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Improving Handover Process for Stroke Patients Transferring from Emergency Department to Interventional Radiology: A Quality Improvement Project

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Department to Interventional Radiology: A Quality Improvement Project

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Table of Contents

Abstract

Background: A standardized handover process is needed for stroke patients transferring from the Emergency Department to Interventional Radiology.

Local Problem: Emergency Department and Interventional Radiology had different handover processes.

Methods: A quality improvement project was conducted in a large Magnet® designated midwestern health system. Participants included emergency department and interventional radiology nurses and stroke patients. Pre/post-quality and post implementation measures were obtained.

Interventions: The interventions included utilizing a standardized handover tool between departments, calling report prior to patient transfer, and turning in handover tool following stroke case to ensure compliance. Two cycles of the Plan-Do-Study-Act Cycle were completed.

Results: No decrease in emergency department to interventional radiology door time (p=1.00) occurred. There was an increase in emergency department (11%) and interventional radiology (16%) nurse satisfaction regarding the new handover process.

Conclusion: Nurse satisfaction improved. Another PDSA cycle needs to occur in order to decrease emergency department to interventional radiology door time.

INTRODUCTION

Nurse to nurse handover report is a critical and necessary task to complete during patient care transitions. Handover occurs when patient care responsibilities are transferred from one care location to another through effective communication to adequately take care of the patient.[1]

The Joint Commission on Accreditation of Healthcare Organizations and the World Health Organization stated minimum requirements for effective handover to improve patient safety.[1-4] This included a standardized process in place, the process is able to adapt to different situations, communication is clear especially when transferring patients to procedures, and an audit adherence to the standardized guidelines is in place by the organization.[1-4] By 2010, the requirements were The Joint Commission standard.[1] Despite these efforts, ineffective communication remains an issue nationwide.

The Joint Commission indicated that inadequate handovers cause 80% of all adverse events.[5] Differences in communication styles between care providers or different departments, lack of a standardized tool, and increase complexity in care, all contribute to communication errors during handover.[6] This results in treatment delays, confusion regarding care, inaccurate clinical assessments, medication errors, avoidable readmissions, and increased cost.[7]

There are multiple approaches outlined in the literature on how to standardize the handover process to ensure effective communication and decrease communication errors. SBAR, I-Pass, and other mnemonics are recommended, yet one is not superior over another. The overarching theme within the literature is the need for standardization with the process itself.[6,8-9] A standardized handover process has the ability to decrease discrepancies, reduce medical errors, ensure adequate amount of information is conveyed, and improves nurse satisfaction with the process.[6,8-9]

In one hospital organization located in the Midwest, the emergency department (ED) and interventional radiology (IR) were not utilizing a standardized handover tool and completing report after the patient transferred. The current process had the ability to not only affect patient outcomes, but also impact registered nurse (RN) satisfaction as well. The purpose of this quality improvement project was to develop then evaluate a new standardized handover process in order to improve patient safety and RN satisfaction.

RATIONALE AND METHODS

Rationale

The Linear Model of Communication (see Figure 1) outlines the key components that occur throughout the handover process, which include a source, message, transmitter, encoder, signal, channel, noise, receiver, decoder, and destination.[10] Throughout the process, internal and external noise is present and causes distractions, corrupts the message delivered, and increases communication errors.[10] The model highlights the importance of effective communication, which can only occur if information is correctly encoded and decoded between messengers and the amount of noise is minimal throughout the handover process. When communication errors are present within an organization, the model helps identify at which step the message deteriorated and the factors that contributed to the communication breakdown. [10] The Standards for Quality Improvement Reporting Excellence SQUIRE 2.0 guidelines were utilized for this article.

Context

The interventions were implemented in a Magnet® designated Comprehensive Stroke Center hospital system located in the Midwest, with focus on ED and IR settings. The ED is a Level I trauma center whose goal is to stabilize patients for their next care transition. IR RNs focus is to facilitate diagnostic imaging and lifesaving interventions to restore a patient back to

their fullest potential. The amount of emergent endovascular stroke cases have progressively increased over the past three years (from 131 in 2017, to 171 in 2018, and 190 in 2019) within this hospital. There are 14 hospitals in the organization, and one performs mechanical thrombectomies. Computerized tomography scan and tissue plasminogen activator can be completed at regional hospitals, but transfer to this particular hospital needs to occur for thrombectomy procedures. Participants in this project include the ED and IR RNs and adult stroke patients.

Interventions

First, a standardized handover tool created by the clinical nurse specialist was implemented in both departments to utilize during every stroke care transition (see Figure 2). The standardized handover tool created a more unified approach to gather pertinent patient information and relay it to the next nurse taking care of the patient.[6,8-9] In the ED, a laminated version of the tool was hung in the trauma bay for accessibility. Hard copies of the handover tool were located at the RN stations. In IR, the handover tool was located in the neuro suite and IR holding room. The handover tool was designed to be initiated in the ED and travel with the patient to the IR RN upon transfer so that information was not lost in the process.[6,8,9,12]

Second, the ED RN was to call the IR RN prior to patient transfer to complete report.[11] Report was currently being conducted after the patient was transferred and on the procedural table in IR. The new workflow change ensured that the ED and IR RNs utilized the same standardized handover tool when giving and receiving report over the phone, which created an easy exchange of information.[6,8-9] Pertinent patient information prior to arrival in IR was obtained by the IR RN. With time sensitive endovascular cases, completing report prior to start

of intervention creates a more seamless transition process. RNs play a pivotal role in coordinating the timely flow of patients with acute stroke through the health system.[11]

Third, a monitoring system was implemented to ensure compliance and sustainability.[12] When the IR RN received report from the ED RN over the phone prior to transfer, the IR RN would write down the names of the two RNs involved in the handover communication, and the time and date report was completed. After the stroke procedure was completed, the IR RN would then turn the handover tool into a bin located in the neuro suites where the procedures were conducted. The department manager would collect the handover tool to ensure they were being utilized and that report was being completed prior to transfer.

Prior to the workflow change implementation, RN education was completed in the ED and IR daily over two weeks in unit huddles by the project and department managers.[12] Weekly emails were also sent to staff to reinforce information from the huddles for two weeks. The RNs signed a document located on the ED and IR unit huddle boards stating understanding of the new workflow changes to be implemented (see Figure 3). The education document included a rationale for the practice change to help RNs understand the need for the change (see Figure 4). After workflow changes were implemented, IR manager, ED supervisor, and the project manager provided support through bimonthly check ins to address the RN barriers and how to overcome the challenges.[12]

The Institute for Healthcare Improvement implementation Plan-Do-Study-Act (PDSA) framework guided quality improvement for this project (see Figure 5).[13] This project had two PDSA cycles. The first cycle was completed over a three-month span of time. It encompassed the three key interventions aforementioned. The second PDSA cycle was one month in duration due to time constraints. The second PDSA cycle only varied by one intervention, which included

the handover tool being modified after gathering RN feedback from the first cycle (Figure 6).

The RNs indicated that they wanted the tool to be more condensed to only include the pertinent

patient information. In addition, a designated area was added for RNs to write their name and

what time report was called. It also provided a reminder at the bottom of the handover tool

indicating that the handover tool needed to be turned into the bin located in room 3. All other

interventions and workflow processes stayed the same.

Measures

The intervention took place from November 2020 through the end of February 2021.

Data was collected by project manager. Anonymous pre-/post-implementation surveys were sent

to RNs in the ED and IR to examine characteristics, perception, and satisfaction over two weeks.

Ten questions were included in the pre-implementation survey: two characteristics, one yes or

no, five using a five-point Likert scale, and two that were open ended with a free-text box. The

post implementation survey included all of the questions from the pre-implementation survey,

with the addition of two questions to determine if report was called prior to patient transfer and if

staff felt supported throughout the process. The RN survey responses helped identify the

difference between knowledge of tool location, knowledge regarding the handover tool, how

often the tool was used, if the tool encompassed pertinent information needed to take care of the

patient, information missed during handover, organizational barriers, and satisfaction regarding

the stroke handover process before and after implementation.

Patient, system, and implementation data was obtained through chart audits, manual

counting, and event reports. Chart audits were completed to identify how many stroke cases there

were per month, time between ED, IR, and procedure start time, and if handover tool information

aligned with chart audits in the organizations computer system. ED to IR door time was the

primary focus as a decreased amount of time to intervention can improve patient outcomes.[14] During education, data collection included number of education documents signed, huddles completed, RNs present during the huddles, and emails sent. During implementation, it included number of cases examined, handover tools turned in, handover tools completed, if handover tool and chart audits concordant, and whether handover tool and report via phone call were completed before or after transfer. Implementation errors were identified through event reports.

Analysis

Characteristics, perception, and satisfaction were analyzed using descriptive statistics. System measures were gathered during the implementation and post implementation through descriptive statistics. Implementation measures were gathered before, during, or after implementation depending on the specific measure and analyzed through descriptive statistics. Patient measures were gathered during and post implementation and analyzed through Fishers Exact Test, mean value, and p-value (greater than/equal to 0.05 significant). SAS software was used to analysis. A thematic analysis of qualitative data occurred to better understand RN open ended question responses.

Ethics

The Internal Review Board at the site determined the project was quality improvement.

RESULTS

Implementation

Education was conducted in department huddles by the project manager, ED supervisor, IR manager, and charge nurses. The ED huddle occurred every 4-hours, Monday through Friday, and IR huddle occurred once daily. There were 40 huddles in the ED and 10 in the IR during implementation of PDSA Cycle 1. Two emails were sent to all RNs during the education time

period. ED had 63.9% (108 of 169) RNs educated (signed confirmation document) compared to 0% (0 of 23) of IR RNs.

Education in morning huddles was reconducted in IR department for the 2-weeks prior to PDSA Cycle 2 as the RNs were resistant to change during the first cycle. An initial email and then a follow up email was sent to RNs outlining the expectations moving forward with the process change. There were total of 10 IR huddles and 2 weekly emails sent to staff regarding this. During this cycle, 60.8% (14 of 23) of IR RNs signed the education confirmation document compared to 0% (14 of 23) in the first cycle. No implementation errors were reported during either cycle. (see Figure 7).

System Outcomes

There were 31 stroke cases in PDSA Cycle 1 and 18 stroke cases in PDSA Cycle 2 that presented to the ED and transferred to IR for a mechanical thrombectomy for a total of 49 stroke cases. The IR manager and the project manager did not collect any (N=0) handover tools during either PDSA cycles. Therefore, handover tools being completed, handover tool and chart audit concordant, and report being completed prior to patient transfer measures was not analyzed despite implementation of another cycle with re-education (see Figure 7).

Patient Outcomes

The door time goals were: ED to IR 50 minutes, IR door to arterial puncture time 20 minutes, and ED door to arterial puncture time is 70 minutes. Door times are reported below by month.

November, ED to IR average door time was 58.25 (standard deviation [SD] 24.86; range 29-114) minutes, with 37.5% (3 of 8) of cases meeting goal time. IR door to arterial puncture average time was 12.5 (SD 4.96; range 4-18) minutes, with 100% (8 of 8) of cases meeting goal

time. ED door to arterial puncture average time was 70.75 (SD 27.84; range 30-131) minutes, with 52.5% (5 of 8) of cases meeting goal time.

December, ED to IR average door time was 67.40 (SD 50.40; range 31- 241) minutes, with 40% (6 of 15) of cases meeting goal time. IR door to arterial puncture average time was 14.6 (SD 7.15; range 4-24) minutes, with 86.6% (13 of 15) of cases meeting goal time. ED door to arterial puncture average time was 82.06 (SD 51.44; range 47-257) minutes, with 53.3% (8 of 15) of cases meeting goal time.

January, ED to IR average door time was 52 (SD 20.67; range 19-70) minutes, with 37.5% (3 of 8) of cases meeting goal time. IR door to arterial puncture average time was 10.5 (SD 3.34; range 6-17) minutes, with 100% (8 of 8) of cases meeting goal time. ED door to arterial puncture average time was 62.5 (SD 20.41; range 32-87) minutes, with 62.5% (5 of 8) of cases meeting goal time.

February, ED to IR average door time was 56.9 (SD 17.39; range 24-88) minutes, with 33.3% (6 of 18) of cases meeting goal time. IR door to arterial puncture average time was 14.2 (SD 6.05; range 3-30) minutes, with 88.8% (16 of 18) of cases meeting goal time. ED door to arterial puncture average time was 71.16 (SD 20.57; range 38-112) minutes, with 55.5% (10 of 18) of cases meeting goal time.

ED to IR door time was compared from PDSA Cycle 1 and 2 (p-Value=1.00). ED to IR transition greater than 50 minutes (overall goal) were 62.5% in PDSA cycle 1 and 66.6% in cycle 2. ED to IR transition less than 50 minutes (goal time) were 37.5% in PDSA cycle 1 and 33.3% in cycle 2 (see Figure 8).

Characteristic Data

Pre/post-implementation ED (23 and 22) and IR (12 and 6) RNs were surveyed. The majority were from those who worked the day shift (0700-1900; 51% [18 of 35] pre and 43% [12 of 28] post-implementation) as shown in Figure 9.

Nurse Perceptions

RN knowledge of tool location increased from 52% to 73% in the ED and 83% to 100% in IR. ED RNs reported an increase from 13% to 32% in level of knowledge about the handover tool content being very good, and IR RNs increased from 42% to 67%. ED RNs use of the handover tool increased from 0% to 32%, and IR RNs use of the handover tool always decreased from 58% to 17%.

