. However, we have already established a special-cause variation in our process by applying the first rule.

After determining the number of observed variations, the team investigated the underlying process and the reasons for special-cause variations. These variations might still be the result of the QI interventions, especially if variations occurred close to the initial QI intervention and could apply to our quality improvement project (Brady et al., 2017).

Table 2 shows the number of patients admitted for each week of data collection. The table also shows the number of handoff days and the number of patient days for that week. We calculated the percentage of handoff days using the formula (number (#) of handoff days divided by the number (#) of patient days).

Table 2

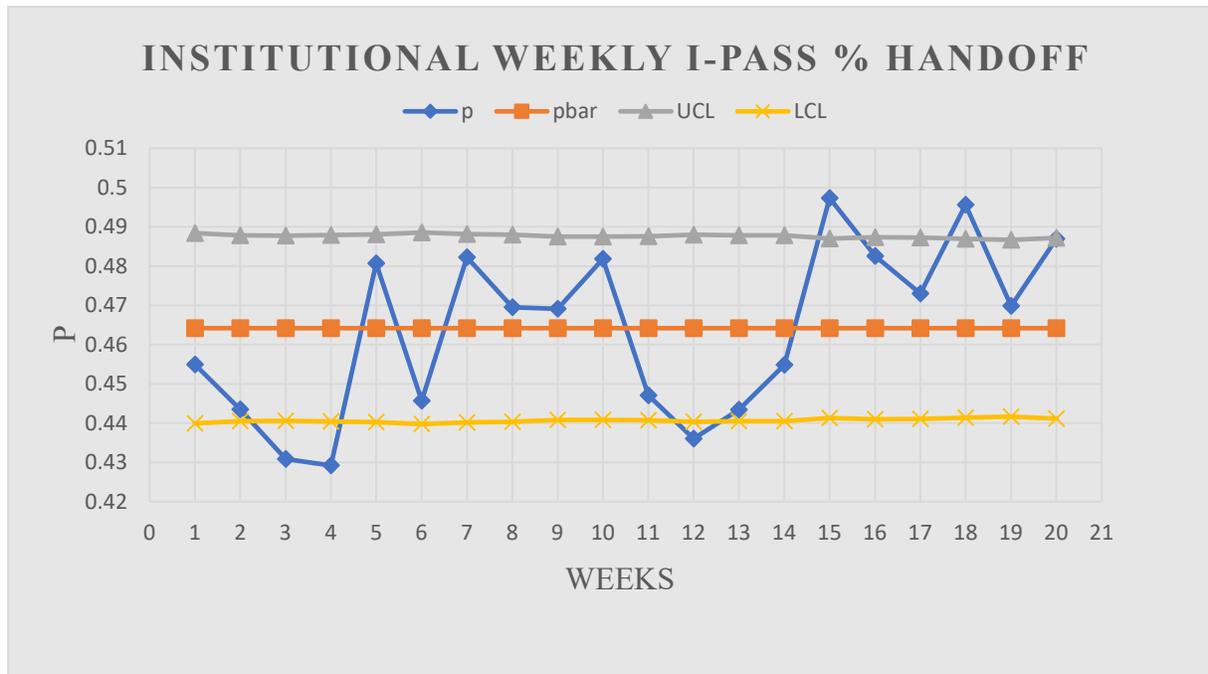
Relationships Between the Number of Patients, Handoff Days, Patient Days, and Handoff Days

Week	Dates per week	# of patients	# of Handoff days	# of patient days	% handoff days
1	June 7 to June 13	888	1735	3814	45%
2	June 14 to June 20	935	1775	4002	44%
3	June 21 to June 27	944	1741	4041	43%
4	June 28 to July 4	898	1704	3970	43%
5	July 5 to July 11	883	1893	3938	48%
6	July 12 to July 18	890	1681	3772	45%
7	July 19 to July 25	887	1875	3,888	48%
8	July 26 to Aug 1	930	1855	3951	47%
9	Aug 2 to Aug 8	945	1934	4123	47%
10	Aug 9 to Aug 15	946	1986	4122	48%
11	Aug 16 to Aug 22	945	1824	4080	45%
12	Aug 23 to Aug 29	908	1719	3942	44%
13	Aug 30 to Sept 5	932	1780	4014	44%
14	Sept 6 to Sept 12	935	1824	4010	45%
15	Sept 13 to Sept 19	1003	2133	4289	50%
16	Sept 20 to Sept 26	973	2022	4190	48%
17	Sept 27 to Oct 3	984	1990	4207	47%
18	Oct 4 to Oct 10	1000	2149	4336	50%
19	Oct 11 to Oct 17	1004	2081	4429	47%
20	Oct 18 to Oct 24	1019	2065	4241	49%

Figure 13 presents the project p-chart. The data used are shown in Appendix E.

Figure 13

P-chart for Weekly I-PASS Handoff



I-PASS Handoff Comparison per Service

We examined the I-PASS percentage of handoffs of medical and surgical teams that give Nocturnal Service handoffs. These numbers were obtained before and after most of the interventions for improving I-PASS handoff took place. The pre-intervention numbers were obtained from May 6, 2020, through June 6, 2020, and post-intervention obtained from September 23, 2020, through October 23, 2020.

The percentage of days for handoffs for both pre- and post-intervention was obtained using handoff days as the numerator divided by the patient days as the denominator. The resulting percentage of days with handoffs was compared with pre- and post-interventions for each service. The results were logged into Excel, and the results were presented with a bar graph. The bar graphs with their percentages were created to compare these numbers by medical and surgical services. It also provided visual representation to make the data clearer. Under Surgical service, seven out of the 11 services had an

improvement in their numbers. Three out of 11 services decreased their I-PASS handoff percentages while one out of 11 services remained the same. For the Medical services, 6 out of 11 services improved their I-PASS percentage handoff rates while 3 out of 11 services had their I-PASS percentage handoff numbers drop. Two out of 11 medical services had no change in their I-PASS percentage handoff numbers.

The Surgical services had a better response to the implemented interventions in improving institutional I-PASS handoffs based on these numbers. These results are worth discussing and investigating with the I-PASS leadership team to determine what interventions helped improve these numbers and what more could be done to improve the medical side and the overall numbers for the institution.

Table 3 shows the number of I-PASS handoffs, both pre- and post-intervention, for the Surgical Team. Figure 14 is a graphical representation of the data from Table 3.

