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Chest Pain Protocol Order Set

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Chest Pain Protocol Order Set

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Clinical Leadership Theme

The clinical leadership theme for this project focuses on the CNL curriculum element of *Clinical Outcomes Manager*. The CNL role function is Outcomes Manager. As Outcome Manager, the CNL will use Evidence-Based Practice (EBP) to change practice and improve patient outcomes. Additionally, the CNL will assess the nurse-initiated chest pain protocol process, interpret collected data, and implement a performance improvement project.

Statement Of The Problem

The Emergency Department (ED) is one of the busiest departments in the hospital. Registered Nurses (RN) and physicians provide care to a high volume of patients. High patient flow strains the limited resources that most EDs have and produces a crowding problem. In order to overcome this problem, EDs have incorporated different strategies. One of these strategies is to allow triage nurses to implement nursing protocols, which permits them to input orders without physician approval. ED nurses are able to enter orders during triage, which improves time for treatment and diagnostic results. Chest pain is one of the most common complaints seen in the ED. Chest pain can be the result of an Acute Myocardial Infarction (AMI). Therefore, it is vital to recognize AMI early in order to provide immediate intervention.

The chest pain protocol helps improve time of recognition and treatment of AMI. The triage nurses are rarely using the nursing protocol policy to place orders for patients complaining of chest pain. The main reasons are that nurses are uncertain which orders are required, lack of time, and confusing policy guideline. This may result in delayed care and poor patient outcomes. The purpose of this project is to improve the use of the chest pain protocol in the ED, which will improve patient outcomes and patient flow.

Project Overview

The goal of this project is to implement a chest pain protocol order set as a new tool for ED nurses to utilize when triaging patients with complain of chest pain. Following the project implementation, all of the ED nurses will be able to comprehend the orders that need to be placed. ED nurses will also verbalize the benefits of having a chest pain protocol order set. All of the ED nurses will utilize the chest pain protocol order set when triaging patients with chest pain and will not wait for physicians to evaluate the patient before placing orders. The early order implementation will allow nurses to provide early treatment and obtain diagnostic data, such as lab work and radiology. The order set will be based on the approved nursing protocol policy and no further approvals are required. The CNL will work with the nurse manager, charge nurses, and physicians to implement this project. The pre- and post-implementation data will be obtained by auditing patient charts. Following implementation of chest pain protocol order set, nurse-initiated chest pain protocol will increase 50% by August 2017. This aim will improve patient outcomes and patient flow.

The project will be implemented in the ED of a hospital located in Fresno, CA. The ED has 13 monitored beds with one high-risk mental health room and two fast track rooms. The ED is open 24 hours a day 7 days a week. The main three reasons for admission are cardiovascular, psychiatric, and respiratory. The ED staffs one Nurse Manager, 27 RNs, one Licensed Vocational Nurse (LVN), and eight Health Technicians (HT). The ED has a problem with understaffing and patient crowding.

PICO Question

In patients presenting to the ED with chest pain (P), does nursing chest pain protocol (I) improve treatment time (O) as compared to no protocol (C)?

Search Strategy

On 14 February 2017, an electronic search was conducted in CINAHL Complete, Cochrane Database of Systemic Reviews, and Pub Med databases using the following key terms: nursing chest pain protocol and treatment time. The search was limited to academic journals and articles published in last 5 years. The search produced 157 articles, 20 articles met search criteria and six were selected for review.

Literature Review

The six studies were reviewed and appraised using the Johns Hopkins Nursing Evidence-Based Practice (JHNEBP) appraisal tool. All studies showed correlation between implementation of nursing protocols and improved outcomes. The studies tested various nursing protocols, including the chest pain protocol.

A retrospective cohort study was conducted, which looked at 149 patients that received Standing Orders (SO)/nursing protocols and 152 patients that received no orders. The SO cohort showed a reduction in physician-to-disposition time by 16.9% when compared to the non-SO cohort. The strengths of the study are the large sample size and credible study method. The weakness of the study is non-randomization and limited 5-month study (Hwang, et al., 2016). The study supports the use of SO/nursing protocols in the ED. The study rating is L II A using the JHNEBP appraisal tool.

A retrospective chart review study was conducted of 87 SO patients and 156 non-SO patients, which showed increase in Time-In-Department (TID) and decrease in Time-In-Room (TIR) in the SO patients as compared to non-SO patients. The strengths of the study are a large sample size and credible study method. The weakness is non-randomization (Stauber, 2013). The

decrease in TIR indicates that patients are diagnosed and treated faster, which improves the patient flow in the ED. The study rating is L II A using the JHNEBP appraisal tool.

A retrospective cohort study was conducted of 15,188 patients, of which 25% received full SO, 56% partial SO, and 19% room orders. The treatment time in patients with SO was 230 minutes as compared to 282 minutes in patients with no SO. The strengths of the study are large sample size and credible study method. The weakness of the study is non-randomization (Retezar, 2011). The study showed that implementation of SO improves patient treatment time. The study rating is L II A using the JHNEBP appraisal tool.