There was an increase from 22% to 42% in RN perception that the handover tool was very adequate in providing enough information to take care of the patient, and IR RNs had a decrease from 58% to 17% in this area. ED RNs reported that information rarely missed decreased from 57% to 55%, and IR RNs thought information rarely missed increased from 33% to 50%. ED RNs indicated that 63% of handover report was called prior to transfer most of the time (27%) or always (36%), and IR report was called most of the time (50%) or always (0%) .

The perception regarding the amount of support varied between the departments, with 82% of the ED RNs reported that support was somewhat adequate (50%) or very adequate (32%), but 33% IR RNs reported it was somewhat adequate (33%) or very adequate (0%) (see Figure 9).

Key themes identified through the open-ended questions regarding barriers included that ED RNs reported that IR RNs were not compliant with the handover process, were "difficult to get ahold of", or "refused to take report over the phone". IR RNs reported that they felt like the

"old process was more efficient" as they prioritized getting the patient on the procedural table first prior to report. For the other open-ended question regarding ways to improve care, ED RNs stated that there needs to be more compliance with IR RNs, "report conducted prior to transfer is more organized", and the handover tool outlines the key information needed to pass along to the IR RN. IR RNs once again stated that they wanted to revert back to the old process, but did not provide a rationale with the response (see Figure 9).

Nurse Satisfaction

For ED RNs, there was an increase from 30% to 41% in RNs being somewhat satisfied with the new handover process. There was also an increase from 17% to 23% in RNs who were somewhat unsatisfied with the process change.

For IR RNs, there was an increase from 17% to 33% in RNs being somewhat satisfied with the new handover process. There was also an increase from 17% to 33% in RNs who were somewhat dissatisfied with the process change (see Figure 9).

DISCUSSION

Numerous barriers hindered the project from reaching the door time goal expected. First, this project was completed during the Covid-19 pandemic where hospital systems and staff members were already overwhelmed with rapid change related to their daily tasks. In addition, many RNs contracted Covid-19 during the education phase or start of implementation, which impacted the first PDSA cycle.

Department culture also appeared to influence the adoption of the workflow interventions. ED RNs were eager to enact the interventions, while IR RNs were more resistant to change. IR culture did not allow for a collaborative approach between the two departments. Often, ED RNs would initiate the standardized handover tool and attempted to call report prior to

patient transfer, but it was challenging to get ahold of an IR RN to complete report or if a call went through the IR RN would indicate they were too busy to take report at that time. Therefore, the process was initiated, but not fully carried out from one department to the next to enable a seamless transition. In addition, two IR supervisors left their role, which caused lower stakeholder engagement and support in IR. Most of these barriers occurred during PDSA cycle 1, which created the need for PDSA cycle 2.

Even with the implementation of PDSA cycle 2, there was minimal improvements found in the IR department due to RN resistance. Most IR RNs reported that the handover tool did not provide an adequate amount of information to take care of the patient and that information was missed half of the time. This could have influenced the decrease in tool use in IR. Discussion with IR RNs revealed that they preferred their old workflow so they did not want to participate in the new workflow changes. This was a significant barrier as this culture hindered the transition process, which impacted the ED to IR door time results.

Despite these barriers, there were successes with the project. There was an increase in the knowledge of tool location, knowledge about tool content, and overall RN satisfaction for both departments. This organization has expressed interest in improving upon this handover process, but did not have the resources to devote to a quality improvement project. With the assistance of a project manager, change was initiated regarding ED to IR stroke transitions.

Nursing Implications

A streamlined nurse-to-nurse handover process is needed for stroke patient transitions. Through use of evidence-based interventions, such as a standardized handover tool, calling report prior to patient transfer, and documenting that the process was completed to ensure compliance, this can occur. In order for a stroke patient to receive a mechanical thrombectomy in

a timely manner, the sending and receiving RNs in each department (ED and IR) need to work together to efficiently and effectively complete handovers. The culture of departments can influence RN compliance with the handover process, which was the primary barrier in this project. The culture in IR needs to be addressed prior to starting a third PDSA cycle.

CONCLUSION

The Joint Commission and World Health Organization set minimum standards for handover report in order to prevent communication errors from occurring. [1-4] These standards include having a standardized process in place, the process is able to adapt to different situations, communication is clear especially when transferring patients to procedures, and an audit adherence to the standardized guidelines is in place by the organization.[1-4] These principles helped guide the project within the organization. As a result, ED and IR RN knowledge about tool location and tool content increased. ED RNs utilized the resource, while IR did not as frequently. This created an environment that was more prone to communication errors and hindered a timelier handover process. As a result, the ED to IR door time did not change a significant amount. Department culture needs to be addressed so that the handover process can be more efficient and impactful on stroke patient outcomes.

Figure 1. **The Linear Model of Communication**
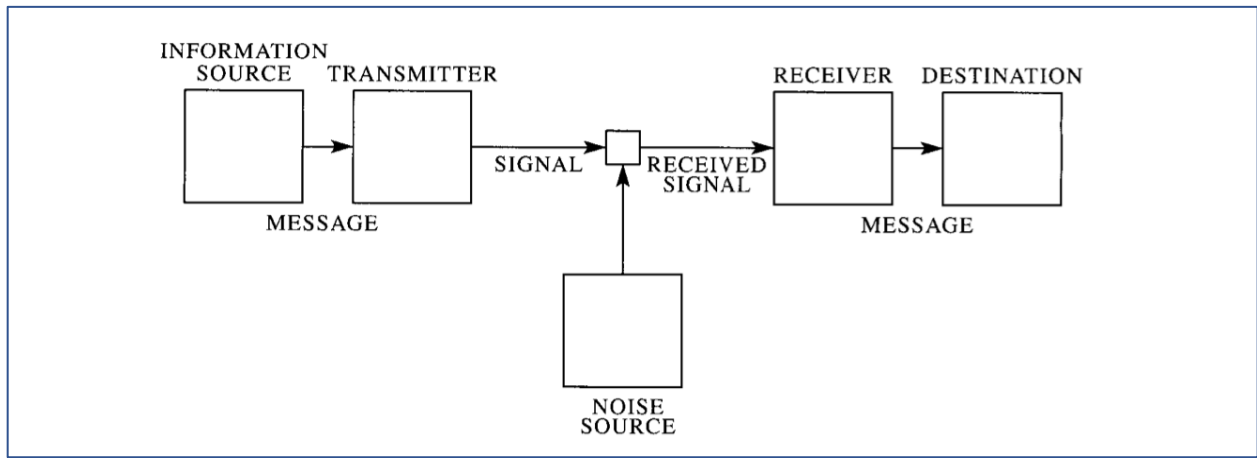
Figure 2. **Standardized Stroke Handover Tool (PDSA Cycle 1)**

NOTE: Use this form during every RN to RN handover during the first 8 hours post-acute stroke intervention (tPA and/or thrombectomy).

TRACKING

Assessments	Every 15 min. for 1 hour			Every 30 minutes for 5 hours						Every Hour for 18 hours					
	Hour 1			Hour 2	Hour 3	Hour 4	Hour 5	Hour 6		Hour 7	Hour 8	Hour 9	Hour 10	Hour 11	Hour 12
TIME															
VITAL SIGNS															
NEURO CHECKS															

SHEATH SITE CHECKS: PER POLICY - Checks to begin post sheath removal.

	Every 15 min.	Every 30 min.	Every hour					Location of sheath _____
	Hour 1		Hour 2	Hour 3	Hour 4	Hour 5	Hour 6	Size of sheath _____
TIME								Time of sheath pulled _____
GROIN CHECKS								Closure device? _____
PERIPHERAL VASCULAR CHECKS								Time of radial band placed _____
								Intervention (Check): ☐ Clot removal ☐ Stenting ☐ Angioplasty ☐ Aborted

REPORT

Utilize to assist with each RN to RN Handover. Each column provides the information that the RN is responsible for during hand over. **NOTE:** It is not an expectation that this section will be filled out completely, but may be used as an organizational tool.

Emergency Department	Interventional Radiology/PACU	Neuro ICU
Last Known Well:	Last Vitals:	Past Medical History:
Initial NIHSS Score:	Type of Sedation/Anesthesia (check): ☐ MAC or ☐ General	☐ Document Swallow Screen .
Neurological Deficits:	Complications During Procedure:	☐ Repeat NIHSS.
Blood Pressure Target Range/ Blood Pressure Management:	Family location (if applicable):	☐ Complete appropriate neuro/groin checks and vital signs for 24 hours.
Admission Bed:	Admission Bed:	☐ Joint Neuro/Groin check with all handovers.
	☐ Joint Neuro/Groin Check	

Figure 3. **Education Document (Front)**

Workflow Changes for Stroke Patients Transitioning from ED to IR

ED Nurses:

Step 1
- Stroke patient arrives in Emergency Department
- Stroke team assess patient.

Step 2
- **ED Nurse gathers the following information based on the stroke handover tool located in the Trauma Bay (Note: This tool will travel with the patient throughout the ED):**
- Last Known Well
- Initial NIHSS Score
- Neurological Deficits
- Blood Pressure Target Range/Blood Pressure Management

Step 3
- If a Mechanical Thrombectomy is indicated, **ED RN will call IR Charge Nurse, who may indicate the name of the IR RN, to give report prior to transfer.**
  - **Nights (2300-0700) - Radiology Holding Room RN (Voalte: BW Nightshift Holding Room RN) will receive report**
- Information conveyed should be directly from the completed handover tool.
- Ensure to ask if a Neuro suite is ready prior to transfer. Once ready, patient will be transferred to IR with ED RN.

IR Nurses:

Step 1
- If a Mechanical Thrombectomy is indicated, **IR Charge Nurse should expect a call from ED RN to complete report or delegate to IR RN for this patient prior to transfer.**

Step 2
- IR Nurse will write down pertinent medical information conveyed during report on the stroke handover tool.
- **IR Nurse will also write down their name, the ED RN name, and the time report was called at the bottom of the handover tool.**

Step 3
- Stroke patient will arrive in IR for Mechanical Thrombectomy.
- Priority will be to get the patient on the table to start the procedure.
- Utilize the stroke handover tool throughout the stroke case.
- **Following completion of stroke case, turn completed handover tool into IR manager (located in room 3).**
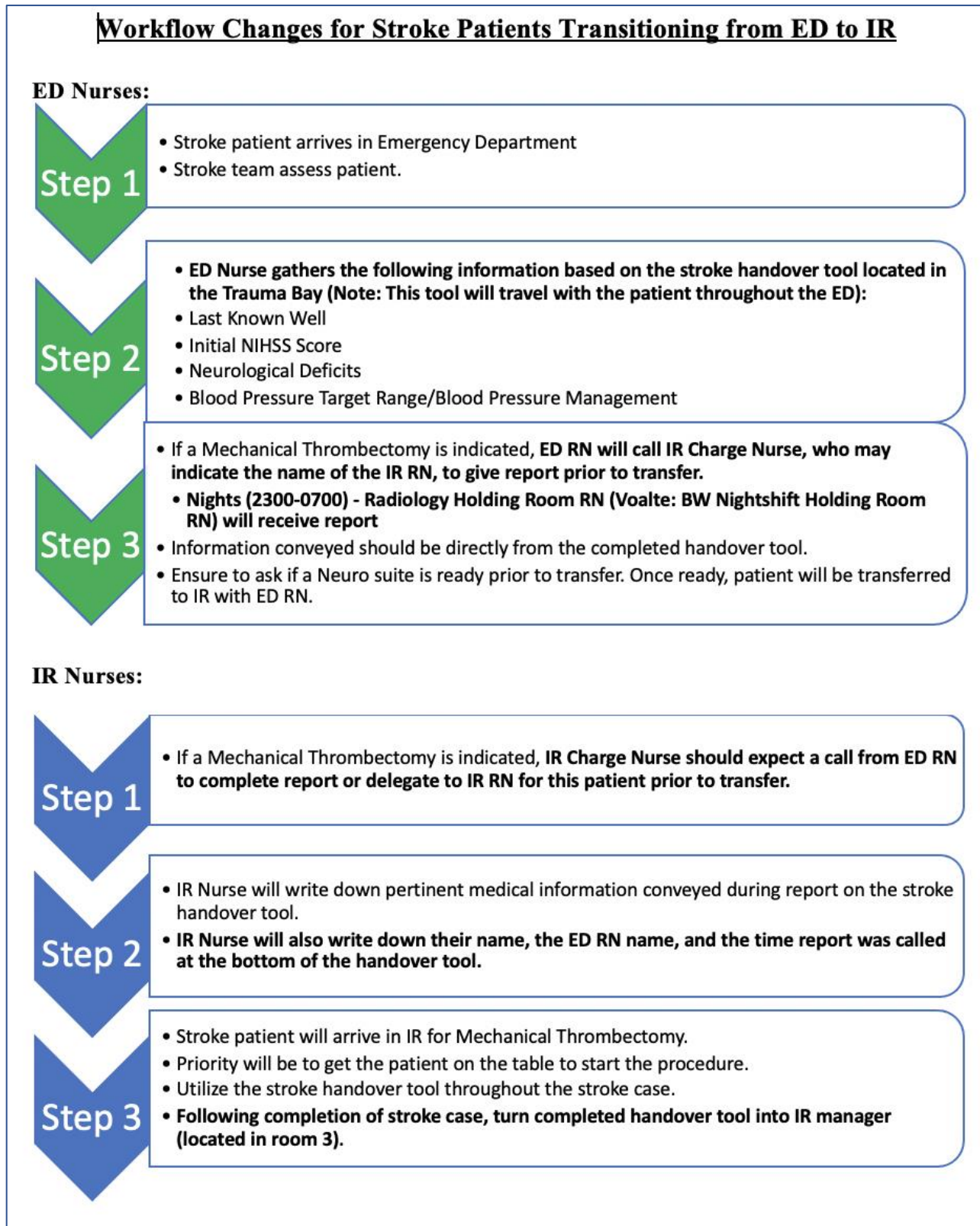
Figure 4. **Education Document (Back)**

Background on Communication Errors related to Handover:
- Communication errors in the United States healthcare system have accounted for at least 30% of all malpractice claims, resulting in 1,744 deaths, and 1.7 billion in malpractice costs over five years (Crico Strategies, 2016).
- In addition, the Joint Commission indicated that inadequate handovers cause 80% of all adverse events (The Joint Commission, 2018). This results in treatment delays, confusion regarding care, inaccurate clinical assessments, medication errors, avoidable readmissions, and increased cost (Sujan et al., 2014).
- Communication errors have been in the top three leading causes of sentinel events for every year since 2004 (The Joint Commission, 2015).
- Differences in communication styles between care providers or different departments, lack of a standardized tool, and increase complexity in care, all contribute to communication errors during handover (Stewart & Hand, 2017).