Table 3

Surgical I-PASS Handoff Rate Pre- and Post-Intervention

Surgical I-PASS handoff rate pre- and post-intervention

Pre-Interventions 5/6/2020 to 6/6/2020 and Post-Interventions 9/23/2020 to 10/23/2020

Patient service	Handoff days pre	Handoff days post	Patient days pre	Patient days post	% Days with handoff pre	% Days with handoff post
Breast Surgical	15	11	19	22	79%	50%
Colorectal Surgical Oncology	293	275	406	349	72%	79%
GI Surgical	205	176	276	229	74%	77%
Gyn Oncology	353	508	458	561	77%	91%
Head and Neck surgery	209	232	318	409	66%	57%
Melanoma Surgical	2	27	2	37	100%	73%
Neurosurgery	216	331	602	653	36%	51%
Orthopedics	51	109	149	238	34%	46%
Surgical Oncology	207	285	256	351	81%	81%
Thoracic Surgery	288	336	360	363	80%	93%
Urology	147	208	383	328	38%	63%

Figure 14

Comparison of Surgical I-PASS Handoff Pre- and Post-Interventions

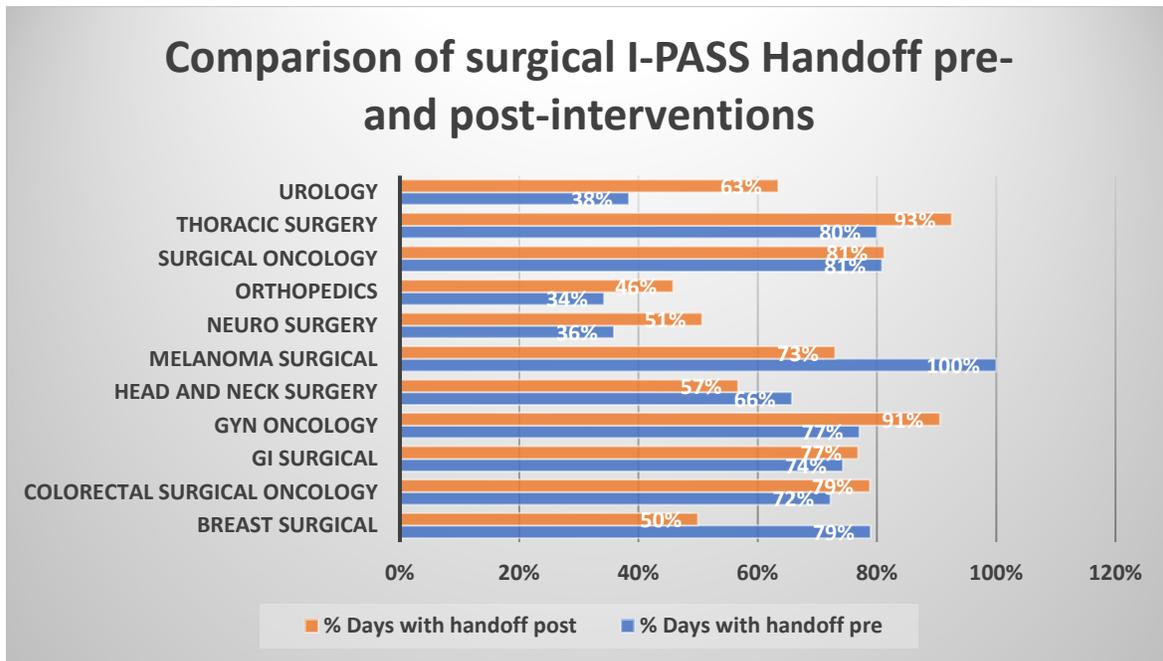


Table 4 shows the number of I-PASS handoffs, both pre- and post-intervention, for the Medical Team.

Figure 14 is a graphical representation of the data from Table 4.