A computer-randomized pragmatic controlled evaluation was done on 76 patients in the protocol group and 67 patients in the non-protocol group. The results showed a reduction in treatment time, lab result time, and Length Of Stay (LOS) in the protocol group as compared to the non-protocol group. The strengths in this study are credible study method, blinded analysis, and analytical tools. The weaknesses of this study are small sample size and no randomization (Douma et al., 2016). The study results show that nursing protocols lead to early treatment and reduce LOS. The study rating is L I A using the JHNEBP appraisal tool.

A literature review was conducted of new initiatives that are effective in the ED and nurse-initiated intervention was identified as one of these strategies. Nurse-initiated pathology orders improved the result time and physicians were able to make decisions during initial evaluation of patient. Additionally, implementing this initiative has also decreased treatment time and LOS (Crawford, 2014, p. 3). The strengths of this study are number of research articles reviewed and credible study method. The weakness of this study is that it is not a systematic review. The literature review provides strong evidence in support of nursing protocols. The study rating is L III A using the JHNEBP appraisal tool.

A literature review identified barriers to care for patients with AMI in and out of hospital setting. 15 articles were analyzed, of which 5 identified that in-hospital barriers related to lack of quality materials and human resources. The medical equipment malfunctioned and health care professionals were unable to identify early symptoms of AMI. Nine of the research articles identified a lack of an AMI protocol as a barrier to proper treatment and diagnosis. A hospital in Brazil initiated an AMI protocol, which resulted in significant reduction in mortality rate. The authors recommend educational training and protocols for healthcare professionals in order to recognize AMI early and take correct actions (de Carvalho Santos, Marques Torres, & da Conceição Queiroz, 2015). The strengths of this study are appraisal of articles and detailed analysis. The weakness of the study is small number of articles reviewed. The study rating is L III A using the JHNEBP appraisal tool.

The research articles provide strong evidence that nurse-initiated protocols are effective in the ED. Two of the studies showed that nurse-initiated protocols reduce treatment time. LOS was also reduced in one of the studies. Therefore, the ED throughput is improved. Diagnostic data resulted faster and physicians were able to make an early decision regarding patient treatment plan. Based on the research, there is overwhelming evidence that supports the use of nurse-initiated protocols.

Rationale

The need for implementing this project was based on data collected from the microsystem assessment, root-cause analysis, and chart audits. Assessment of potential vulnerabilities in the triage process was conducted and lack of nursing protocol use was identified. The ED has an approved nursing protocol order policy, which covers the approved diagnostic lab, radiology, and intervention orders that nurses are able to initiate. However, the

guideline is not organized by conditions, which can create confusion regarding what needs to be ordered. Complaint of chest pain was identified as one of the most common problems seen in the ED and one of the most life threatening if not identified and treated early. The ED triage nurses have been placing chest pain orders 11 percent of the time and physicians 89 percent of the time. Nurse-initiated orders are placed in less than 10 minutes while 50 percent of physician orders were over 30 minutes. According the American Heart Association (AHA) guidelines, 12-lead ECGs have to be completed in less than 10 minutes and X-rays in less than 30 minutes (Amsterdam et al., 2014). The ED is a chaotic environment and physicians are not always available for immediate evaluation and input of orders, therefore, nurses have the power to place orders.

Based on the review of evidence-based research, implementing nurse-initiated chest pain protocol may lead to improved patient outcomes and patient flow. The average door-to-decision time is 225 minutes as compared to the national average of 168 minutes. The average LOS is 531 minutes. When nurses initiate orders, diagnostic results are completed faster and physician-to-disposition times are improved. The chest pain protocol order set will help improve patient outcomes and ED throughput.

The improvement goal of the project is to decrease LOS of 1 patient by 1 day for 12 months. The average expenses per inpatient day are \$3,341. The Improvement cost is \$1,810 and the revenue improvement through cost avoidance is \$40,092. Therefore the Return on Investment (ROI) is \$38,282 (\$40,092 - \$1,810).

Methodology

The implementation of this project will require active participation of the Nurse Manager, Charge Nurses, Nurses, and Physicians. The chest pain protocol order set will be a one-page

document and will be divided into three sections of orders: labs, diagnostic imaging, and nursing orders. The order set will be reviewed by the team members and adjusted as needed. The CNL will present the evidence-based data and the order set to the ED nurses during morning change of shift. One order set will be pinned to the board in the triage room, one will be placed in the triage binder, and two will be available at the nursing station.

Following implementation, ED nurses will be encouraged to provide feedback regarding the order set in order to improve the project. The order set will be adjusted as needed. The post-implementation data will be obtained by auditing patient charts that present to the ED with chest pain. Physicians will add and take away from the orders as needed. The outcome that will be measured is the overall percentage of nurse-initiated chest pain protocol. The goal is to increase nurse-initiated chest pain orders by 50 percent from the 11 percent baseline. The process measure is that 80 percent of nurses will be trained on the protocol, and the balancing measure is that physician-initiated chest pain protocol will decrease to 80%. Charts will be audited for patients triaged between Monday and Friday, 0900-1800 hours, which is the busiest time in the ED.