Objective:
- Improve the nurse to nurse handover for stroke patients transferring from Emergency Room to Interventional Radiology to undergo a mechanical thrombectomy through standardizing the process through:
  - Implementation of a standardized tool between departments
  - Calling report prior to patient transfer
  - Documentation that this process was completed

Rationale for Practice Change:
- Literature supports the implementation of a standardized handover tool as it has shown to (Pokojva & Bartlova, 2018; Rusticali & Piccolotto, 2019; Stewart & Hand, 2017):
  - Improves information recall
  - Creates a common language for communication
  - Increases confidence in presenting and receiving handover report
  - Improve efficiency and accuracy of handover
  - Improved nurse satisfaction
  - Decrease in communication errors
- The American Heart Association emphasizes that nurses play a pivotal role in assessing patients and coordinating timely transfers of patients throughout healthcare systems (Middleton, Grimley, & Alexandrov, 2015).
  - ED RN calling IR RN prior to patient transfer can:
    - Increase continuity of care
    - Ensure less distractions when report is given
    - Improve patient outcome by decreasing delays in care
    - Note: Each 15-minute decrease in treatment delays results in one month of additional disability-free life after a stroke (Meretoja et al., 2014).

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Figure 5. **The Institute for Healthcare Improvement- PDSA Cycle 1 and 2**

Implementation Framework for QI Project
PDSA: Cycle 1 (October 26, 2020- January 15, 2021)

- Improve upon identified weaknesses with new plan.
- Promote adaptability to ensure sustainability.
- Initiate second PDSA cycle.

Act

Plan

- Organizational Assessment.
- Literature Review.
- Project Proposal.

Study

Do

- Look at current process.
- Identify facilitators and barriers to the intervention.
- Receive staff feedback.
- Meeting with stakeholders to discuss project progression.

- Implement desired interventions in the ED and IR.
- Educate staff to ensure understanding and compliance.
- Facilitation.

PDSA: Cycle 2 (January 15, 2021- February 28, 2021)

- Disseminate findings.
- Improve upon identified weaknesses.
- Promote adaptability to ensure sustainability.

Act

Plan

- Multiple meetings with organizational leaders.
- Input from staff regarding process.
- Plan how to overcome barriers.
- Create new handover tool.
- Discussion with IR staff that this is a requirement.
- Reeducate IR staff only.
- Place bin in IR Neuro suite to turn in under labeled sign.

Study

Do

- Look at quality measures before and after the intervention.
- Identify facilitators and barriers to the intervention.
- Receive staff feedback.
- Analyze the project as a whole.

- Implement new changes in ED and IR.
- Educate IR staff to ensure understanding and compliance.
- Facilitation.

Figure 6. **Updated Standardized Stroke Handover Tool**

ED TO IR STROKE HANDOVER TOOL	
Emergency Department to IR	**IR to PACU**
Last known well:	Last Vitals:
Initial NIHSS Score:	Type of Sedation: MAC _____ General _____
Neurological Deficits:	Complications During Procedure:
Blood Pressure Target Range/ Blood Pressure Management:	Endovascular Interventions: Clot removal _____ Stenting _____ Angioplasty _____ Aborted _____
IV tPA bolus Given? Time _____	Location of Sheath: Size of Sheath: Time Sheath Pulled: Closure Device? Time Radial Band Placed:
Admission Order Placed:	Admission Bed:
Family presence (if applicable):	Joint neuro/groin check with ICU RN _____
ED RN Name (received report from):	IR RN Name: Date/Time report received from ED:

IR RN : PLACE COMPLETED FORM IN BIN LOCATED IN ROOM 3

-Tear this part off for the provider, if requested-

Door Time: _____　　　Device Deployment: _____ / _____ / _____ / _____

Access: _____ / _____ / _____　　　Reperfusion Time: _____ / _____ / _____ / _____

Figure 7. **Implementation and System Measures**

| Factors | Measures | PDSA Cycle 1 | | PDSA Cycle 2 |
		ED	IR	IR Only
Implementation Measures	Education Document Signed	63.9% (108 of 169)	0% (0 of 23)	60.8% (14 of 23)
	Number of Huddles Completed (Mon-Fri for 2 weeks)	40	10	10
	Number of Staff in Huddles	0700, 1900: 20-30 1100, 1500: 10-20	0900: 1-10	0900: 1-10
	Number of Emails Sent to Staff	2	2	2
	Implementation Errors	0	0	0

PDSA Cycle 1

Factors	Measures	Results
System Measures	Number of cases examined	31
	IR Manager obtained handover tool	0
	Handover tool completed	0
	Handover tool and chart audit concordant	N/A
	Report completed before procedure	N/A

PDSA Cycle 2

Factors	Measures	Results
System Measures	Number of cases seen	18
	IR Manager obtained handover tool	0
	Handover tool completed	0
	Handover tool and chart audit concordant	N/A
	Report completed before procedure	N/A

Figure 8. **Patient Measures**

Timing per Month

PDSA Cycle 1

November (n=8)			
Target Times:	ED to IR Door **(50 min)**	IR Door to Arterial Puncture **(20 min)**	ED Door to Arterial Puncture **(70 min)**
Average Time (Mean):	58.25 min	12.5 min	70.75 min
Goal Met % (n):	37.5% (3)	100% (8)	62.5% (5)

December (n=15)			
Target Times:	ED to IR Door **(50 min)**	IR Door to Arterial Puncture **(20 min)**	ED Door to Arterial Puncture **(70 min)**
Average Time (Mean):	67.40 min	14.6 min	82.06 min
Goal Met % (n):	40% (6)	86.6% (13)	53.3% (8)

January (n=8)			
Target Times:	ED to IR Door **(50 min)**	IR Door to Arterial Puncture **(20 min)**	ED Door to Arterial Puncture **(70 min)**
Average Time (Mean):	52 min	10.5 min	62.5 min
Goal Met % (n):	37.5% (3)	100% (8)	62.5% (5)

PDSA Cycle 2

February (n=18)			
Target Times:	ED to IR Door **(50 min)**	IR Door to Arterial Puncture **(20 min)**	ED Door to Arterial Puncture **(70 min)**
Average Time (Mean):	56.9 min	14.2 min	71.16 min
Goal Met % (n):	33.3% (6)	88.8% (16)	55.5% (10)

ED to IR Door Time

	% (n)			
Factors	Measures	PDSA Cycle 1	PDSA Cycle 2	p-value
Patient Measure: ED to IR Door Time	> 50 min	62.5% (5)	66.6% (12)	p= 1.00
	< 50 min	37.5% (3)	33.3% (6)	

Figure 9. **Nurse Survey Results (Characteristic Data, Perception, Satisfaction Measures)**

ED Nurse Satisfaction

	Very unsatisfied	Somewhat unsatisfied	Neutral	Somewhat satisfied	Very satisfied	No response
Pre	17%	17%	26%	30%	9%	0%
Post	9%	23%	18%	41%	5%	5%

■ Pre ■ Post

IR Nurse Satisfaction

	Very unsatisfied	Somewhat unsatisfied	Neutral	Somewhat satisfied	Very satisfied
Pre	25%	17%	33%	17%	8%
Post	17%	33%	17%	33%	0%

■ Pre ■ Post

Post- Implementation Only

Amount of Support Provided

	Very inadequate	Somewhat inadequate	Neutral	Somewhat adequate	Very adequate	No response
ED	0%	0%	9%	50%	32%	9%
IR	0%	33%	33%	33%	0%	0%

■ ED ■ IR

Report Called Prior to Transfer

	Never	Rarely	Some of the time	Most of the time	Always
ED	5%	14%	18%	27%	36%
IR	17%	0%	33%	50%	0%

■ ED ■ IR

Factors	Measures	Responses (Open Ended)
Perception Measure	Organizational Barriers: **Pre-Implementation**	• **Handover tool not utilized; Unaware of standardized tool.** • **Could not identify where the standardized tool was located on unit.** • ED performs multiple handovers before transferring patient to IR. • **IR and ED using different handover forms- difficult to follow along during report.** • Lack of background in report. • **Timing of report is not consistent (before or after patient transitions).**
	Organizational Barriers: **Post-Implementation**	• **IR not on board with the new handover process.** • IR RN not always signed into Voalte phone, so difficult to contact to complete report. • IR would not take report via phone. • Time.

Factors	Measures	Responses (Open Ended)
Perception Measure	Ways to Improve Care **Pre-Implementation**	• IR priority focused on getting patient ready for procedure; ED priority to give handover. • Unclear who ED should give handover report to in IR. • **Further education on standardized tool is needed.** • **Need to initiate standardized tool in ED.**
	Ways to Improve Care: **Post-Implementation**	• "Process is adequate as a similar process works well with the Cath lab." • **"Report involves the core information needed at that time in care so it is a simple process and would not change."** • IR log into Voalte phones. • IR consistently take report via phone. • **Report prior to transfer creates a more organized care transition.** • IR nurses liked the old process better.

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Improving Handover Process for Stroke Patients Transferring from Emergency Department to Interventional Radiology

Megan Buchman

DNP Project Defense

April 19th, 2021

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Objectives for Presentation

1. Review the clinical problem.

2. Review the organizational assessment and literature review based on current issue.

3. Review the project plan.

4. Discuss project results, project implications, and the organizations next steps.

5. Discuss application of the DNP Essentials to this project.

Introduction

- Communication errors have been in the top three leading causes of sentinel events for every year since 2004 (The Joint Commission, 2015).

- The Joint Commission indicated that inadequate handovers cause 80% of all adverse events (The Joint Commission, 2018).

- Differences in communication styles between care providers or different departments, lack of a standardized tool, and increase complexity in care, all contribute to communication errors during handover (Stewart & Hand, 2017).

- A knowledge gap still exists on how to standardize the handover process to improve communication (Bakon et al., 2017; Robertson et al., 2014, Smeulers et al., 2014).

Organizational Assessment

The Six-Box Organizational Model

Weisbord, M. (1976). Organizational diagnosis: Six places to look for trouble with or without a theory. *Organizational Management, 1*(4), 430-447. Doi: 10.1177/105960117600100405
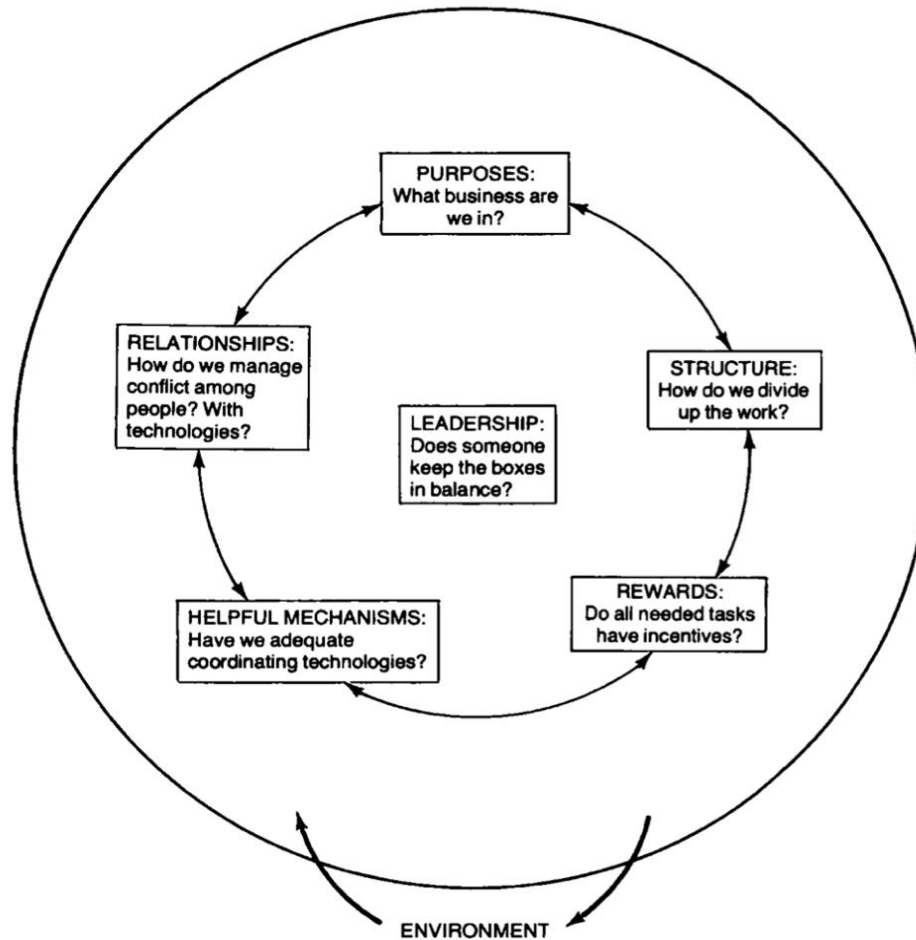
The Six-Box Organizational Model
(Weisbord, 1976).