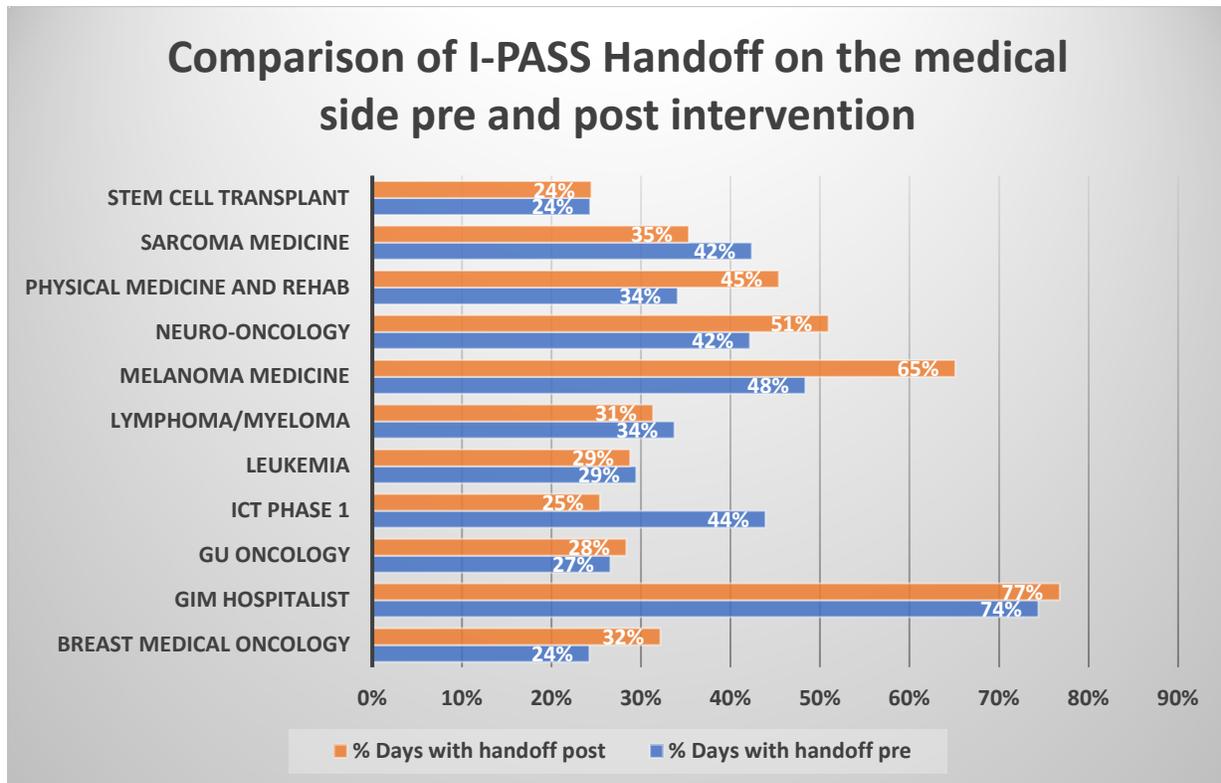
Table 4

Medical I-PASS Handoff Rate Pre- and Post-Intervention

Medical I-PASS % handoff days pre- and post-intervention						
Pre-Interventions 5/6/2020 to 6/6/2020 and Post Interventions 9/23/2020 to 10/23/2020						
Patient service	Handoff days pre	Handoff days post	Patient days pre	Patient days post	% Days handoff pre	% Days handoff post
Breast Medical Oncology	65	110	268	342	24%	32%
GIM Hospitalist	1820	2437	2447	3175	74%	77%
GU Oncology	156	177	587	624	27%	28%
ICT Phase 1	47	45	107	177	44%	25%
Leukemia	715	1059	2427	3676	29%	29%
Lymphoma/Myeloma	576	596	1707	1901	34%	31%
Melanoma Medicine	104	194	215	298	48%	65%
Neuro-Oncology	35	53	83	104	42%	51%
Physical Medicine & Rehab	91	109	267	240	34%	45%
Sarcoma Medicine	145	134	342	379	42%	35%
Stem cell transplant	434	500	1786	2044	24%	24%

Figure 15

Comparison of Medical I-PASS Handoff Pre- and Post-Interventions



Discussion and Conclusions

Initially, we planned to do one big “Go Live” event to introduce I-PASS to our institution. The introduction was to involve videos. The introduction was an advertisement for I-PASS and would be viewed by the institution on the intranet. We were also planning for a luncheon type conference for providers, introducing the new initiative to improve I-PASS handoffs while encouraging open discussion. We were planning to build a new website on the intranet dedicated to I-PASS handoffs. We also anticipated purchasing pins, lanyards, reminder cards, and stickers for a fun way to remind providers to use I-PASS handoffs daily. These activities would have been possible because the institution had initially granted us monetary support for this project. However, with the advent of COVID-19, the focus of the hospital executives understandably changed. Priorities were altered, including all financial focus, to keep all staff employed and to prevent layoffs. Therefore, we continued with our project and went “live” with

each intervention along the way as much as we were able to, by using what we already had as resources and not spending any extra funds.

In looking at our results, based on the handoff-provider-satisfaction survey for the GIM Service, three out of six questions for the satisfaction survey showed an increase in scores. Two out of six remained the same. One had a drop of 2% from the pre-survey. The scores range from 63% to 89% for the pre-survey, and the post-survey scores range from 70% to 87%. For the Nocturnal Department, four out of six scores went up from pre- to post-survey. Two out of six of the scores dropped by 5% and 3%. However, for both services, overall satisfaction in the use of I-PASS increased.

After reviewing the results from our control p-chart, we saw the numbers for I-PASS handoffs did go up from the 40% institutional baseline utility rate to 50%. We also learned that our process was not in statistical control. Three data points go beyond the LCL, and two go beyond the UCL. By studying the control chart method results, the team can analyze the causes of variation, looking at the QI project level and the PDSA level. The team can then decide whether the variations were due to implemented changes or other causes in the system (Provost, n.d.). In looking at the weeks and dates when the numbers were beyond the LCL, we realized the end of June and July's start is usually when our resident MDs and fellows change assignments. The original group of MDs move on, sometimes to a different department, and often to other institutions, and a new group of MDs begins their rotation. Most of the time, they must go through a period of orientation before beginning. Orientation is an area on which the task force can focus. It would be possible to adjust for an earlier orientation in the use of institutional I-PASS handoffs at our institution.

The data points above the UCL could be due to interventions during the second week of September and the first week of October. During these times, our I-PASS dashboard in EPIC went live, and at the end of September, we also had Haiku go live. Haiku is an application on our providers' iPhones that helps teams access I-PASS more efficiently.

Comparing the surgical and medical team pre- and post-intervention results showed that the surgical team had more improvements in I-PASS handoffs' utility. I believe this is something that the I-PASS task force should examine. Could it be because the surgical team is covered mostly by residents

and fellows during the day? Residents and fellows rotate every few months, and part of their responsibility with the surgical teams is to make sure that handoffs are given to the Nocturnal Team every afternoon. In the past, the surgical team's issue is not that they do not do handoffs, but they do not use the I-PASS handoff tool in EPIC. Instead, they use SharePoint separately from EPIC and email. However, during the QI project, different surgical teams expressed that they had started using I-PASS handoffs in EPIC more regularly; their department head had mandated the procedure.

The primary services that have decided to step up and do their handoffs daily using the I-PASS handoffs in EPIC do so because their department leadership told them this procedure is a priority for patient safety. The I-PASS task force's leadership knows that our numbers have not been as high as we had wanted because we lacked the support we expected from the institution's leadership. The focus at the start was to make the QI project a priority. However, after March 2020, everyone's focus, including every hospital in the Medical Center, was on the growing pandemic caused by COVID-19. The shift in priorities was understandable.

Barriers

This I-PASS handoff project was supposed to be hospital-wide. However, the EC, the ICU, the post-anesthesia care units (PACU), and the pediatrics department (PD) were separated from this project. Currently, these units have handoff tools that are not under the I-PASS task force. Another limitation involved surveying the providers. Although picking the highest users of handoffs made sense considering limited time and resources, it would have been better to survey at least one of the top Surgical team users. Ideally, the survey should have gone to all of the providers who were using I-PASS handoffs.

Another barrier for this project was that it only explored how our interventions helped increase the use of I-PASS handoffs and improve user satisfaction. This project did not investigate whether the increase in handoffs and user satisfaction directly affected preventable medical errors, the length of stay, or transfers to the ICU.

Section V

Summary and Conclusions

Recommendations and Implications

In nine medical centers, I-PASS handoff's successful institutional implementation produced a 30% reduction in preventable adverse events for patients and a 23% reduction in medical errors (Rosenbluth et al., 2018). With such strong evidence, we were expecting help from the leaders of our institution. Indeed, at first, we had their attention. However, COVID-19 ended a lot of plans for a lot of people. The institution's urgent need to focus on this change was directed to other even more urgent safety issues to protect our patients and our staff from the pandemic. All efforts and focus were on this, and rightly so, as our institution cares for cancer patients with vulnerable immune systems.