Time management can be tested by allowing nurses to implement the order set, which will reduce the time it take to place orders. Workflow improvement can be tested by ensuring that nurses are using the protocol order set and not waiting for physician orders. Changes to work environment can be tested by implementing the order set and nurses will not have to really on physician to place orders.

Kurt Lewin is a psychologist who is considered by many as the founding father of change management. Lewin discovered the change theory of unfreeze, change, and refreeze that is still being used today (Cummings, Bridgman, & Brown, 2016, p. 34). The unfreezing phase consists

of creating the motivation to change; the change phase consists of learning new concepts; and the refreezing phase consists of institutionalizing the new concepts (Cummings et al., 2016, p. 42).

Lewin's change theory will be used to implement the chest pain protocol order set. The unfreezing phase will be initiated by discussing the issue of not having the order set in place and how it may delay care and result in decreased patient outcomes. This will motivate staff to initiate change. The moving phase will begin by implementing the chest pain protocol order set and ED nurses will use the tool when triaging patients. The refreezing phase will be initiated by providing positive feedback on results of the implementation and encourage ED nurses to continue to use the order set.

The Fishbone Root Cause Analysis Tool was used to identify people, environment, equipment, materials, and method factors responsible for inhibiting the use of nurse-initiated chest pain protocol. The Stakeholder Analysis Tool was used to identify key stakeholders who for the project. The Strengths, Weaknesses, Opportunities, and Threats (SWOT) Analysis Tool was used to help assess the microsystem.

The developed charter will be used as a guide to implement the chest pain protocol order set. The CNL will present the charter to the stakeholders and obtain feedback. The IHI modal for improvement will also be used to guide the implementation of this project. The use of nurse-initiated chest pain protocol will increase. The change will be known as an improvement when the percentage of nurse-initiated chest pain protocol will increase by 50%. Implementation of the chest pain protocol order set will help nurses increase this percentage.

The PDSA cycle will also be used to help implement the project. The plan phase consisted of the microsystem assessment, identification of process gap, identifying stakeholders, evidence-based research, protocol development, and obtaining base line data. The Do phase will

consist of educating nursing staff, posting the protocol in triage locations, and providing guidance. The Study phase will consist of obtaining post-implementation data and obtaining feedback from stakeholders. The Act phase will consist of implementing changes to the project based on data and feedback. The PDSA cycle will continue to be active throughout the project.

Timeline

The microsystem assessment was conducted in February 2017. The research and project development was conducted from March 2017 to June 2017. Pre-implementation data was conducted from May 2017 to June 2017. The post-implementation data will be collected from July 2017 to August 2017. The end of project will be August 2017.

Expected Results

The anticipated outcome following the implementation of this project will be that the nurse-initiated chest pain protocol will increase by 50% from baseline. Currently, ED nurses rarely implement the protocol due the aforementioned reasons. The chest pain protocol order set will help guide and empower nurses to take initiative. Patients that present with chest pain will be treated immediately and diagnostic lab results will be available sooner.

Nursing Relevance

Implementing this project is important because it will prove that nursing protocols are an effective strategy that improves patient outcomes and patient flow in the ED (Hwang, et al., 2016). The overcrowding problem, budget cuts, and lack of resources have placed a significant burden on nurses, physicians, and other members of the healthcare team. By empowering the frontline staff, hospitals can counter these problems and improve daily operations in the ED. The chest pain protocol order set will empower ED nurses to improve the care that patients receive in the ED and reduce delayed care.

Summary Report

A chest pain protocol order set was developed on one page of paper and was laminated. Prior to implementation, the protocol was presented to the nurse manager, physicians, nurse educator, and charge nurses. Adjustments were made to the wording and font size. The CNL presented the evidence-based data and baseline data to the nursing staff during change of shift huddle. The CNL explained the content in the protocol and how to utilize the tool. The protocol was posted in the triage areas and nursing station. Post-implementation data was collected from patient charts and analyzed. The data showed that nurse-initiated chest pain protocols increased from 11% to 30%. The physician-initiated orders decreased from 89% to 70%. 90% of nurses were trained.

The expected outcome for the project was surpassed and the nurse-initiated chest pain protocol increased. Nurses felt more confident when placing orders due to the chest pain protocol order set. Sustainability of this project will be conducted by integrating the order set into the Computerized Patient Record System (CPRS) so that nurses can place order sets more efficiently. Additionally, the protocol order set will be part of the annual competency requirement. The Nurse Educator will continue to use the charter to implement and improve the project, as well as collect performance data. The autonomy of ED nurses will continue to help counter the challenges that the department faces. By empowering ED nurses to conduct nurse-initiated protocols, hospitals will improve patient outcomes and quality of care.