Key Components	Key Concepts	Outcomes
Purpose	Goal clarity and agreement.	Identify priorities to create programs, projects, or products.
Structure	Goals and guidelines within an organization to improve outcomes.	Form creates function.
Relationships	How people, units, and their technologies function together within the work setting.	Conflict or cohesive workflow.
Rewards	Physical reward or verbal recognition for accomplishing a desired task.	Growth, responsibility, and achievement within the work setting.
Leadership	Behaviors that define purpose, enforce standards, and elicit support.	Formal and informal systems are in balance through effective leadership within an organization.
Mechanisms	System that binds an organization together.	Problem-solving operations in place to help keep the organization functioning.

Organizational Survey (Handout)

Type of Data	Specific Data Gathered
Characteristics	Work Location
	RN Shift Worked
Knowledge	Knowledge of Tool Location
	Knowledge Level about Tool
Use of Tool	Frequency of Tool Use
	Tool Providing Enough Information
Information Missed	Perception of Information Missed
Satisfaction	Level of Nurse Satisfaction
Barriers Identified & Improvement of Care	Open Comments from Staff

SWOT Analysis

(Moran et al., 2017).

Strengths	Weaknesses
• **Magnet designated organization and Comprehensive Stroke Center** (XXX, 2018). • Written policies and procedures in place. • **RN willingness for change.** • Standardized tool is a low-cost intervention.	• **Different handover tools used in each department.** • Incomplete handover or not completed at all. • **No tracking system or sustainability plan.** • Time to conduct handover is limited. • Loss of information- Multiple ED RNs caring for patient before transferring. • ED and IR RN perceptions are different.
Opportunities	Threats
• **Create standardized process for handover report** (Pokojva & Bartlova, 2018; Rusticali & Piccolotto, 2019; Stewart & Hand, 2017). • **Education in both departments** regarding standardization of process (Rusticali & Piccolotto, 2019). • Create a **monitoring system** to ensure compliance (Powell et al., 2015). • Create a **sustainability plan** (Hailemariam et al., 2019).	• **Patient safety during transition if not completed.** • Time sensitive nature of transition can cause handover to not be completed (Sujan et al., 2014). • **Lack of standardized tool and increased care complexity causes increased prevalence of communication errors** (Stewart & Hand, 2017).

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Clinical Practice Question

- Does a standardized process, involving a handover tool, for stroke patients transitioning from the emergency department to interventional radiology improve communication between departments to effectively take care of the patient and improve nurse satisfaction?

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Literature Review

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Aim of Literature Review

- Analyze the outcome of implementing standardization strategies during handover process.
    - Effectiveness of standardized handover tools.
    - Adequate amount of information conveyed.
    - Decrease communication errors.
    - Increase nurse satisfaction.

PRISMA Figure

- Three systematic reviews were included.
- An average of 1,835 handovers were observed within each systematic review, with an **approximate total of 5,505 handovers.**

| Identification | Articles identified using key words in CINHL Complete, PubMed, and ProQuest Medical databases (n=788) | Additional articles identified through review of references (n=21) |

Articles after duplicates removed (n=778) → Duplications Removed (n=31)

Articles screened (n=778) → Records excluded after title and abstract reviewed for reasons pertaining to language, source, setting, population, intervention, comparison, and outcomes (n= 768)

Full text articles assessed for eligibility (n=10) → Full-text articles excluded for reasons pertaining to methods, setting, population, intervention, comparison, and outcomes (n= 7)
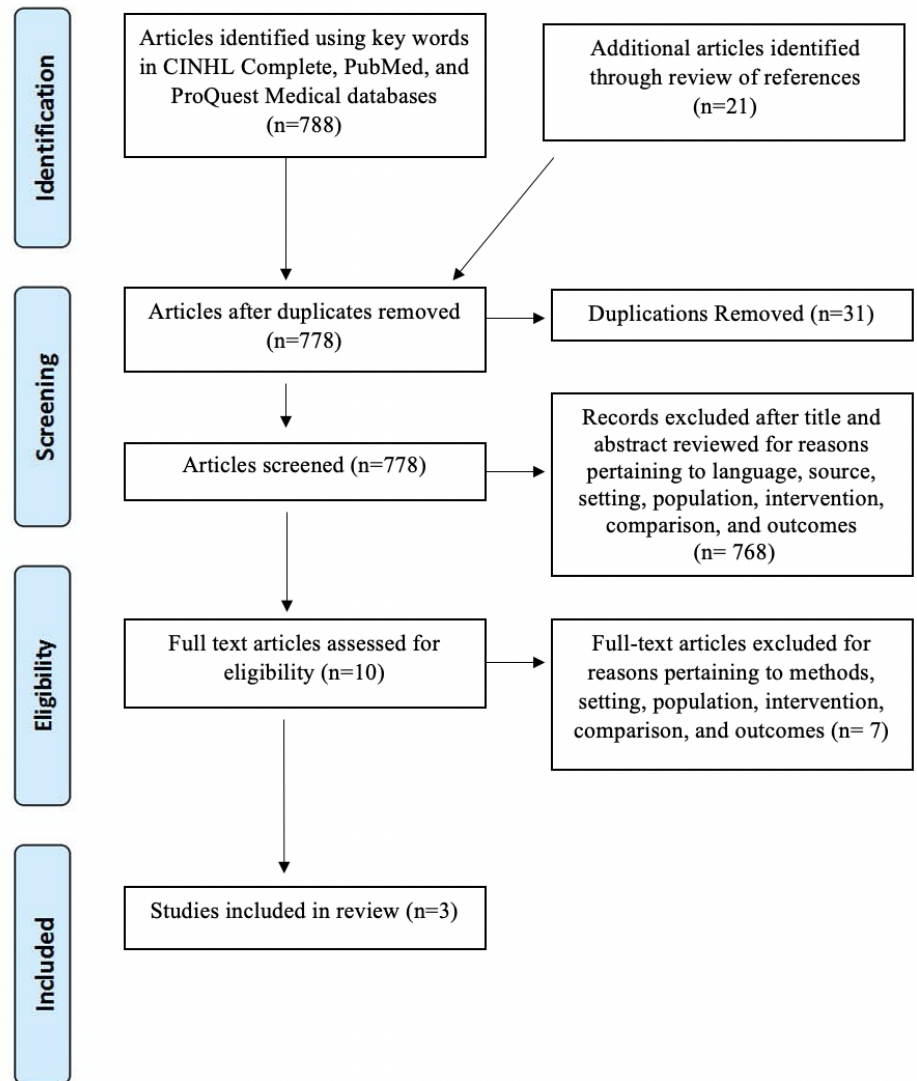
Studies included in review (n=3)

Figure. Flow diagram of search selection process. Adapted from "Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement," by D. Moher, A. Liberati, J. Tetzlaff, D. Altman, and PRISMA Group. Copyright 2009 by *PLoS Medicine.*

Results (Handout)

Systematic Review #1

- Included 28 studies (Pokojova & Bartlova, 2018).
- **Standardized tools** (SBAR, I-PASS, body system models, or models for trauma patients) have been effective in helping with communication and information recall during the handover process when used during every care transition.

Systematic Review #2

- Included 10 studies (Rusticali & Piccolotto, 2019).
- **A standardized tool** (SBAR and ISBAR) should be used as a guide to conduct handover, but can be modified to adapt to specialty areas if needed.
- **Staff training** is also a necessary component to increase adherence to new recommendations.

Systematic Review #3

- Included 17 studies (Stewart & Hand, 2017).
- The use of a **standardized tool** (SBAR) creates a common language for communication as it increases confidence in presenting and receiving handover report, improves efficiency, and accuracy of handover, improves the perception of effective communication and is easily adapted by health care professionals.

Summary

- Handover is a vital time for transfer of information.

- Standardized handover tool improves communication and patient safety (Pokojva & Bartlova, 2018; Rusticali & Piccolotto, 2019; Stewart & Hand, 2017).

- One tool is not superior over another tool, but the standardization of a tool within an organization is what makes it effective (Pokojva & Bartlova, 2018; Rusticali & Piccolotto, 2019; Stewart & Hand, 2017).

- Staff training and monitoring improves adherence to tool (Rusticali & Piccolotto, 2019).

Project Plan

Problem Statement

- A standardized process between emergency department and interventional radiology needed evaluation and implementation strategies to improve nurse to nurse handover.

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Phenomenon Model

The Linear Model of Communication
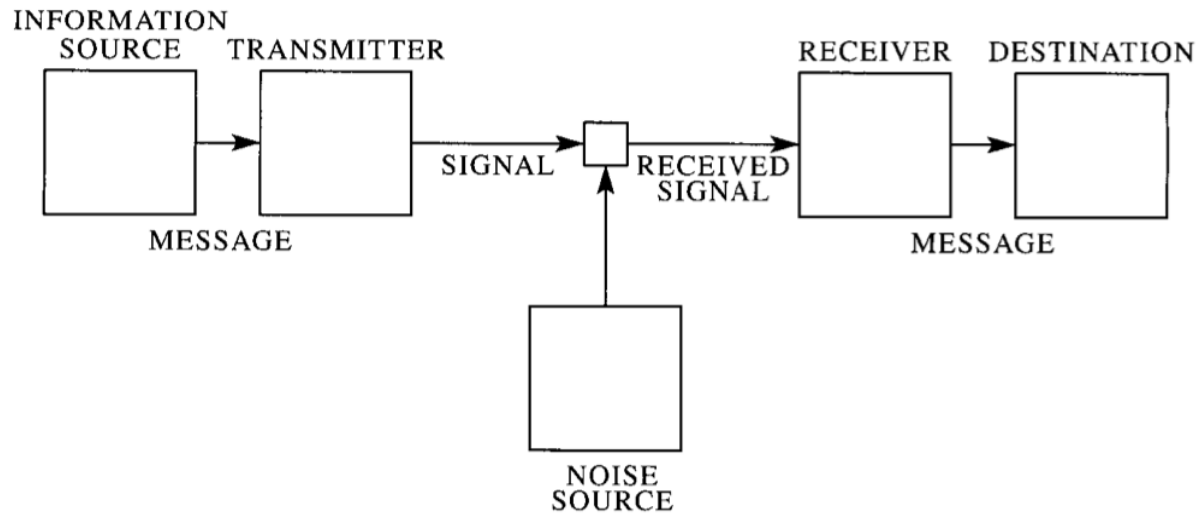
Adapted from "A mathematical theory of communication," by C. Shannon, 1948, *The Bell System Technical Journal, 27*(3), 379-423.

Project Purpose

- Purpose: Improve the nurse to nurse handover process for stroke patients that are transferring from the emergency department to interventional radiology through an updated standardized process to ensure patient safety and increase nurse satisfaction.

- Type of Project: Quality Improvement.
- IRB approval obtained from project site.

Project Plan Objectives

1. Review setting, participants, and key stakeholders involved.

2. Review implementation strategies utilized.

3. Review implementation framework.

4. Review project measures and analysis plan.

5. Review project timeline.

Setting & Participants

- Setting:
  - Magnet Hospital and Comprehensive Stroke Center (XXX, 2018).
    - Many organization locations, but only one designated hospital to perform a mechanical thrombectomy.
    - The amount of emergent endovascular stroke cases has progressively increased every year.
  - Departments involved: ED and IR
    - ED: Level 1 Trauma Center focuses on stabilization before transferring.
    - IR: Focuses on performing lifesaving interventions.

- Participants:
  - Nurses in ED and IR
  - Adult stroke patients

Key Stakeholders
(Moran et al., 2017).

Implementation Framework for QI Project

• Planned how to improve upon the current process and how to overcome barriers to see improvement within the next cycle of change.

• Outlined the desired change that was to be implemented and identified all key parts needed to ensure the plan was enacted.

Act

Plan

Study

Do

• Studied project measures before, during, or after implementation to see effectiveness of project plan.

• Implemented the desired change.

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Implementation Strategies & Elements

Implementation Strategies: Overview

Plan:
1. Assessed readiness of organization
2. Conducted local needs assessment
3. Identified barriers and facilitators
4. Expert involvement

Do:
5. Workflow change
6. Developed and Distributed education materials
7. Education time
8. Obtained formal commitment
9. Facilitation

Study:
10. Audit and provide feedback

Act:
11. Conducted cyclical small tests of change
12. Disseminated the results

(Powell et al., 2015).

Implementation Strategies: Plan

1. **Assessed readiness of organization:**
   – Determined aspects of an organization that were ready to implement.
     • Organizational discussions with ED supervisor, IR manager, CNS of stroke program.
     • Nurse surveys.
2. **Conducted local needs assessment:**
   – Gathered information related to current situation.
     • Through organizational assessment.
3. **Identified barriers and facilitators:**
   – Determined barriers that could slow implementation.
   – Determined strengths that could be utilized to facilitate.
     • Staff discussions.
     • Manager/supervisor discussions.
     • Nurse surveys.
4. **Expert involvement:**
   – Identified individuals who could provide guidance throughout implementation.
     • Clinical advisor (GVSU).
     • Site mentors (unit manager and hospital supervisor).
     • Clinical nurse specialist from the stroke program.

(Powell et al., 2015).

Implementation Strategies: Do

5. **Workflow change:**

– Used standardized tool in ED and IR.

  • Completed by ED and IR nurses.

– ED RN to call IR RN prior to patient transfer.

  • ED and IR RN utilized standardized tool while completing the handover via phone.

– Documentation completed on standardized tool.

  • Completed by IR RN.

  • Documentation included: Nurses names (from ED and IR), time ED RN called IR RN to give report, and the date.

  • This tool was turned into IR manager or bin located in the IR Neuro suite to track compliance.

(Powell et al., 2015).