From the beginning of this QI project, we communicated the need for change to the front-line providers and the institution's leaders. We attempted to engage every department head, medical directors from every unit, nursing management, and every administrator for all of the institution's services. We created an I-PASS task force group whose primary responsibility was to help disseminate information and to help monitor adherence in the use of I-PASS handoffs. However, having an I-PASS task force, and frequently communicating and meeting about the plans and steps for change was not enough. We attempted to engage and empower providers from every service to encourage them to use I-PASS handoff. We also tried to meet every request presented to us by primary teams to help make the I-PASS handoff tool more useful for their use. For example, we worked with our technology and informatics group to make I-PASS available for the providers who had institutionally provided iPhones to access I-PASS on their phones. Despite all of our efforts, the fact is that our institution is large, and bureaucracy and politics are significant issues. I believe that for this project to be truly successful, we needed buy-in from the very top.

An issue brought up by a member of the task force was that the primary teams do not feel the pressure of handing off their patients. The primary teams expect the Nocturnal Service to care for their patients, whether they get a handoff from the primary team or not. Different APP supervisors and

department heads frequently state in meetings that they are “too busy” to put a handoff into EPIC. The primary complaint we get is that the primary teams feel overworked and burned out that asking them to do handoff for each of their patients was giving them “another thing they have to do.”

For it to be successful, the use of I-PASS handoffs should be made mandatory for all providers. Our task force should also consider targeted teaching for the departments with very little or no handoffs at night. But then again, it all comes down to leadership. Leadership should provide support and empowerment to the task force; we need more buy-in from the top. Part of the solution should be to reevaluate who needs to be added to the I-PASS leadership task force to help make this possible.

On the other hand, this year was probably not a good year to start significant changes in a rather large institution. As I had already mentioned, COVID-19 played an overpowering role in all healthcare establishments, and ours was no different. We will reevaluate our PDSA and determine what steps we need to take and the changes we must make for the next round. Unfortunately, we cannot wait until COVID-19 completely goes away. We have to reevaluate other changes and steps we need to take to make I-PASS handoffs a permanent part of every provider's everyday practice in our institution.

Overall Project Summary

It has been estimated that every year in the United States, miscommunication between clinicians contributes to one-third of the serious medical inpatient errors and results in the preventable deaths of 250,000 patients (Parent et al., 2018). The Joint Commission established a National Patient Safety Goal in 2006, focusing on the importance of handoffs. In 2011, the ACGME also required residency programs to provide supervision and training for handoff communication to increase resident handoffs due to the restriction of duty hours (Rosenbluth et al., 2018).

I-PASS handoff is a mnemonic that stands for Illness severity, Patient summary, Action list, Situation awareness, and Synthesis by the receiver. More than 50 hospitals have adopted the program. Previous studies from nine medical centers that implemented the program showed a decrease in preventable adverse events by 30%. (The Joint Commission, 2017).

In 2017, our institution started using EPIC for our Electronic Health Records (EHR); with this resource came the opportunity to begin using I-PASS handoffs in EPIC. I-PASS handoff use occurred slowly throughout the whole institution. By early 2020, all of the primary services received an introduction to I-PASS. Our QI project goal was to increase the 40% I-PASS handoff rate by 25% to at least 65%. I used Lewin's Change Theory for this QI project. Lewin's Change Theory includes three stages: Unfreeze, Change, and Refreeze.

Unfreeze is the first stage and focuses on preparing those impacted by the change (Wojciechowski et al., 2016). Our leadership task force group met with all department leaders and I-PASS champions to help use and increase I-PASS handoffs. Unfreeze is the most stressful and challenging part of Lewin's Change Theory stages because it involves breaking down the status quo and rebuilding with a new operating way (Wojciechowski et al., 2016). An essential part of this stage is to have strong support from senior management. Unfreeze also involves delivering a clear and compelling message of why change must occur (Mind Tools, n.d.).

For this QI project, we met with different services and their leaders to present the current issues about how we are currently doing I-PASS handoffs, specifically the low numbers of utilization from each team and the institution in general. We discussed the necessity of improving handoffs. We also presented the requirements from credentialing bodies and the safety goal of the institution. We also met with the larger I-PASS task force group made up of 44 members considered I-PASS champions. The I-PASS task force includes medical directors of units, administration, attending physicians, residents and fellows, pharmacists, nurses, and Advanced Practice Providers. This group helped to disseminate information about the I-PASS handoff process.

The second stage is Change. After meeting with different services almost every week, some, but not all the primary care services agreed about the need for change, but they accepted the challenge of a new way of doing things. Most of the services that were open to change and onboard with improving numbers for I-PASS handoff were from the surgical team. We are still meeting resistance from the medical side. However, our task force agrees that the surgical side leadership has supported I-PASS

handoff from the very beginning. The surgical service also has many surgical residents and fellows. They are also very aware of ACGME's re-credentialing requirements, providing formal training for trainees' handoffs.

The I-PASS leadership task force group understands that the Change stage does not happen overnight because people need time to know how the change will benefit them. It will also take time for people to accept a different way of doing things (Wojciechowski et al., 2016). We would know when re-education and reminders are needed. We have frequent observations and monitoring of I-PASS handoff numbers and reoccurring meetings with the I-PASS champions for each service. These procedures could be done quickly and efficiently by the team to also help with sustainability.

The third and final stage is Refreeze. Refreeze is the time for embracing changes and making those changes part of everyday practice in the institution. Refreeze is also described as a period of stabilizing and integrating a new equilibrium into a system to make the practice part of a habit that helps resist further change (Wojciechowski et al., 2016). Although Refreeze is our task force's ultimate goal for this QI project, we are far from reaching this stage. Our survey shows that providers' satisfaction in using I-PASS handoffs by the two largest users, GIM and Nocturnal on the medical side, was high for the pre-survey and was mostly improved for the post-survey. Our I-PASS utility rate went up from the previous 40% baseline data obtained by GIM early this year to 50%. Although our goal initially was to increase by 25%, the 10% rise was significant. Our control chart showed that our process was in chaos, and for this, the I-PASS handoff task force needs to sit down and analyze why our process has a special cause. It may be because of recent changes in quality improvement or some other factor we failed to consider.

Refreeze is the stage that we would like to reach for this project. We need to continue to adopt what was successful in our interventions, like continuously meeting with the different services and meeting regularly and supporting the I-PASS task force champions. We need to continue to address issues as they come to maintain sustainability and to (a) improve the use of I-PASS handoff, (b) maintain or improve user satisfaction in its use, and (c) make it a permanent daily routine for all providers.