References

- Amsterdam, E. A., Wenger, N. K., Brindis, R. G., Casey Jr, D. E., Ganiats, T. G., Holmes Jr, D. R., & ... Holmes, D. J. (2014). 2014 AHA/ACC guideline for the management of patients with non-ST-elevation acute coronary syndromes: executive summary: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines. *Circulation*, *130*(25), 2354-2394. doi:10.1161/CIR.0000000000000133
- Crawford, K., Morphet, J., Jones, T., Innes, K., Griffiths, D., & Williams, A. (2014). Initiatives to reduce overcrowding and access block in Australian emergency departments: A literature review. *Collegian*, *21*(4), 359-366. doi:10.1016/j.colegn.2013.09.005
- Cummings, S., Bridgman, T., & Brown, K. G. (2016). Unfreezing change as three steps: Rethinking Kurt Lewin's legacy for change management. *Human Relations*, *69*(1), 33-60. doi:10.1177/0018726715577707
- Douma, M. J., Drake, C. A., O'Dochartaigh, D., Smith, K. E., & O'Dochartaigh, D. (2016). A Pragmatic Randomized Evaluation of a Nurse-Initiated Protocol to Improve Timeliness of Care in an Urban Emergency Department. *Annals Of Emergency Medicine*, *68*(5), 546-552. doi:10.1016/j.annemergmed.2016.06.019
- de Carvalho Santos, M., Marques Torres, R., & da Conceição Queiroz, I. (2015). Pre-and intra-hospital barriers on patient care with acute myocardial infarction: An integrative review. *Journal Of Nursing UFPE / Revista De Enfermagem UFPE*, *9*(9), 9264-9275. doi:10.5205/reuol.7874-68950-4-SM.0909201514
- Hwang, C. W., Payton, T., Weeks, E., & Plourde. (2016). Implementing Triage Standing Orders in the Emergency Department Leads to Reduced Physician-to-Disposition Times.

Advances in Emergency Medicine, vol. 2016, Article ID 7213625, 6 pages, 2016.

doi:10.1155/2016/7213625

Retezar, R., Bessman, E., Ding, R., Zeger, S., & McCarthy, M. (2011). The effect of triage diagnostic standing orders on emergency department treatment time. *Annals Of*

Emergency Medicine, 57(2), 89-99.e2. doi:10.1016/j.annemergmed.2010.07.026

Stauber, M. A. (2013). Advanced Nursing Interventions and Length of Stay in the Emergency Department. *JEN: Journal Of Emergency Nursing*, 39(3), 221-225.

doi:10.1016/j.jen.2012.02.015

Appendix A

Charter

Chest Pain Protocol Order Set

Clinical Performance Improvement Project in a Microsystem

University of San Francisco

Andrey Kulikov

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Project Charter**Aim**

Project: Following implementation of chest pain protocol order set, nurse-initiated chest pain protocol will increase 50% by August 2017.

Global: The ED will increase the use of nurse-initiated chest pain protocol and improve performance and standardize care for patients.

Background

The Emergency Department (ED) is one of the busiest departments in the hospital. Registered Nurses (RN) and physicians provide care to a high volume of patients every day. The high volume of patients is straining limited resources that most EDs have and produces a crowding problem. In order to overcome this problem, EDs have incorporated different strategies. One of these strategies is to allow triage nurses to implement nursing protocols, which permits them to input orders without physician approval. ED nurses are able to enter orders during triage, which improves time for treatment and diagnostic results. Chest pain is one of the most common complaints seen in the ED. Chest pain can be the result of an Acute Myocardial Infarction (AMI). Therefore, it is vital to recognize AMI early in order to provide the appropriate treatment and in a timely matter. Lack of protocols is identified as one of the barriers to proper treatment (de Carvalho Santos et al., 2015). The chest pain protocol helps improve time of recognition and treatment of AMI. The ED triage nurses have not been using the chest pain nursing protocol policy to place orders for patients complaining of chest pain. The main reasons are that nurses are uncertain which orders are required, lack of time, and confusing policy guideline. The purpose of this project is to improve the use of the chest pain protocol in the ED, which will improve patient outcomes and patient flow.

Sponsors

Rhonda Eisenzimmer

Goals

The goal of this project is to implement a chest pain protocol order set as a new tool for ED nurses to utilize when triaging patients that complain of chest pain. Following the project implementation, all of the ED nurses will be able to comprehend the orders that need to be placed. ED nurses will also verbalize the benefit of having a chest pain protocol order set and how it benefits both patients and unit. All of the ED nurses will utilize the chest pain protocol order set when triaging patients with chest pain. Nurses will not wait for physicians to evaluate the patient before placing orders. The early order implementation will allow nurses to provide early treatment and obtain diagnostic data, such as lab work and radiology. The order set will be based on the approved nursing protocol policy and no further approvals are required.

Measures

Outcome Measure	Measure Definition	Data Source	Target
Increase nurse-initiated chest pain protocol	$N = X/Y = P \times 100$ D = total # of orders	Chart review	22%
Process Measure			
Nurses receive training	N = # of nurses trained D = 27	Observation	80%
Balancing Measure			
Physician-initiated chest pain protocol	$N = X/Y = P \times 100$ D = total # of orders	Chart review	80%

Measurement Strategy**Background (Goal Statement)**

Use of nurse-initiated chest pain protocol will increase by 50% by August 2017.

Population Criteria

The CNL will educate the nursing staff on the new chest pain protocol order set. The CNL will also collect pre- and post-implementation data.