Standardized Tool in ED/IR

- **ED:** Laminated standardized tool in stroke packet used during stroke assessment. Hard copies available at nurses station.

- **IR:** Hard copies of standardized tool located in Neuro suites and holding room.

ED TO IR STROKE HANDOVER TOOL

Emergency Department to IR	IR to PACU
Last known well:	Last Vitals:
Initial NIHSS Score:	Type of Sedation: MAC _____ General _____
Neurological Deficits:	Complications During Procedure:
Blood Pressure Target Range/ Blood Pressure Management:	Endovascular Interventions: Clot removal _____ Stenting _____ Angioplasty _____ Aborted _____
IV tPA bolus Given? Time _____	Location of Sheath: Size of Sheath: Time Sheath Pulled: Closure Device? Time Radial Band Placed:
Admission Order Placed:	Admission Bed:
Family presence (if applicable):	Joint neuro/groin check with ICU RN _____
ED RN Name (received report from):	IR RN Name: Date/Time report received from ED:

IR RN : PLACE COMPLETED FORM IN BIN LOCATED IN ROOM 3

-Tear this part off for the provider, if requested-

Door Time: _____

Access: _____ / _____ / _____

Device Deployment: _____ / _____ / _____ / _____

Reperfusion Time: _____ / _____ / _____ / _____

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Implementation Strategies: Do

6. **Developed and distributed education materials:**
   – Developed an outline that helped stakeholders understand the desired change.
   – Distributed multiple ways to reach maximum amount of participants (nurses).
   – Developed:
     • One page document with workflow change description on the front and rationale for practice change on the back.
     • Easy to understand flow diagram.
     • Based on collaborative input from both departments.
   – Distributed:
     • Employee weekly emails.
     • Huddle board in each department (ED and IR).

7. **Education time:**
   – Communicated objectives and expectations related to implementation.
   – Occurred for two weeks prior to implementation.
   – Education discussed at daily huddles in ED and IR.
   – Education conducted by project manager, ED supervisor, and IR manager.

8. **Obtained formal commitment:**
   – Written commitment from nurses that stated they understood and would follow the implementation.
   – Signed document once understanding education.
   – Located on huddle board next to education material.

(Powell et al., 2015).

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Education Document (Front)

- Hung on huddle boards in ED and IR.

- Sent to nurses via weekly email updates for further review.

- Aligns with strategy #4, 6, 7.

- Handout.

Workflow Changes for Stroke Patients Transitioning from ED to IR

ED Nurses:

Step 1
- Stroke patient arrives in Emergency Department
- Stroke team assess patient.

Step 2
- **ED Nurse gathers the following information based on the stroke handover tool located in the Trauma Bay (Note: This tool will travel with the patient throughout the ED):**
- Last Known Well
- Initial NIHSS Score
- Neurological Deficits
- Blood Pressure Target Range/Blood Pressure Management

Step 3
- If a Mechanical Thrombectomy is indicated, **ED RN will call IR Charge Nurse, who may indicate the name of the IR RN, to give report prior to transfer.**
  - **Nights (2300-0700) - Radiology Holding Room RN (Voalte: BW Nightshift Holding Room RN) will receive report**
- Information conveyed should be directly from the completed handover tool.
- Ensure to ask if a Neuro suite is ready prior to transfer. Once ready, patient will be transferred to IR with ED RN.

IR Nurses:

Step 1
- If a Mechanical Thrombectomy is indicated, **IR Charge Nurse should expect a call from ED RN to complete report or delegate to IR RN for this patient prior to transfer.**

Step 2
- IR Nurse will write down pertinent medical information conveyed during report on the stroke handover tool.
- **IR Nurse will also write down their name, the ED RN name, and the time report was called at the bottom of the handover tool.**

Step 3
- Stroke patient will arrive in IR for Mechanical Thrombectomy.
- Priority will be to get the patient on the table to start the procedure.
- Utilize the stroke handover tool throughout the stroke case.
- **Following completion of stroke case, turn completed handover tool into IR manager (located in room 3).**

Education Document (Back)

- Outlined pertinent information related to:
  - Background.
  - Objectives.
  - Rationale for practice change.

- Aligns with strategy #4, 6, 7.

- Handout.

Background on Communication Errors related to Handover:

- Communication errors in the United States healthcare system have accounted for at least 30% of all malpractice claims, resulting in 1,744 deaths, and 1.7 billion in malpractice costs over five years (Crico Strategies, 2016).
- In addition, the Joint Commission indicated that inadequate handovers cause 80% of all adverse events (The Joint Commission, 2018). This results in treatment delays, confusion regarding care, inaccurate clinical assessments, medication errors, avoidable readmissions, and increased cost (Sujan et al., 2014).
- Communication errors have been in the top three leading causes of sentinel events for every year since 2004 (The Joint Commission, 2015).
- Differences in communication styles between care providers or different departments, lack of a standardized tool, and increase complexity in care, all contribute to communication errors during handover (Stewart & Hand, 2017).

Objective:

- Improve the nurse to nurse handover for stroke patients transferring from Emergency Room to Interventional Radiology to undergo a mechanical thrombectomy through standardizing the process through:
  - Implementation of a standardized tool between departments
  - Calling report prior to patient transfer
  - Documentation that this process was completed

Rationale for Practice Change:

- Literature supports the implementation of a standardized handover tool as it has shown to (Pokojva & Bartlova, 2018; Rusticali & Piccolotto, 2019; Stewart & Hand, 2017):
  - Improves information recall
  - Creates a common language for communication
  - Increases confidence in presenting and receiving handover report
  - Improve efficiency and accuracy of handover
  - Improved nurse satisfaction
  - Decrease in communication errors
- The American Heart Association emphasizes that nurses play a pivotal role in assessing patients and coordinating timely transfers of patients throughout healthcare systems (Middleton, Grimley, & Alexandrov, 2015).
  - ED RN calling IR RN prior to patient transfer can:
    - Increase continuity of care
    - Ensure less distractions when report is given
    - Improve patient outcome by decreasing delays in care
    - Note: Each 15-minute decrease in treatment delays results in one month of additional disability-free life after a stroke (Meretoja et al., 2014).

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Education Confirmation Form

- Documentation that nurses understood the new workflow change that occurred on their unit.

- Located on huddle board next to education document.

- Aligns with strategy #5, 6, 8.

- Handout.

Education Confirmation of Workflow Changes

By signing this document, I confirm that I understand the new workflow changes and expectations that will be implemented on my unit.

ED Nurses:
1. Using the standardized tool for stroke patients.
2. ED RN is to call report to IR RN prior to patient transfer to procedural space.

IR Nurses:
1. Use the standardized tool for stroke patient.
2. IR RN is to receive report from ED RN prior to patient transfer to procedural space.
3. IR RN is to document their name, the ED nurses name, and the time that report was called on bottom of handover tool.
4. Turn in handover report tool to IR manager once completed.

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Implementation Strategies: Do

9. **Facilitation:**

– Interactive problem solving and support that occurred in a context of a recognized need for improvement and a supportive interpersonal relationship.

- Internal: ED Supervisor and IR manager available for daily support.

- External: Project manager available for additional support.

- Ongoing collaborative feedback by monthly audits and meetings with internal stakeholders.

(Powell et al., 2015).

Implementation Strategies: Study

10. Audit and provide feedback:

– Collected and summarized clinical performance data during implementation and provided the results to each department in order to monitor, evaluate, and modify behavior.

– Audits conducted monthly and discussion with department leaders regarding progress.

- Clinical data: Provided results for system, implementation, and patient measures in virtual meetings with stakeholders.

(Powell et al., 2015).

Implementation Strategies: Act

11. Conducted cyclical changes:
– This strategy aligned with PDSA cycle.
– Small tests of change based on implementation phase to continually improve upon the care transition.
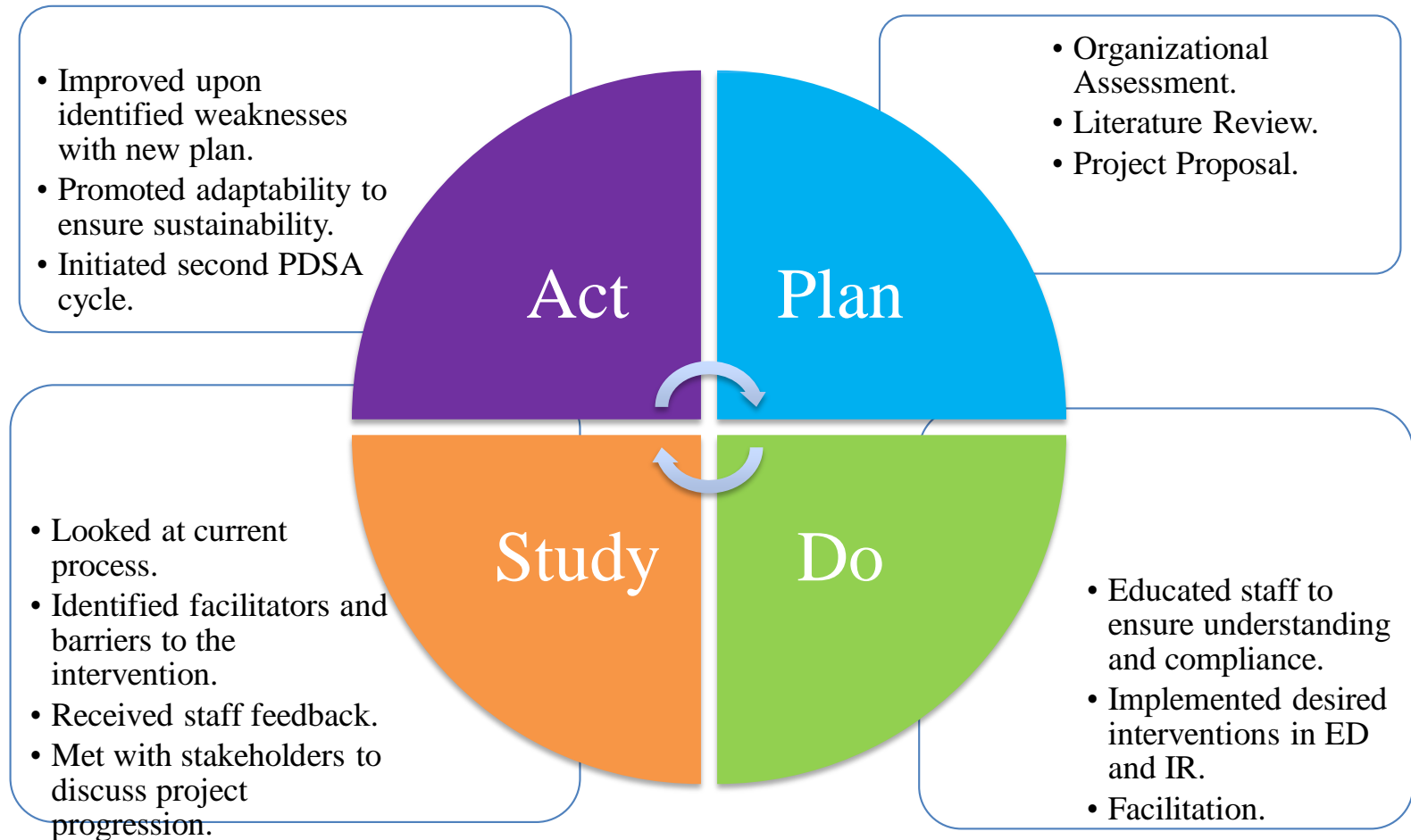
12. Disseminated the results:
– Distributed final results from all project measures to the organization.
– Described sustainability plan in detail for potential continual improvement within the organization.
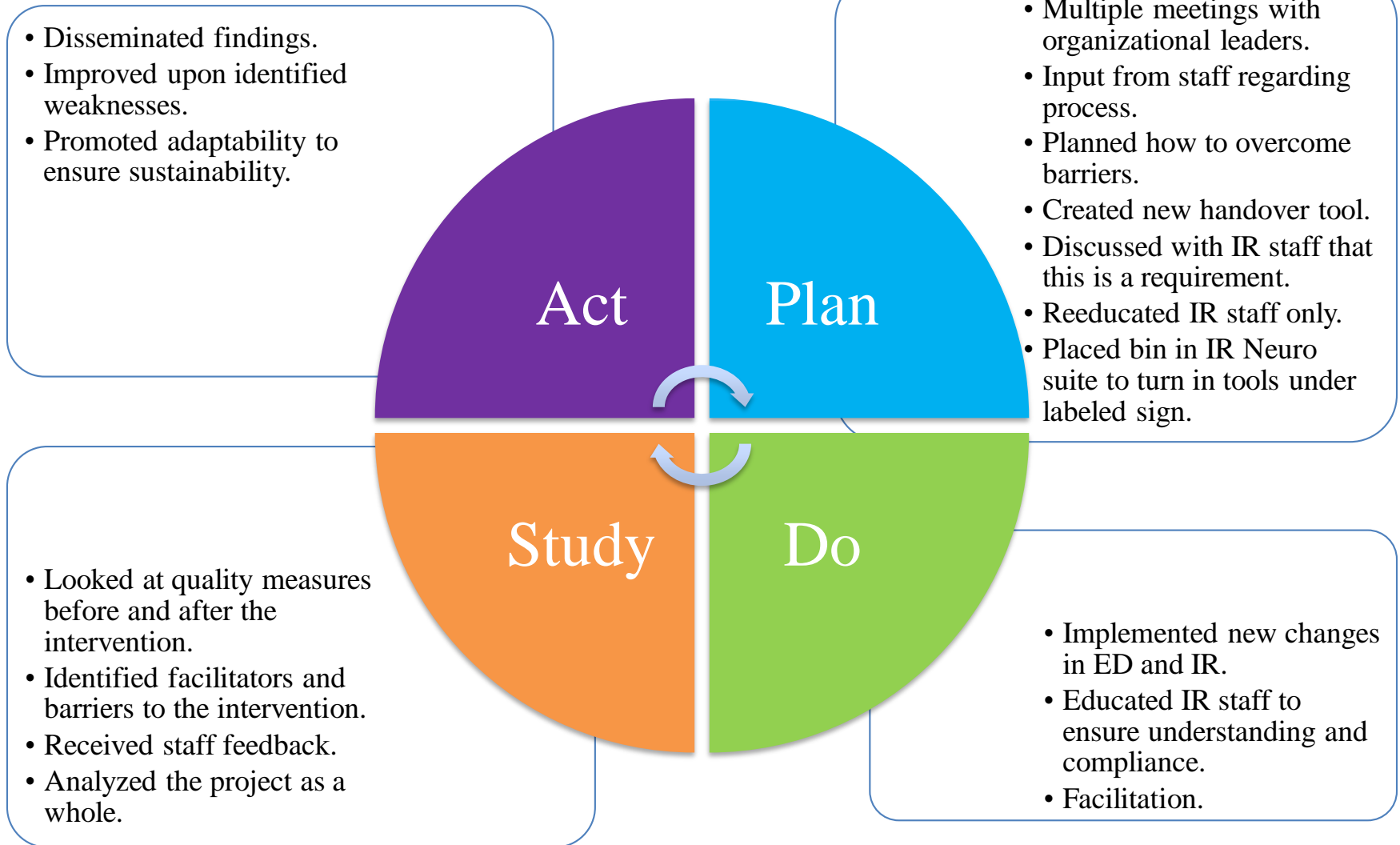– Final project defense.