Next Steps

The next step we will make will be to adapt the interventions that we think were successful. Our I-PASS task force champions' feedback is that the online education module for I-PASS was beneficial, and we plan to push to make it mandatory for all providers to do. We also received feedback that our monthly meetings were helpful for the champions. Primary team services also request meetings with the I-PASS task force every other month and as needed.

Our institution's strategic plan for the year 2020–2021 focuses on safety culture, and I-PASS handoff should be part of improving patient safety. To get the I-PASS handoff to be successful, the institution's leadership has made tentative plans for the Department of Quality Assessment and Performance Improvement (QAPI) to take over the I-PASS handoff project. QAPI is headed by the different directors and heads of all the primary team departments in the institution. They report directly to the president. The objective is not only to make I-PASS handoff successful but also to include outpatient clinics and the EC.

Alignment with DNP Essentials

This QI project reflects the six DNP Essentials (American Association of Colleges of Nursing [AACN], n.d.).

1. DNP Essential I. Scientific Underpinnings for Practice

I demonstrated DNP Essential I by reviewing and synthesizing the literature review, evaluating it for inclusion, and developing all the QI project elements.

2. DNP Essential II. Organizational and Systems Leadership for Quality Improvement and Synthesis Thinking

I demonstrated DNP Essential II by attending quality improvement meetings, developing a business plan, developing a SWOT analysis, identifying and meeting with stakeholders, and disseminating the QI project findings.

3. DNP Essential III. Clinical Scholarship and Analytical Methods for Evidence Based Practice

I demonstrated DNP Essential III by developing my DNP project proposal, preparing for my final DNP project and manuscript, attending meetings related to my project, and conducting my project evaluations.

I further demonstrated DNP Essential III by participating in data collection and analysis, consulting with a statistician virtually, by phone, by email, and disseminating the DNP findings' results.

4. DNP Essential IV. Information Systems/Technology and Patient Care Technology for the Improvement and Transformation of Healthcare

I demonstrated DNP Essential IV by performing data extraction from large data sets (dashboard), helping develop a mobile application for healthcare for the institution, and helping create an I-PASS institutional dashboard.

5. DNP Essential V. Interprofessional Collaboration for Improving Patient and Population Health Outcomes

I demonstrated DNP Essential V by participating in an interprofessional team such as the I-PASS leadership task force and consulting with my mentor by video, phone, and in-person regarding my QI project.

6. DNP Essential VI. Advance Nursing Practice

I demonstrated DNP Essential VI by assessing the organization/institution in the practice setting and disseminating knowledge to other healthcare providers, specifically regarding the project results and its implications.

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Appendix A

Project Approval Email Letter

From: Ait Aiss, Mohamed <MAit@mdanderson.org>

Sent: Wednesday, May 20, 2020 2:40 PM

To: Niangar, Zalie <mniangar@mdanderson.org>

Subject: FW: QIAB:QI Project approved + More info (Project title:Handoff Communication I-PASS Initiative)

Hello, Zalie,

Below is the email for QI approval. Sorry for the delay.

Thanks,

Moh

Subject: QIAB:QI Project approved + More info (Project title:Handoff Communication I-PASS Initiative)

Workflow Notification

The QIAB has reviewed and approved your QI project titled: Handoff Communication I-PASS Initiative

–Your project is now part of MD Anderson's Quality Improvement Project Registry.

–Click this* [Link](#) to access your project in the Registry, where – among other things – you can add/update/change the names of your Project Team Lead(s), Team Members, and/or Facilitator(s)

***Please save this email with the link to your project, or copy the url link and save it in your Contacts.**

FROM THE OFFICE OF PERFORMANCE IMPROVEMENT:

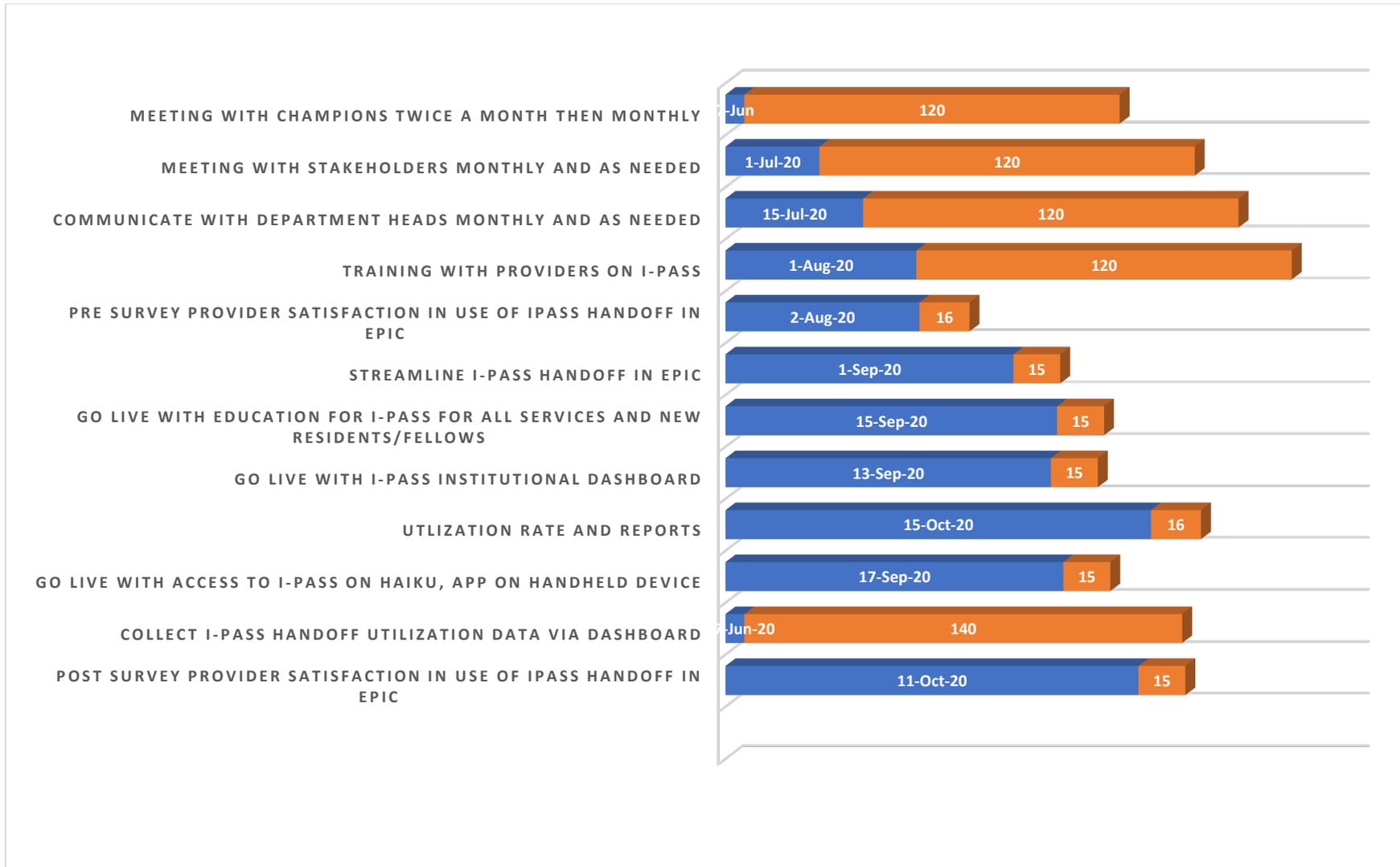
[Patient Experience:](#) Incorporate patient perspectives into your decision-making process or your quality improvement project.