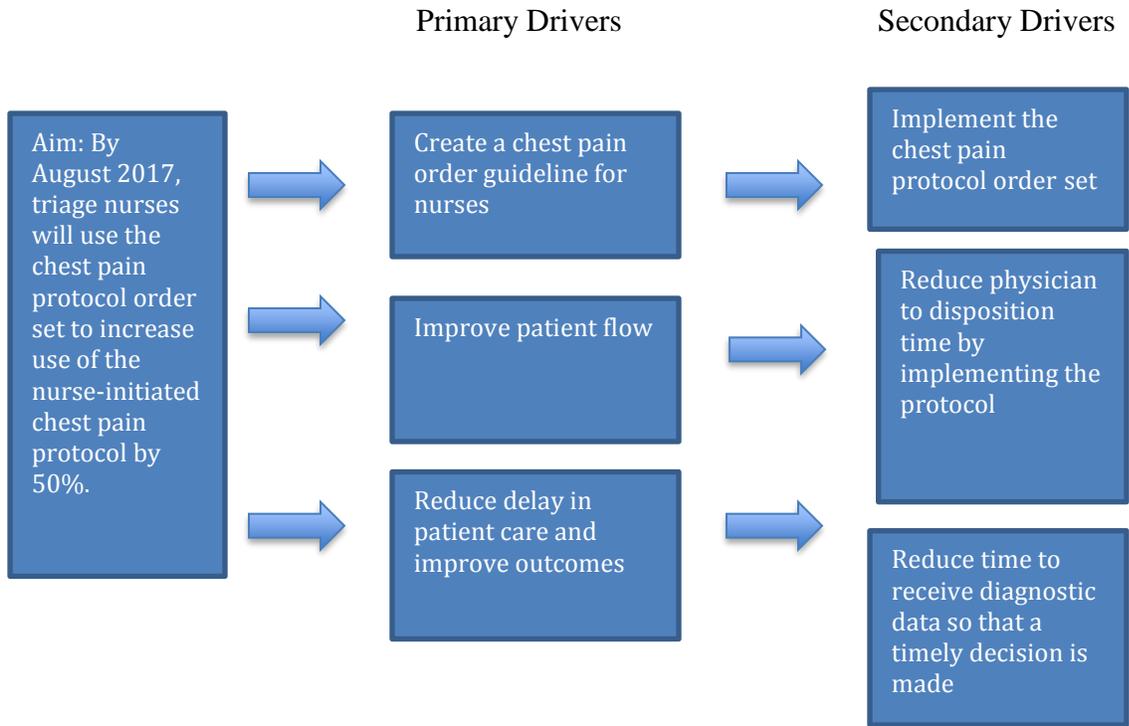
Data Collection Method

Pre- and post- implementation data will be collected from chart reviews.

Data Definitions

Data Element	Definition
Pre-Implementation data	Three days worth of patient data will be analyzed prior to implementation.
Post-implementation	Three days worth of data will be analyzed after implementation.
Staff population	The CNL will educate nurses on the chest pain protocol order set and collect data.

Driver Diagram



Changes to Test

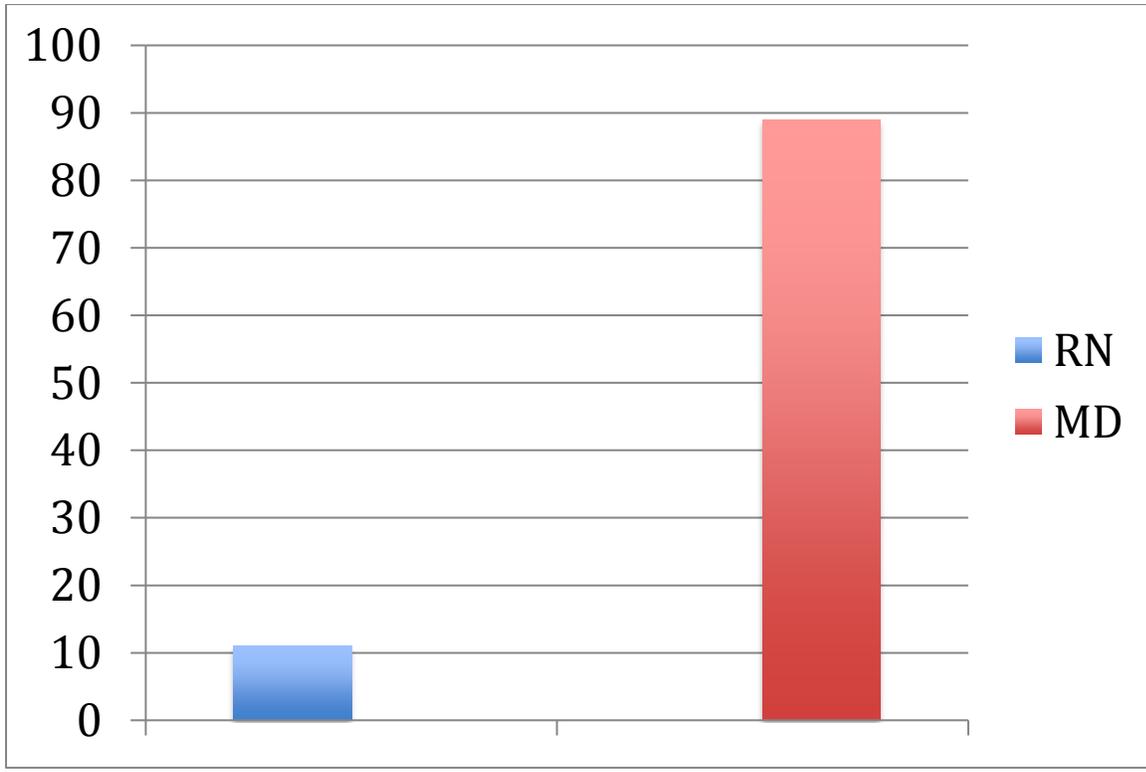
Time management can be tested by allowing nurses to implement the chest pain protocol order set, which will reduce the time it takes to place orders.