(Powell et al., 2015).

Implementation Framework for QI Project
PDSA: Cycle 1 (October 26, 2020- January 15, 2021)

Act
- Improved upon identified weaknesses with new plan.
- Promoted adaptability to ensure sustainability.
- Initiated second PDSA cycle.

Plan
- Organizational Assessment.
- Literature Review.
- Project Proposal.

Study
- Looked at current process.
- Identified facilitators and barriers to the intervention.
- Received staff feedback.
- Met with stakeholders to discuss project progression.

Do
- Educated staff to ensure understanding and compliance.
- Implemented desired interventions in ED and IR.
- Facilitation.

(Institute for Healthcare Improvement, 2020)

PDSA: Cycle 2 (January 16, 2021- February 28, 2021)

- Disseminated findings.
- Improved upon identified weaknesses.
- Promoted adaptability to ensure sustainability.

- Multiple meetings with organizational leaders.
- Input from staff regarding process.
- Planned how to overcome barriers.
- Created new handover tool.
- Discussed with IR staff that this is a requirement.
- Reeducated IR staff only.
- Placed bin in IR Neuro suite to turn in tools under labeled sign.

Act

Plan

Study

Do

- Looked at quality measures before and after the intervention.
- Identified facilitators and barriers to the intervention.
- Received staff feedback.
- Analyzed the project as a whole.

- Implemented new changes in ED and IR.
- Educated IR staff to ensure understanding and compliance.
- Facilitation.

(Institute for Healthcare Improvement, 2020)

Evaluation & Measures (Handout)

- **Implementation Measures**
  - Education document signed
  - Number of huddles completed
  - Number of staff in huddles
  - Number of emails sent to staff
  - Implementation errors

- **System Measures**
  - Number of cases seen each month
  - IR Manager obtained handover tool
  - Handover tool completed
  - Handover tool and chart audit concordant
  - Report completed prior to transfer

- **Patient Measures**
  - Timing per Month
  - ED to IR Door Time

- **Characteristic Data**
  - Unit of employment
  - Shift worked

- **Perception Measures**
  - Knowledge of tool location
  - Knowledge level about tool
  - Frequency of tool use
  - Tool provided enough information
  - Information missed
  - Organizational barriers
  - Report completed prior to transfer
  - Amount of support provided by unit manager, charge nurse, and/or project manager during facilitation

- **Satisfaction Measures**
  - Nurse satisfaction in ED
  - Nurse satisfaction in IR

Analysis Plan

Topic	Measure	Analysis Plan
Characteristic Data	Survey Results	Descriptive Statistics- Pre/Post Implementation
Perception Measures	Survey Results	Descriptive Statistics- Pre/Post Implementation
Satisfaction Measures	Survey Results	Descriptive Statistics- Pre/Post Implementation
System Measures	Chart Audits Event Reports Manual Counting	Descriptive Statistics- Implementation Phase & Post Implementation Descriptive Statistics- Implementation Phase & Post Implementation Descriptive Statistics- Implementation Phase & Post Implementation
Implementation Measures	Manual Counting Survey Results Event Reports	Descriptive Statistics- Pre Implementation Descriptive Statistics- Post Implementation Descriptive Statistics- Implementation Phase & Post Implementation
Patient Measure	Event Reports	Fisher's Exact Test/mean value/p-value: Implementation Phase & Post Implementation Descriptive Statistics

Project Timeline

Plan

- January 2020- Identified project team and broad project topic.
- March 2020- IRB application submitted.
- May 2020- IRB approved; Identified specific project plan; Organizational Assessment started.
- June 2020- Literature Review started; Surveys sent to nursing staff in departments.
- July 2020- Organizational Assessment and Literature Review completed.
- September 2020- Shadowed in departments; Implementation strategies and quality measures identified.
- October 2020- Project Plan Defense completed; Start 2 week education before implementation.

Do

- November 2020 to February 2021- Implementation strategies integrated in ED and IR.

Study

- March 2021- Gathered data on quality measures; analyzed the results; identified strengths and weaknesses in order for this process to continually evolve; wrote manuscript.

Act

- April 2021- Presented results; Made recommendations for the future to enhance practice.

Budget & Resources

Improving Handover Process for Stroke Patients Transferring from Emergency Department to Interventional Radiology		
Expenses (Including Donated Resources)		
Project Team Time		
Nurse Manager	$2,270	52 hours (1hr per week) x $43.66
Nurse Supervisor	$2,444	52 hours (1hr per week) x $47.00
Clinical Nurse Specialist	$150.40	3 hours x $50.13
Registed Nurse	$2,775	30min each nurse (ED: 169; IR: 10) x $31.01
Project Manager Time	$13,955	450 hours x $31.01
Project Materials		
Qualtrics Online Software	$1,500	Annual Fee
Cost of Printing Materials	$30.00	200 sheets (100 each department)
Cost of Colored Paper (Office Max)	$16.50	200 sheets (100 each department)
Consultations		
Statistician	$143.91	3 hours x $47.97
Project Expense Total (including Donated Resources)	$23,284.81	
Donated Resources		
Project Manager Time	($13,955)	450 hours x $31.01
Qualtrics Online Software	($1,500)	Annual Fee
Cost of Printing Materials	($30.00)	200 sheets (100 each department)
Cost of Colored Paper (Office Max)	($16.50)	200 sheets (100 each department)
Statistician	($143.91)	3 hours x $47.97
Donated Resource Total	$15,645.41	
Total Expenses	$7,639.40	
Cost Savings		
Nurse Turnover	$44,400	(Per- Nurse Cost)
Reduction of Financial Cost if Door to Needle Time Goal Met	$61,375	(Per-Person Cost)
Total Potential Cost Savings	$105,775	

Project Results

Results: Implementation Measures on Education

| Factors | Measures | PDSA Cycle 1 | | PDSA Cycle 2 |
		ED	IR	IR Only
Implementation Measures	Education Document Signed	63.9% (108 of 169)	0% (0 of 23)	60.8% (14 of 23)
	Number of Huddles Completed (Mon-Fri for 2 weeks)	40	10	10
	Number of Staff in Huddles	0700, 1900: 20-30 1100, 1500: 10-20	0900: 1-10	0900: 1-10
	Number of Emails Sent to Staff	2	2	2
	Implementation Errors	0	0	0

Results: Implementation Measures on Education

RN Education Rate in ED

Not completed 36%

Completed 64%

RN Education Rate in IR
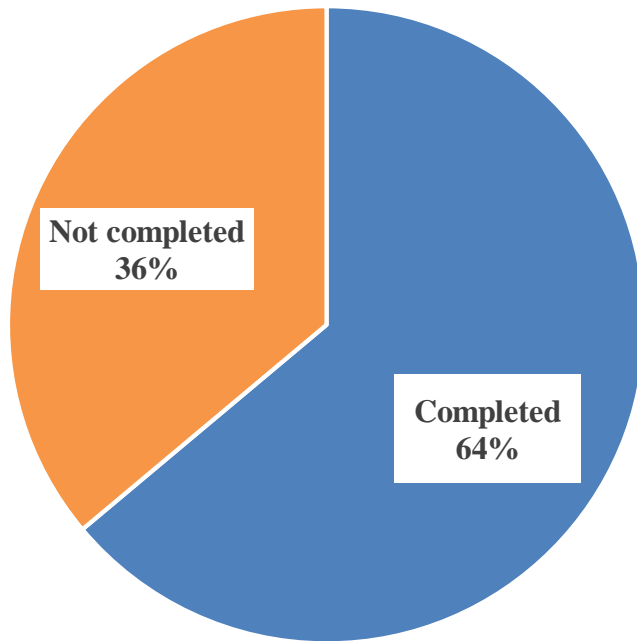
Not completed 39%
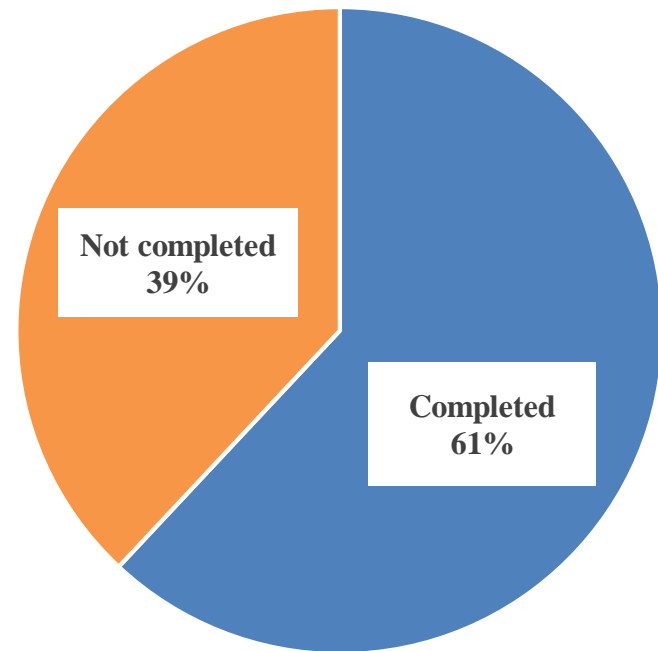
Completed 61%

Results: System Measures

PDSA Cycle 1

Factors	Measures	Results
System Measures	Number of cases	31
	IR Manager obtained handover tool	0
	Handover tool completed	0
	Handover tool and chart audit concordant	N/A
	Report completed before procedure	N/A

PDSA Cycle 2

Factors	Measures	Results
System Measures	Number of cases	18
	IR Manager obtained handover tool	0
	Handover tool completed	0
	Handover tool and chart audit concordant	N/A
	Report completed before procedure	N/A

Patient Measure: Timing per Month

PDSA Cycle 1

November (n=8)			
Target Times:	ED to IR Door **(50 min)**	IR Door to Arterial Puncture **(20 min)**	ED Door to Arterial Puncture **(70 min)**
Average Time (Mean):	58.25 min	12.5 min	70.75 min
Goal Met % (n):	37.5% (3)	100% (8)	62.5% (5)

December (n=15)			
Target Times:	ED to IR Door **(50 min)**	IR Door to Arterial Puncture **(20 min)**	ED Door to Arterial Puncture **(70 min)**
Average Time (Mean):	67.40 min	14.6 min	82.06 min
Goal Met % (n):	40% (6)	86.6% (13)	53.3% (8)

Patient Measure: Timing per Month

PDSA Cycle 1	January (n=8)		
Target Times:	ED to IR Door (50 min)	IR Door to Arterial Puncture (20 min)	ED Door to Arterial Puncture (70 min)
Average Time (Mean):	52 min	10.5 min	62.5 min
Goal Met % (n):	37.5% (3)	100% (8)	62.5% (5)

PDSA Cycle 2	February (n=18)		
Target Times:	ED to IR Door (50 min)	IR Door to Arterial Puncture (20 min)	ED Door to Arterial Puncture (70 min)
Average Time (Mean):	56.9 min	14.2 min	71.16 min
Goal Met % (n):	33.3% (6)	88.8% (16)	55.5% (10)

ED to IR Door Time Goal Met (%) - November

37.50%
62.50%
■ Yes ■ No
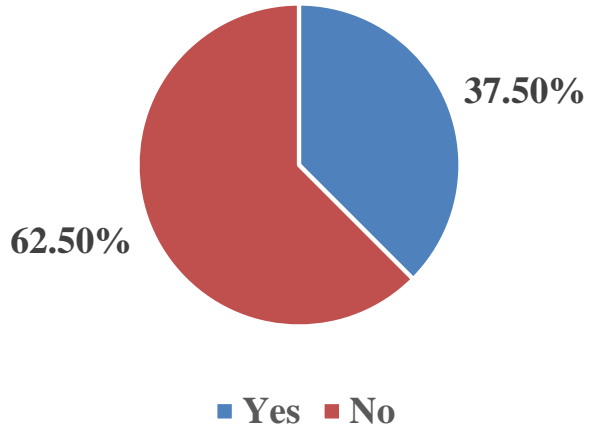
ED to IR Door Time Goal Met (%) - January