[Patient Satisfaction Report/PGSurveys:](#) If surveying patients (patient satisfaction) as part of your project, closely review Press Ganey survey questions to determine if they are applicable to your project.

[Quality College:](#) An MD Anderson resource for quality education and tools.

Appendix B

Quality Improvement (QI) Project Gantt Chart



Appendix C

Measure of Interest / Metric Needed

Measure of interest	Measure Metric needed	Type of Measure	Time Period for Measure	Operational Definition-Denominator	Operational Definition-Numerator	Data elements needed to operationalize the measure	Level of Measure needed for data	Location of Data	Data owner/Requires Permission of use?
Number of I-PASS handoff utility rate for the whole institution	Number of patients with I-PASS hand off in the institution	Outcome	Weekly	Number of inpatient days	Number of I-PASS handoff per service	Number of handoff days for the institution and number of patient days for the institution	Count- Need ration level data	Data are available in EHR EPIC, on dashboard	Data are owned by the hospital, but open for all the providers inpatient, using EPIC. No permission needed.
Number of patients admitted to the hospital	Number of patients admitted in the last few months have dropped due to COVID-19	Balancing	Monthly	n/a	n/a	Number of admissions in the hospital, per month	Count-ratio level	EPIC dashboard	EPIC users/No permission needed
Number of patients admitted to each service daily	Number of admitted patients had dropped significantly in the last few months due to COVID-19	Balancing	Monthly	n/a	n/a	Number of admissions per service, per month	Count- ratio level	EPIC dashboard	EPIC users/No permission needed
Provider user satisfaction	Level of satisfaction in using I-PASS	Outcome	Monthly	n/a	n/a	Survey	Nominal	Survey	Nocturnal/I-PASS task force/No permission needed.

Appendix D

Comparison of Results of Pre- and Post-survey for GIM and Nocturnal Department

1. Did the use of I-PASS help improve the content in handoff															
	Agree				Disagree				Neutral				Total		
	Pre-survey		Post-survey		Pre-survey		Post-survey		Pre-survey		Post-Survey		pre	Post	
GENERAL INTERNAL MEDICINE	19	70%	16	70%	0	0%	1	4%	8	30%	6	26%	27	23	
NOCTURNAL	8	53%	13	65%	3	20%	3	15%	4	27%	4	20%	15	20	
2. Did the use of I-PASS handoff improve time spent on handoff every day?															
	Agree				Disagree				Neutral						
	Pre-survey		Post-survey		Pre-survey		Post-survey		Pre-survey		Post-Survey				
GENERAL INTERNAL MEDICINE	17	63%	16	70%	2	7%	4	17%	8	30%	3	13%	27	23	
NOCTURNAL	7	46%	14	70%	4	27%	2	10%	4	27%	4	20%	15	20	
3. Did the use of I-PASS handoff improve communication with nocturnal/primary team?															
	Agree				Disagree				Neutral						
	Pre-survey		Post-survey		Pre-survey		Post-survey		Pre-survey		Post-Survey				
GENERAL INTERNAL MEDICINE	24	89%	20	87%	0	0%	0	0%	3	11%	3	13%	27	23	
NOCTURNAL	12	80%	15	75%	1	7%	1	5%	2	13%	4	20%	15	20	
4. Did the use of I-PASS handoff create a seamless transition of care to the nocturnal covering service/primary service?															
	Agree				Disagree				Neutral						
	Pre-survey		Post-survey		Pre-survey		Post-survey		Pre-survey		Post-Survey				
GENERAL INTERNAL MEDICINE	19	70%	16	70%	0	0%	0	0%	8	30%	7	30%	27	23	
NOCTURNAL	8	53%	10	50%	3	20%	2	10%	4	27%	8	40%	15	20	
5. Did the use of I-PASS handoff help in providing timely patient care at the beginning of your shift?															
	Agree				Disagree				Neutral						
	Pre-survey		Post-survey		Pre-survey		Post-survey		Pre-survey		Post-Survey				
GENERAL INTERNAL MEDICINE	20	74%	19	83%	1	4%	1	4%	6	22%	3	13%	27	23	
NOCTURNAL	9	60%	16	80%	3	20%	2	10%	3	20%	2	10%	15	20	
6. How easy was it to navigate the I-PASS tool in EPIC?															
	Very difficult				Very easy				Neutral						
	Pre-survey		Post-survey		Pre-survey		Post-survey		Pre-survey		Post-survey				
GENERAL INTERNAL MEDICINE	1	4%	0	0%	21	78%	19	83%	5	18%	4	17%	27	23	
NOCTURNAL	0	0%	0	0%	14	93%	19	95%	1	7%	1	5%	15	20	

Appendix E

P-chart Data

Sample	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
n # of patient days	3814	4002	4041	3970	3938	3772	3888	3951	4123	4122	4080	3942	4014	4010	4289	4190	4207	4336	4429	4241
D # of handoff days	1735	1775	1741	1704	1893	1681	1875	1855	1934	1986	1824	1719	1780	1824	2133	2022	1990	2149	2081	2065

Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	SUM
n # of patient days	3814	4002	4041	3970	3938	3772	3888	3951	4123	4122	4080	3942	4014	4010	4289	4190	4207	4336	4429	4241	81359
D # of handoff days	1735	1775	1741	1704	1893	1681	1875	1855	1934	1986	1824	1719	1780	1824	2133	2022	1990	2149	2081	2065	37766
p	0.455	0.444	0.431	0.429	0.481	0.446	0.482	0.470	0.469	0.482	0.447	0.436	0.443	0.455	0.497	0.483	0.473	0.496	0.470	0.487	
pbar	0.464	0.464	0.464	0.464	0.464	0.464	0.464	0.464	0.464	0.464	0.464	0.464	0.464	0.464	0.464	0.464	0.464	0.464	0.464	0.464	0.464
UCL	0.488	0.488	0.488	0.488	0.488	0.489	0.488	0.488	0.487	0.487	0.488	0.488	0.488	0.488	0.487	0.487	0.487	0.487	0.487	0.487	0.487
LCL	0.440	0.440	0.441	0.440	0.440	0.440	0.440	0.440	0.441	0.441	0.441	0.440	0.441	0.441	0.441	0.441	0.441	0.441	0.441	0.442	0.441

$$UCL = \bar{p} + 3\sqrt{\left(\frac{\bar{p}(1-\bar{p})}{n_i}\right)}$$

$$CL = \bar{p} = \frac{\sum P_i}{\sum n_i}$$

$$LCL = \bar{p} - 3\sqrt{\left(\frac{\bar{p}(1-\bar{p})}{n_i}\right)}$$

Appendix F

Evidence Table

Author and Date	Theoretical Conceptual Framework	Research Question/ Hypothesis	Methodology	Analysis and Results	Level of Evidence	Critical Appraisal	Implications for Practice
<p>1. A theoretical framework and competency-based approach to improving handoffs. Arora, Johnson, Meltzer, Humprey, 2008</p>	<p>None</p>	<p>Describe how handoff affect both patients and physicians based on night float service implementation for an inpatient general medicine service at the University of Chicago.</p>	<p>Interns were interviewed regarding communication failures, uncertainty during medical decision making and shift work mentality.</p>	<p>The case study highlighted how increased cost of coordination, (including communication failures and uncertainty and medical decision making) and agency problems (shift work mentality and lack of responsibility in cross covering patients) can negatively affect patient care. Due to increasingly fragmented care, it is important to teach interns and residents how to do proper handoff.</p>	<p>Level IV</p>	<p>Although the paper states that interviews were done the number of interns involved were not specified or the specific questions were not provided.</p>	<p>This study could help support the fact that Nocturnal Service encounter difficulty when handoff is subpar, and this also affects patient care negatively.</p>
<p>2. The I-PASS mnemonic and the occurrence of handoff-related errors in adult acute care hospitals: A systematic review protocol Ransom and Winters 2018</p>	<p>None</p>	<p>What is the effectiveness of the I-PASS mnemonic in reducing handoff-related errors during inter or intra hospital transfers for</p>	<p>Search strategy, the authors used this strategy to find both published and unpublished studies. They used a three-step search: Initial</p>	<p>The authors of this paper are attempting to create a protocol for systemic review of occurrence of handoff-related errors and the use of I-PASS mnemonic. Unfortunately, the</p>	<p>Level III</p>	<p>The results of the study are not presented, the proposal for the systemic review protocol is instead provided.</p>	<p>Though the paper is more of a proposal for the systemic review protocol about I-PASS, the background research is useful as it explains how I-PASS is different</p>

Author and Date	Theoretical Conceptual Framework	Research Question/ Hypothesis	Methodology	Analysis and Results	Level of Evidence	Critical Appraisal	Implications for Practice
		hospitalized patients?	limited search using MEDLINE and CINAHL, a second search using all identified keywords and terms using all database, and a third search where the reference list of all identified articles will be searched for additional studies.	paper does not discuss the actual study. The authors discuss how the preliminary review of data showed that there was no systemic review that focuses on I-PASS handoff mnemonic and its effect on handoff-related error rates.			from other standardized mnemonic handoff. It also discusses the background of handoff and how ineffective handoff communication leads to serious medical errors
3. Large-scale implementation of the I-PASS handover system at the academic medical center Shahian, McEachern, Rossi, Chisari and Mort, 2017	None identified	To address concerns regarding problematic handoff and to prevent errors and adverse outcomes due to lack of handoff, the Massachusetts General Hospital completed a phase one multifaceted program to implement standardized	A multidisciplinary committee was created and focused on large-scale training regarding the use of I-PASS handoff. Administrative and clinical leadership support, templates for I-PASS in EHR, policy revision, various	After training over 6,000 nurses, therapists and doctors, scores showed non-uniform but progressive use of I-PASS in the institution.	Level III	The results are consistent with sufficient size sample. There are consistent recommendations based on the results.	The evidence in this study would help my project because it is similar to the scale of change that needs to happen at our institution. We are also encountering the same challenges and barriers and are planning the same steps for change

Author and Date	Theoretical Conceptual Framework	Research Question/ Hypothesis	Methodology	Analysis and Results	Level of Evidence	Critical Appraisal	Implications for Practice
		handoff using I-PASS.	educational modalities, use of I-PASS Champions, handoff observation was an important part of the method. Suggestions and feedback by caregivers were also important.				
4. Effect of Standardized Handoff Curriculum on Improved Clinician Preparedness in the ICU Parent, LaGrone, Albirair, Serina, Keller, 2017	None noted	Does the University of Washington I-PASS standardized handoff affect clinician communication in the ICU?	The study is a cluster randomized stepped-wedged randomized clinical trial which involved eight surgical and medical ICU at two academic hospital systems. Participants included advance practice nurses, fellows, residents and attending physicians Data was collected from daily surveys and patient medical records.	The University of Washington I-PASS standardized handoff was found to help improve intensive care provider preparedness and workflow. I-PASS handoff represented an important step in communication standardization and could help reduce errors and omissions in communication.	Level I	Consistent results with adequate control, sufficient sample size and definitive conclusion	This article is helpful because it discusses overnight issues without standardized handoff. It also has the same setting as our institution and identifies the same challenges and intervention done to implement change.