Workflow improvement can be tested by ensuring that nurses are using the chest pain protocol order set and not waiting for physician orders.

Changes to work environment can be tested by implementing the chest pain protocol order set, which will improve efficiency and standardize the order set.

Histogram

Pre-implementation average percentage of chest pain orders



Project Timeline

	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept
Microsystem assessment	█							
Research and project development		█	█	█	█			
Pre-Implementation data collection				█	█			
Project Implementation					█			
Post-Implementation data collection						█		

Lessons Learned**Microsystem Assessment**

- Identify key individuals with access statistical data on microsystem
- Seek guidance from staff and leadership in order to find the correct information
- Allow several clinical days to complete the information gathering

Evidence-Based Research

- Utilize hospital online resources to find EBP that supports the change project
- Identify protocols and EBP that other departments are using
- Utilize a variety of search terms in order to access greater number of relevant articles

CNL Competencies**Quality Improvement and Safety**

- Identified need for performance improvement based on current EBP in order to promote better outcomes and provide quality care
- Demonstrated exceptional communications skills with staff, management, and patients.
- Completed comprehensive microsystem assessment and identified a problem and developed a solution

Organizational and Systems Leadership

- Collaborated with healthcare professionals to plan, implement and evaluate improvement opportunity
- Participated in a shared leadership team to make recommendations for improvement at microsystem level

References

- de Carvalho Santos, M., Marques Torres, R., & da Conceição Queiroz, I. (2015). Pre-and intra-hospital barriers on patient care with acute myocardial infarction: An integrative review. *Journal Of Nursing UFPE / Revista De Enfermagem UFPE*, 9(9), 9264-9275.
doi:10.5205/reuol.7874-68950-4-SM.0909201514

Appendix B

Evaluation Table

Citation	Conceptual Framework	Design/ Method	Sample/ Setting	Variables Studied and Their Definitions	Measurement	Data Analysis	Findings	Appraisal: Worth to Practice
Hwang et al., 2016	None	Retrospective cohort study Patient data extracted from EMR	149 Standing Order (SO) cohort 152 non-SO cohort ED, University of Florida college of medicine	Implementing SO to patients presenting with chest pain and compare to patients that did not have SO.	1. ED LOS 2. provider-to-disposition time	SO cohort was further analyzed 1. Patients who received SO and labs resulted prior to MD evaluation and second group with SO and partial labs resulted prior to MD evaluation	SO group had a reduction in MD to disposition time from 154 min in no SO cohort to 128 min (26 min decrease, 16.9%, p = 0.04)	Strengths: large sample size and credible method Weaknesses: 5 month study, no random assignment of patients Feasibility: Present data to ED nurses and leadership in order to gain support for the performance improvement project and maximize participation L II A
Stauber, 2013	None	Retrospective chart review Patient EMR	243 patients. 87 Advanced Nursing Intervention (ANI) and 156 without ANI. ESI level 3 ED, Midwestern academic medical center	ANI applied as compared to no ANI applied. ANIs allow nurses to initiate diagnostic studies or therapeutic interventions base on patient's chief complaint	ED LOS (mean Time In Department (TID) and mean Time In Room (TIR)	Chief complaint of abdominal pain and an ESI level 3 triage score was obtained from monthly ED level. Chart audits were conducted of patients who presented to the ED between noon and midnight.	ANI group resulted in increased TID and decreased TIR with medium effect size	Strengths: large sample size and credible method Weaknesses: No randomization of patients Feasibility: A reduction in TIR optimizes the bed availability in the emergency department. This improves the ED patient flow and helps counter the "crowding" problem. L II A
Retezar et al., 2011	None	Retrospective Cohort Study Clinical information system	15,188 patients 25% received full triage SO, 56% partial SO, 19% room orders ED, academic medical center	Compared patients that received triage standing orders to patients who received room orders	ED treatment time	Effect of triage SO in ED treatment time and boarding time. Partial SO, Full SO, and no SO were compared. Triage nurses were categorized according to number of patients triaged.	ED treatment time for patient without SO was 282 minutes as compared to 230 minutes in patients with SO	Strengths: large sample, credible method Weaknesses: No randomization of patients Feasibility: substantial reduction in ED treatment time for chest pain, shortness of breath, abdominal pain, or genitourinary complaints. The chest pain protocol will improve the treatment time in the ED L II A
Douma et al., 2016	None	Computer-randomized, pragmatic, controlled evaluation]	76 protocol group and 67 in the control group Patient EMR	Compared implementation of nursing protocol to no implementation and obtainment of standard care.	1. Time to diagnostic test 2. Time to treatment 3. Time to consultation 4. ED LOS	Statistical analysis in a blinded fashion. Median outcome times, along with interquartile ranges, were calculated. Bonett and Price tool was used. Intention-to-treat analysis was also performed	Pain or fever treatment time was reduced by 186 minutes. Troponin result time was reduced by 79 minutes. Length of stay median was reduced by 224 minutes for suspected hip fracture and 232 for vaginal bleeding during pregnancy.	Strengths: credible method. Blinded analysis, analysis tools. Weaknesses: No randomization. Small sample size Feasibility: Protocol implementation improves time to test or medication. In some cases, reduces ED LOS. L I A
Crawford et al., 2014	None	Literature Review	None Research Databases	Explores current literature and highlights the key strategies adopted by different ED to reduce delays and improve treatment time	Searched initiatives that work in other EDs	Searched databases for initiatives that reduce overcrowding	Waiting room nurse. Streaming. Rapid assessment teams. Short stay units, care coordination programmers. Nurse initiated interventions	rengths: number of research articles Weaknesses: No systematic review done. Feasibility: Nurse initiated intervention is identified as one of the important initiatives that EDs are using in order to reduce overcrowding. L III B
de Carvalho Santos, 2015	None	Systematic Review	15 research articles Research databases	Pre- and Intra- hospital barriers to care for patients with AMI	Pre- and intra hospital barriers	Research databases were searched with 2000-2014 range	Pre-hospital barriers: lack of symptoms and service location, and choice of suitable transport. Intra-hospital barriers: time spent in admission to initiation of therapy; quality and availability of human and material resources and absence of care protocols.	Strengths: research articles appraised Weaknesses: number of research articles Feasibility: Lack of protocols was identified as one of the barriers to proper treatment of AMI. L II A