37.50%
62.50%
■ Yes ■ No
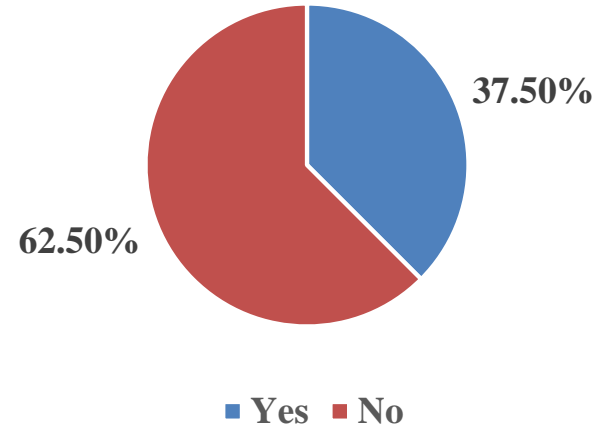
ED to IR Door Time Goal Met (%) - December

40.00%
60%
■ Yes ■ No
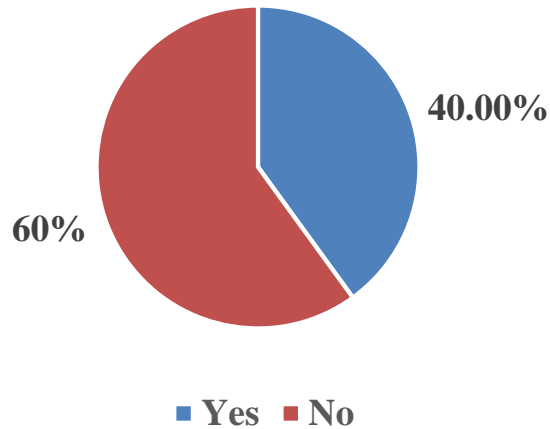
ED to IR Door Time Goal Met (%) - February
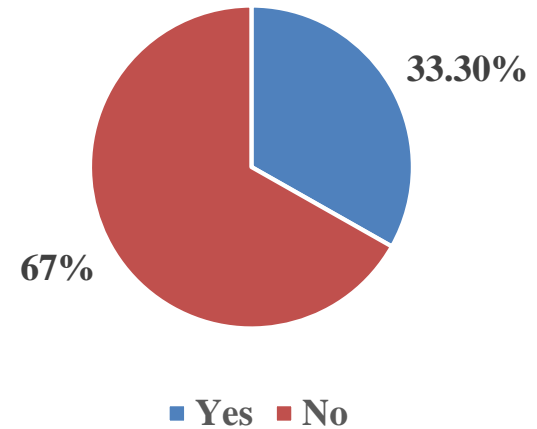
33.30%
67%
■ Yes ■ No

Patient Measures: ED to IR Door Time

Factors	% (n)			
	Measures	PDSA Cycle 1	PDSA Cycle 2	p-value
Patient Measure: ED to IR Door Time	> 50 min	62.5% (5)	66.6% (12)	p= 1.00
	< 50 min	37.5% (3)	33.3% (6)	

- Fishers Exact Test completed.
- p-Value not significant:
  - Small sample size.
  - Percent is similar so no significant change.
  - Only one month in PDSA cycle 2 due to time.
  - May take more time in PDSA cycle 2 to see change.
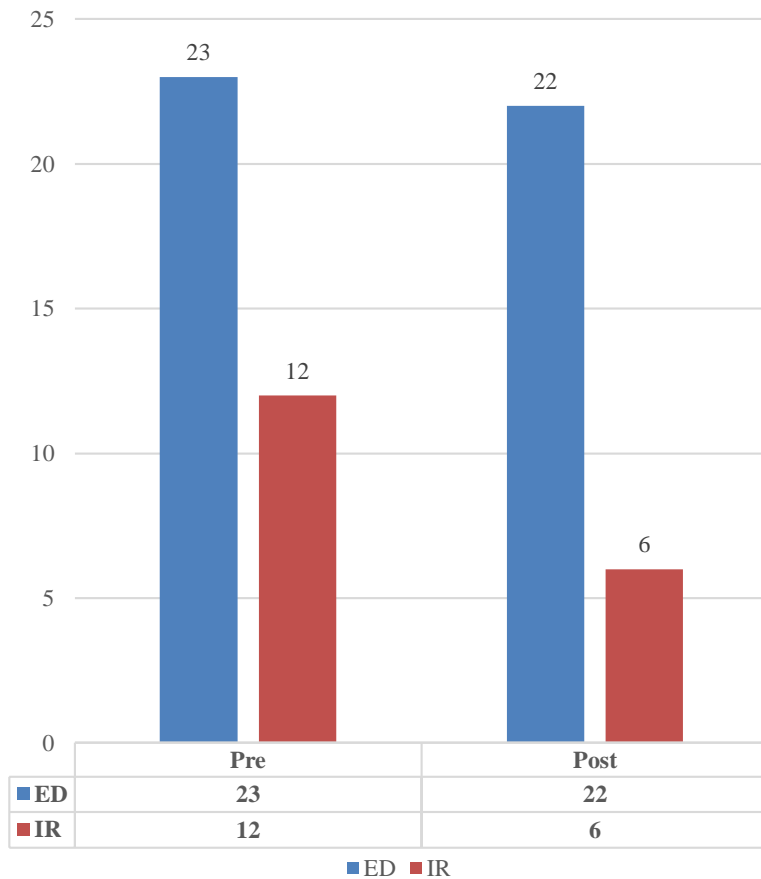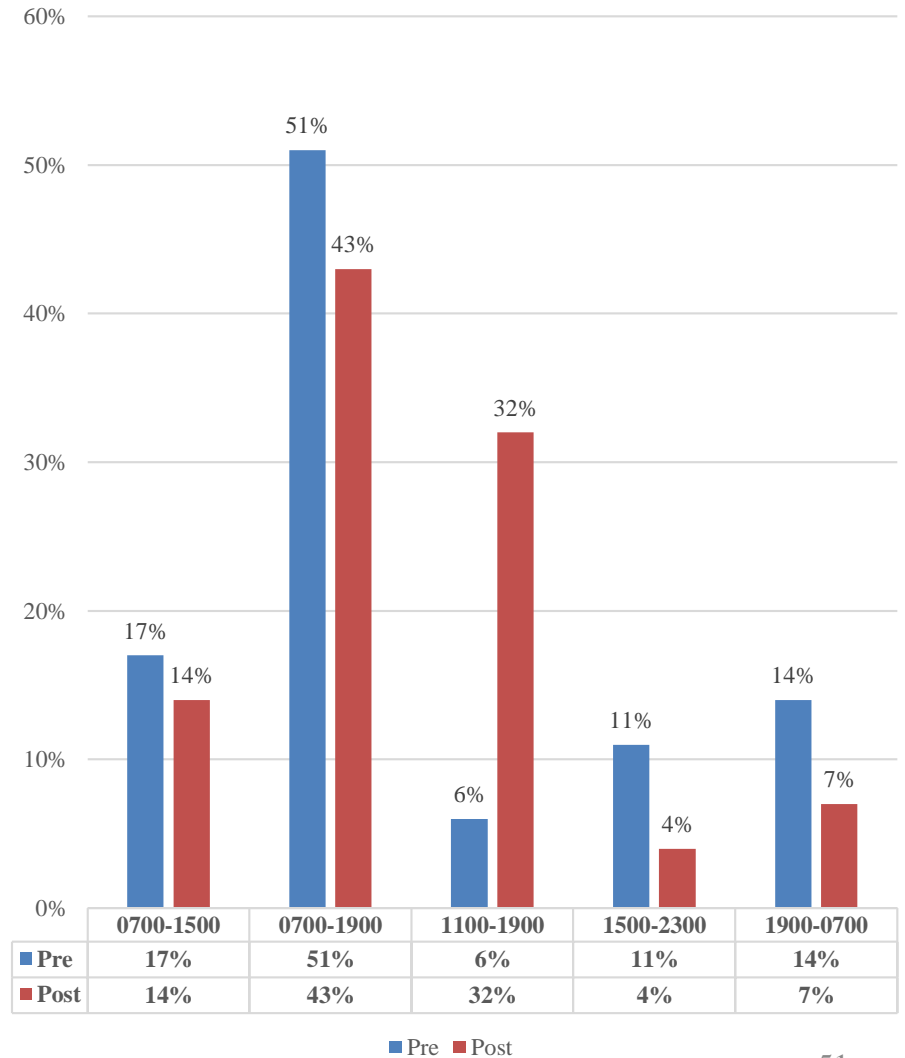
Patient Measures: ED to IR Door Time

PDSA Cycle 1

37.50%

62.50%

■ > 50 min   ■ < 50 min

PDSA Cycle 2

33.30%

66.60%

■ > 50 min   ■ < 50 min
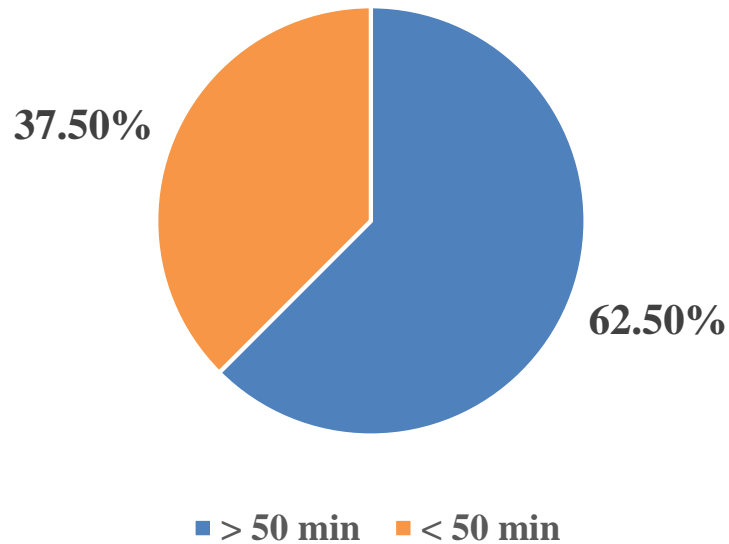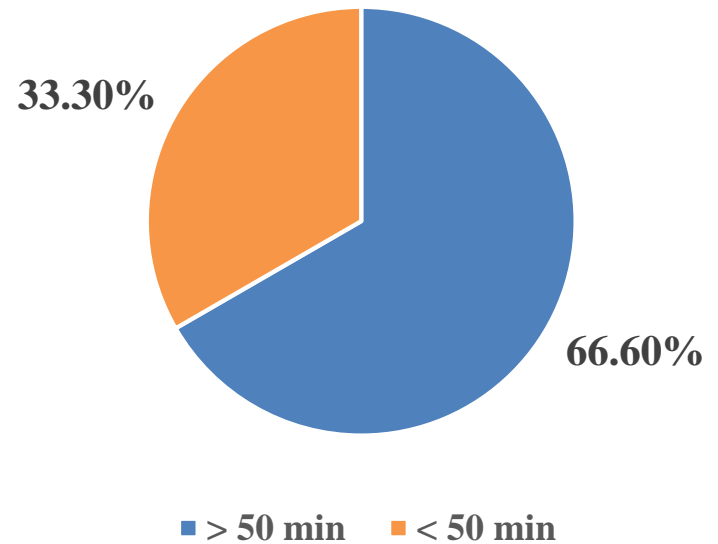
Characteristic Data- Nurse Survey Results

Unit of Employment

	Pre	Post
ED	23	22
IR	12	6

Shift Worked

	0700-1500	0700-1900	1100-1900	1500-2300	1900-0700
Pre	17%	51%	6%	11%	14%
Post	14%	43%	32%	4%	7%

51

Perception Measures- ED Nurse Survey Responses

ED Nurse Survey Responses

	Knowledge of Tool Location (Yes)	Knowledge Level About Tool (Very good)	Frequency of Tool Use (Always)	Tool Providing Enough Information (Very Adequate)	Information Missed (Rarely)
■ Pre	52%	13%	0%	22%	57%
■ Post	73%	32%	32%	42%	55%