Author and Date	Theoretical Conceptual Framework	Research Question/ Hypothesis	Methodology	Analysis and Results	Level of Evidence	Critical Appraisal	Implications for Practice
5. Sentinel Event Alert The Joint Commission, 2017	None	None	The article discusses the potential for harm from handoff failure. It also discusses factors involved in hand off communication failure including training and expectations of health care providers, cultural or ethnic considerations and language barrier. Other factors such as documentation that is incomplete, inadequate or non-existent is also mentioned.	The article discusses issues regarding handoff and the need for improvement. It also enumerates steps and actions recommended by The Joint Commission to help improve handoff.	Level IV	The article presents well-defined methods using rigorous approach to help improve handoff.	Helpful in explaining The Joint Commission’s stand on the issue with handoff and provides clear guidelines on how to improve handoff with a focus on I-PASS mnemonic as an effective tool for standardization of handoff.
6. A Quality Improvement Approach to Standardization and Sustainability of the Hand off Process Fryman, Hamo, Raghavan, Goolsaraan, 2017	None	To test the feasibility and effectiveness of standardized I-PASS handoff and to create a sustainability model.	After a baseline measurement of handoff methods was done at their hospital, a QI team was formed consisting of six internal medicine	The study showed that standardized handoff is a feasible method that helped improved overall handoff quality at their hospital. Active surveillance and reinforcement are important to ensuring compliance	Level II	Sufficient sample size with consistent results. The study presented definitive conclusions and recommendations were consistent.	This study showed that maintaining sustainability in QI projects are very challenging. There needs to be an ongoing plan to sustain change. This is applicable

Author and Date	Theoretical Conceptual Framework	Research Question/ Hypothesis	Methodology	Analysis and Results	Level of Evidence	Critical Appraisal	Implications for Practice
			resident, quality nurses, associate program director of the internal medicine residency and a patient safety officer from the institution. Study participants included internal medicine residents. PDSA method of QI was used for the study.	and making the change permanent.			to my project as well.
7. I-PASS Mentored Implementation Handoff Curriculum: Implementation Guide and Resources O'Toole, Starmer, Calaman, 2018	None	As part of the adaptation of the I-PASS program, a comprehensive guide for implementation was created to help individuals in this process.	The I-PASS Mentored Implementation guide was created based on the Society of Hospital Medicine (SHM) mentored implementation programs, original I-PASS study and from the experience of members of the I-PASS group study. It contains training activities, measuring impact,	32 sites across North America has utilized the guide as part of their program, post program surveys from the two sites showed that 85% (N=34) felt that the guide was very good or excellent The I-PASS Mentored Implementation Guide is an important resource for institutions who want to implement a large-scale I-PASS Handoff Program.	Level II	Sufficient sample size with consistent results. Recommendations based on extensive literature review.	This study will help support my project on I-PASS handoff as it provides a guide and discusses how changes in a large-scale institution can happen.

Author and Date	Theoretical Conceptual Framework	Research Question/ Hypothesis	Methodology	Analysis and Results	Level of Evidence	Critical Appraisal	Implications for Practice
			campaign, sustaining the program and contains detailed information on generating institutional support.				
<p>8. Ensuring Effective Care Transition Communication: Implementation of an Electronic Medical Record-Based Tool for Improved Cancer Treatment Handoffs Between Clinic and Infusion Nurses Padya, Clarke, Scrsella, Alngi, Amport, Hamel, Dougherty 2019</p>	None	Does development and implementation of a standardized handoff process using an electronic medical record-based tool ensure optimal communication between oncology nurses?	Using a Plan-Do-Study-Act methodology, a multidisciplinary team came together to develop a standardized handoff process that is built into their EMR. Study outcomes included tool utilization, handoff completion, proportion of handoff-related medication errors, patient waiting time and nurse satisfaction with tool.	The EMR based tool for handoff helped optimize communication between nurses during patient transition. Reduction in the proportion of medication errors from ineffective handoff was also shown after the intervention.	Level III	Results are applicable to practice, sufficient sample size and definitive conclusions.	This evidence supports my project as it shows the effectiveness of standardizing handoff and also having it within the electronic medical record.
<p>9. Integrating research, Quality Improvement and Medical Education for Better Handoffs and Safer Care: Disseminating,</p>	None	How to effectively has I-PASS been adapted and disseminated	The I-PASS study group, after receiving funding from private and	The authors created a mentored implementation project where they directly assisted	Level II	High quality of evidence, consistent results, definitive conclusions, well-	This article is very helpful as it provides a lot of support for the use of

Author and Date	Theoretical Conceptual Framework	Research Question/ Hypothesis	Methodology	Analysis and Results	Level of Evidence	Critical Appraisal	Implications for Practice
<p>Adapting and Implementing the I-PASS Program Starmer, Spector, West, Srivastava, Sectish and Ladrihan 2017</p>		<p>and used across different disciplines and specialties after receiving funding from federal and private sources.</p>	<p>federal sources, carried out implementation and dissemination projects and directly worked with more than 50 hospitals to help implement I-PASS handoff.</p>	<p>institutions to adapt the I-PASS program. They also formed a company, the I-PASS Patient Safety Institute that is a mission-driven company with the goal of driving widespread adoption of I-PASS across health systems and hospitals in the US, to help improve patient safety.</p>		<p>defined methods using rigorous approach.</p>	<p>standardized handoff, I-PASS and its effect on patient safety</p>
<p>10. I-PASS Handoff Program: Use of campaign to effect transformational change Rosenbluth, Destino, Starmer, Landrihan, Spector, Sectish, I-Pass Campaign Committee, 2018</p>	<p>Kotter’s 8 step Model was used by the authors as key steps in effecting transformational change</p>	<p>Using I-PASS handoff program campaign can help effect transformational change.</p>	<p>Using Kotter’s model for transformational change, the authors used the eight steps: establish a sense of urgency, build a powerful coalition of leaders, create the vision, communicate the vision, empower others to act on the vision, plan for and create short-term wins, consolidate</p>	<p>Implementation of I-PASS was successful and showed improvements in rates of errors and preventable adverse events.</p>	<p>Level III</p>	<p>Quality of the evidence is high, showing consistent results with sufficient sample size, well-defined reproducible search strategies, well-defined methods.</p>	<p>This evidence supports the effectiveness of I-PASS handoff in other institutions and the use of Kotter’s model for transformational change.</p>

Author and Date	Theoretical Conceptual Framework	Research Question/ Hypothesis	Methodology	Analysis and Results	Level of Evidence	Critical Appraisal	Implications for Practice
			<p>improvements and institutionalize new approaches. This structured process and strong campaign helped lead to a successful local implementation of I-PASS handoff and lead to national and international dissemination.</p>				