Appendix C

Budget

Project Cost			
Item	Description	1st yr	2nd yr
CNL clinical hours	120 hours x \$15	\$1,800.00	0
Materials		\$10.00	\$10.00
	Total	\$1,810.00	\$10.00
Project Revenue			
Item	Description	1st yr	2nd yr
Decreased LOS	1 x 1 x 3,341 x 12 (1 pt x 1 day x \$3,341 per day x 12 months)	\$40,092.00	\$40,092.00
	Total	\$40,092.00	\$40,092.00
Net Benefit			
Item	Description	1st yr	2nd yr
Net benefit	Total benefits - total cost	(\$40,092 - 1,810)	(\$40,092 - 10)
	Total net benefit	\$38,282.00	\$40,082.00
Benefit-Cost Ratio			
Item	Description	1st yr	2nd yr
Benefit-cost ratio	Net benefit / Total cost	40,092/1,810	40,092/10
	Benefit cost ratio	22	4009

Appendix D

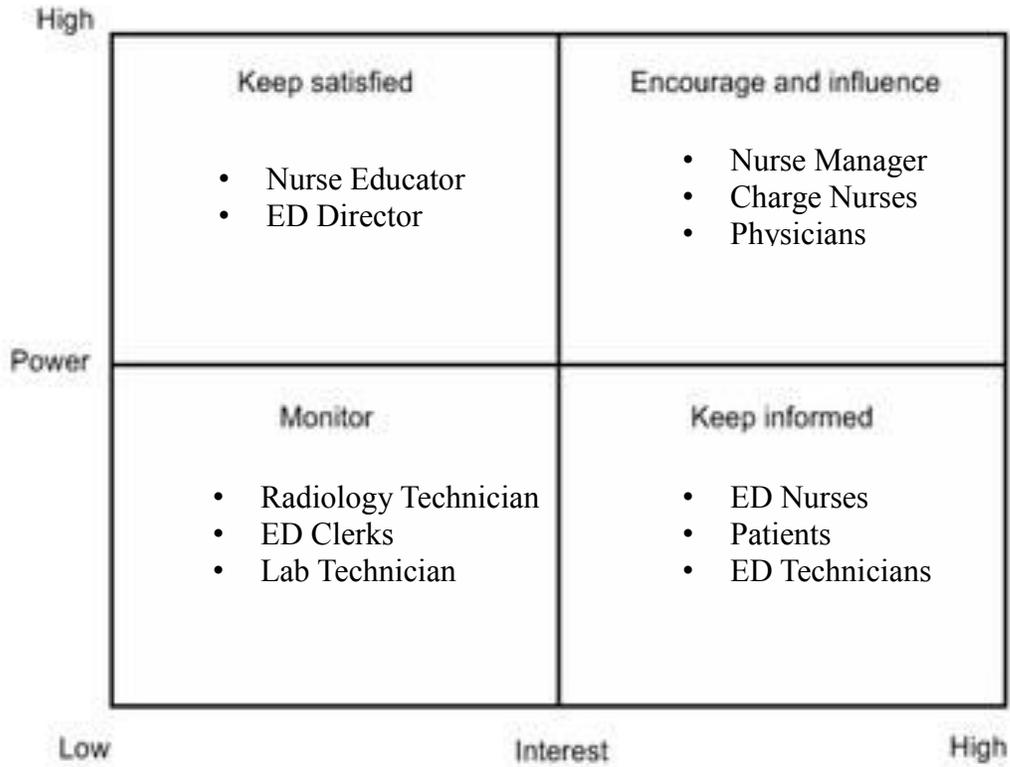
Return on Investment (ROI)