■ Pre ■ Post
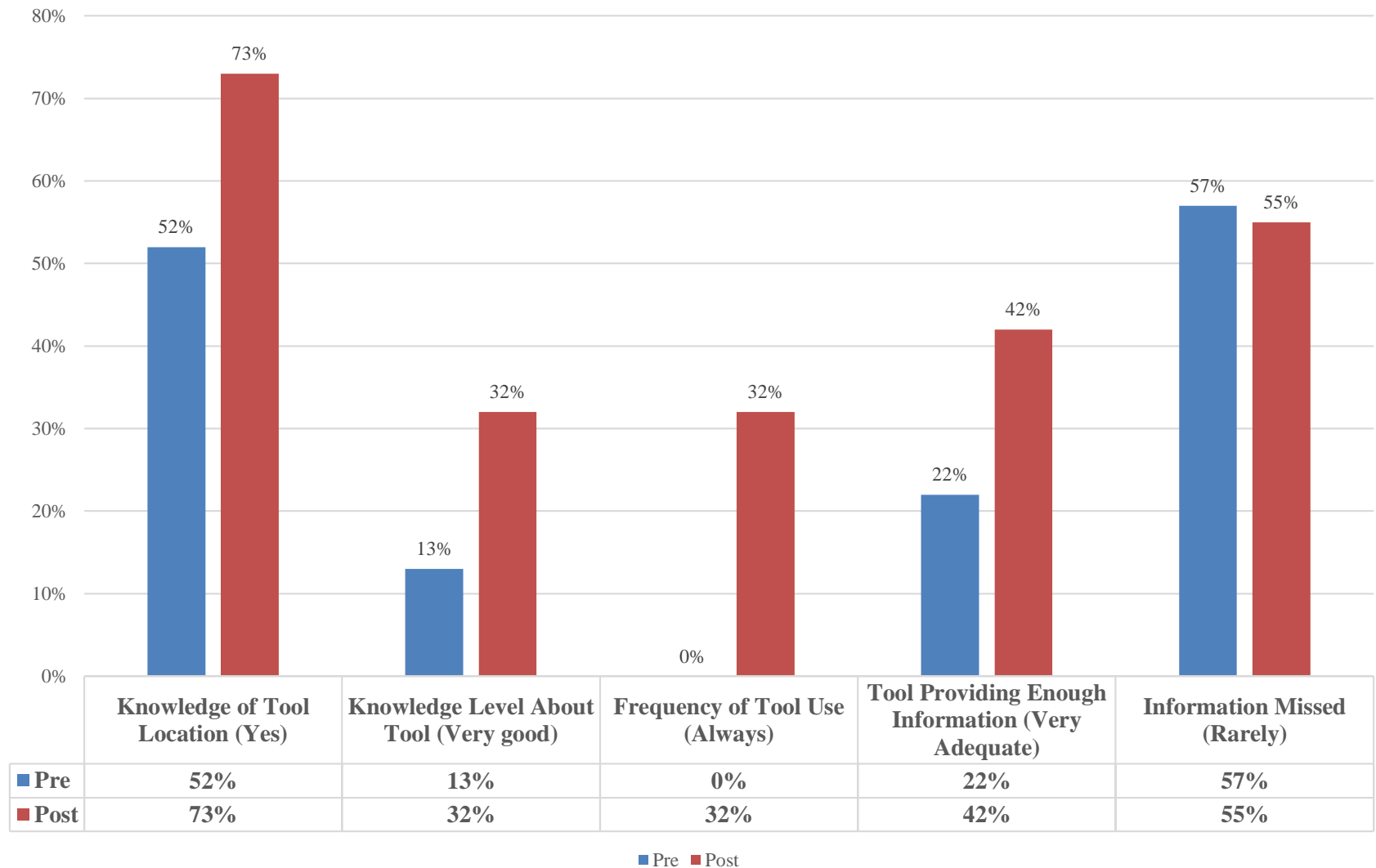
Perception Measures- IR Nurse Survey Responses

IR Nurse Survey Responses

	Knowledge of Tool Location (Yes)	Knowledge Level About Tool (Very good)	Frequency of Tool Use (Always)	Tool Providing Enough Information (Very Adequate)	Information Missed (Rarely)
■ Pre	83%	42%	58%	58%	33%
■ Post	100%	67%	17%	17%	50%
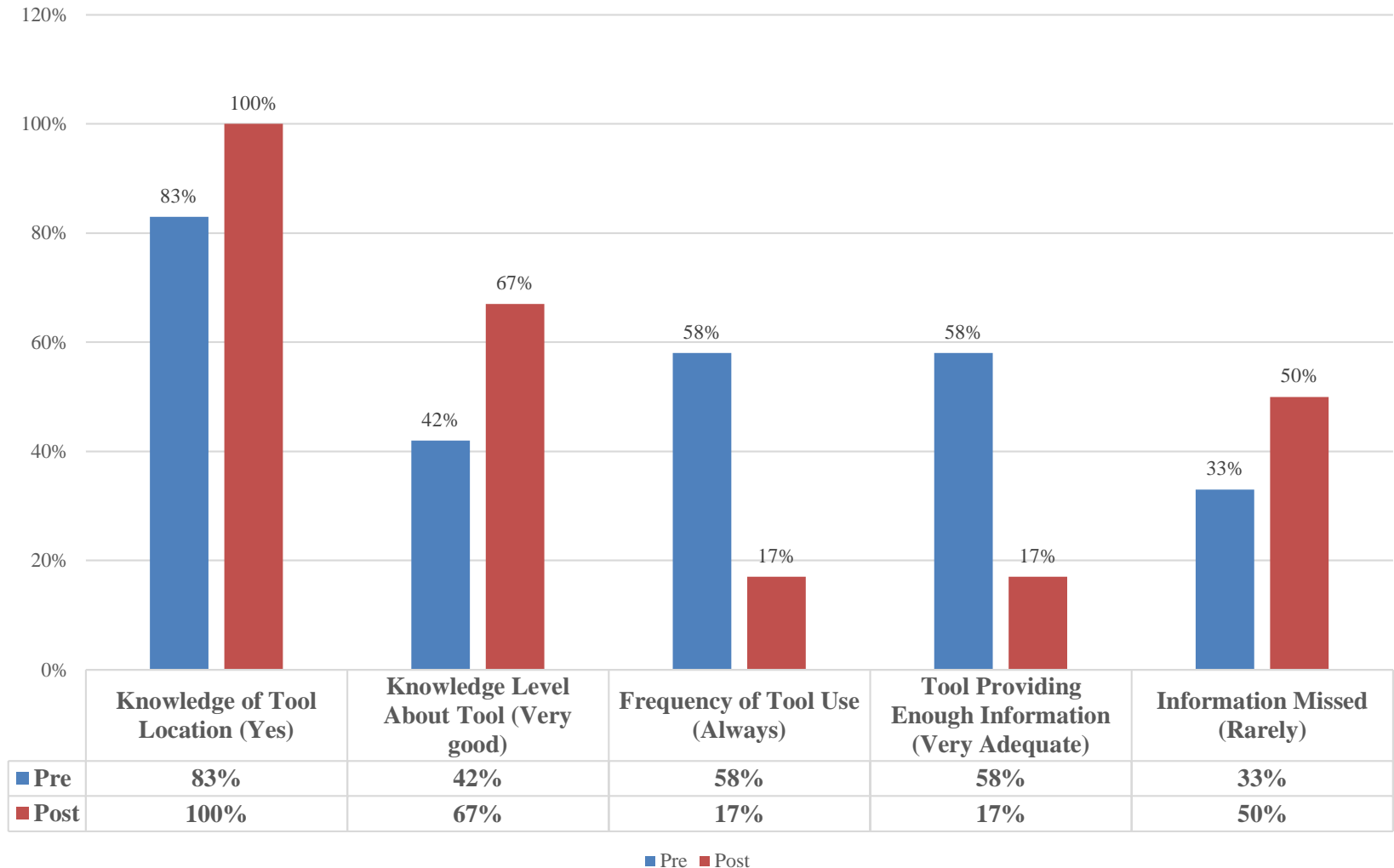
■ Pre ■ Post

Perception Measures: Nurse Survey Responses (Post-Implementation)

Report Called Prior to Transfer

	Never	Rarely	Some of the time	Most of the time	Always
ED	5%	14%	18%	27%	36%
IR	17%	0%	33%	50%	0%

ED ■ IR

Amount of Support Provided

	Very inadequate	Somewhat inadequate	Neutral	Somewhat adequate	Very adequate	No response
ED	0%	0%	9%	50%	32%	9%
IR	0%	33%	33%	33%	0%	0%

ED ■ IR

54

Satisfaction Measures- Nurse Survey Responses

ED Nurse Satisfaction

	Very unsatisfied	Somewhat unsatisfied	Neutral	Somewhat satisfied	Very satisfied	No response
Pre	17%	17%	26%	30%	9%	0%
Post	9%	23%	18%	41%	5%	5%

■ Pre ■ Post

IR Nurse Satisfaction

	Very unsatisfied	Somewhat unsatisfied	Neutral	Somewhat satisfied	Very satisfied
Pre	25%	17%	33%	17%	8%
Post	17%	33%	17%	33%	0%

■ Pre ■ Post

55

Perception Measures: Nurse Survey Responses

Factors	Measures	Responses (Open Ended)
Perception Measure	Organizational Barriers: **Pre-Implementation**	• **Handover tool not utilized; Unaware of standardized tool.** • **Could not identify where the standardized tool was located on unit.** • ED performs multiple handovers before transferring patient to IR. • **IR and ED using different handover forms- difficult to follow along during report.** • Lack of background in report. • **Timing of report is not consistent (before or after patient transitions).**
	Organizational Barriers: **Post-Implementation**	• **IR not on board with the new handover process.** • IR RN not always signed into Voalte phone, so difficult to contact to complete report. • IR would not take report via phone. • Time.

Perception Measures: Nurse Survey Responses

Factors	Measures	Responses (Open Ended)
Perception Measure	Ways to Improve Care **Pre-Implementation**	• IR priority focused on getting patient ready for procedure; ED priority to give handover. • Unclear who ED should give handover report to in IR. • **Further education on standardized tool is needed.** • **Need to initiate standardized tool in ED.**
	Ways to Improve Care: **Post-Implementation**	• "Process is adequate as a similar process works well with the Cath lab." • **"Report involves the core information needed at that time in care so it is a simple process and would not change."** • **Report prior to transfer creates a more organized care transition.** • IR log into Voalte phones. • IR consistently take report via phone. • IR nurses liked the old process better.

Discussion

Outcomes		
Positives: • Increase knowledge of tool location in ED and IR. • Increase knowledge level about tool in ED and IR. • ED using tool frequently. • Tool provided enough information for ED nurses. • IR felt information was missed less with new process. • Report was called prior to transfer by ED RN. • ED more satisfied with the process changes.	**Neutral:** • Support in IR was divided between somewhat adequate and somewhat inadequate. • IR nurse satisfaction was divided between somewhat satisfied and somewhat unsatisfied.	**Needs Improvement:** • IR tool use frequency. • Tool did not provide enough information for IR RNs. • IR RNs not logging into Voalte phones. • IR RNs not consistently taking report via phone. • ED to IR Door timing.

Discussion

- Standardized handover process was implemented.
- Knowledge gained on how to move forward.
- Limitations:
  - Small sample size, especially in PDSA Cycle 2
  - Barriers impacted project results.
  - Internal validity and generalizability.

Barrier Category	Specific Barriers	Project Adjustments
Education Barriers	• Decrease stakeholder: IR supervisor left department role.	• Support IR manager with educating staff during that time.
Implementation Barriers	• Lack of adoption of implementation by IR nurses	• Re-education on why the process change was needed. • Second PDSA cycle implemented.
	• 0 handover tools turned in	• Bin placed in Neuro suite for close location to turn in. • New handover tool stated where to turn the tool in. • Signs hung on wall as a reminder on where to turn it in. • Frequent meetings with stakeholders to identify and resolve barriers. • Emails send to staff from managers to remind staff that this is not optional.
	• Difficult to complete call for report.	• IR manager created a special sign in for her nurses so that it was easy for ED to find number to call in Voalte.
Competing Barriers	• 4 other Go-Lives at the start of implementation • COVID surge in November and December • Holidays and weekends had less staff	• Out of project managers scope of control.

60

Conclusions

- Multiple PDSA cycles needed to achieve desired results.
  - Primary goal: Improve ED to IR door time.
  - Literature supports a standardize process.
    - Standardized handover tool.
    - Report prior to transfer.
    - Monitoring system with tool documentation.

Sustainability Plan

- Organizational stakeholders prioritizing and supporting continued use (Hailemariam et al., 2019).

  - ED supervisor and IR manager available for daily support.
  - Nurse surveys sent out by unit managers to ensure nurse perception measures are not declining (Weisbord, 1976).
  - Meetings with nurses and different stakeholders to identify ongoing barriers.
  - Continuation of project by another DNP student.
  - Complete a third PDSA cycle (Powell et al., 2015).

- Maintenance of workforce skills through booster training sessions, supervision, and feedback (Hailemariam et al., 2019).

  - If decrease in compliance, educational materials will be redistributed to refresh staff on the requirements.

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Implications for Practice

- Goal: Decrease time to procedure for optimal patient outcomes.

- Working together to complete a standardized handover process to allow for a seamless transition.

- Biggest barrier: Department culture on compliance.

- Overcoming identified barriers through another PDSA cycle for continual improvement.

Dissemination

- Shared PowerPoint and manuscript with site mentors.

- Result reports sent to nurses in both departments.

- Virtual project defense.

- Submission to Scholar Works.

DNP Essentials

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DNP Essentials Reflection

- **Essential I: Scientific Underpinning for Practice**
    - Used a framework to help understand the organizational problem.
    - Utilized the PRISMA framework to complete a literature review.
    - Incorporated evidence-based interventions for the project.
- **Essential II: Organizational and Systems Leadership**
    - Used evidence-based implementation strategies.
    - Created a sustainability plan for the organization.
- **Essential III: Clinical Scholarship and Analytical Methods of Evidence-Based Practice**
    - Used analytical methods in the literature review and organizational assessment process.
    - Analyzed 24 measures for the project.
- **Essential IV: Information Systems and Technology**
    - Used technology to gather data, create a budget, design education materials, distribute materials, and conduct meetings.

DNP Essentials Reflection

- **Essential V: Advocacy for Health Care Policy**
  - Analyzed current handover policies within the organization.
  - Advocated for nursing staff throughout the process to ensure it was conducive to their workflow.
- **Essential VI: Interprofessional Collaboration**
  - Collaborated with managers, supervisors, nursing staff in both departments, clinical nurse specialist, Grand Valley staff, and a statistician.
  - Helped facilitate quality improvement project and bridge the gap between the two departments.
- **Essential VII: Clinical Prevention and Population Health**
  - Determined what interventions would benefit the organization and the patient population to improve upon the current process.
- **Essential VIII: Advanced Nursing Practice**
  - Utilized clinical judgement in complex situations.
  - Involvement within the organization to help with the quality improvement process.
  - Outcomes were analyzed and disseminated to help with continual improvement with this process.

Handouts

1. Nurse Survey Questions.

2. Literature Review.

3. Education Material.

4. Project Measures.

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