Improvement Goal	Improvement Cost	Revenue Improvement through cost avoidance	ROI
Decrease LOS of 1 patient by 1 day for 12 months	\$1,810.00	\$40,092.00	$\$40,092 - 1,810 = \$38,282.00$

Appendix E

Stakeholder Analysis

Stakeholder power / interest matrix



Appendix F

SWOT Analysis

Strengths	Weaknesses
<ul style="list-style-type: none">• Strong leadership support• Teamwork• Clinical Judgment	<ul style="list-style-type: none">• Staffing• Crowding
<ul style="list-style-type: none">• Unit CNL• Updating and improving protocol• Empowering front-line staff	<ul style="list-style-type: none">• Resistance to change• Workarounds• Data monitoring
Opportunities	Threats

Appendix G

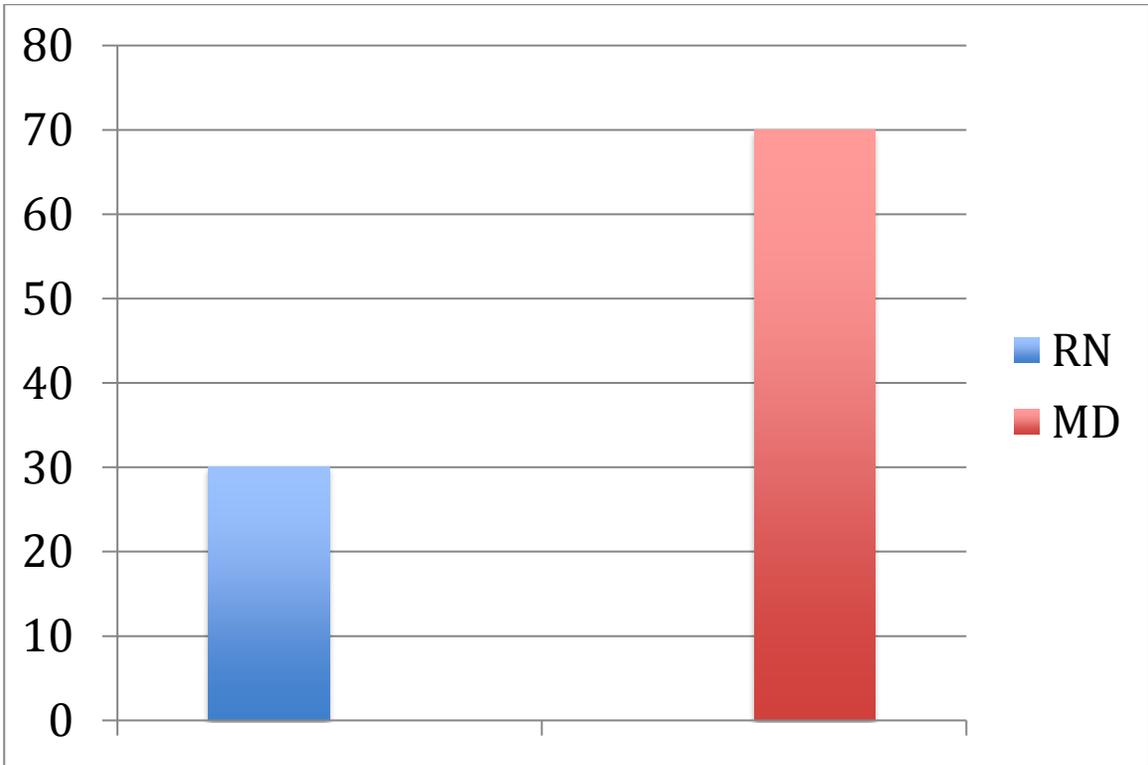
Chest Pain Protocol Order Set

Chest Pain Protocol Order Set		
Labs	Nursing	Diagnostic Imaging
<ul style="list-style-type: none">• CBC• Chem 8• PT/PTT, INR• ISTAT Troponin	<ul style="list-style-type: none">• Telemetry• 12-lead EKG• IV Saline Lock• O2 at 2L/NC and titrate to >94%	<ul style="list-style-type: none">• Portable Chest X-ray

* Consult physician regarding medications

Appendix H

Post-Implementation RN-initiated orders increased from 11% to 30%

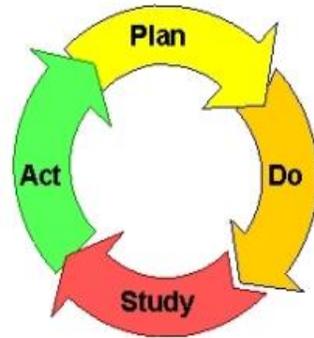


Appendix I

PDSA

- Microsystem assessment
- Identified process gap
- Identified stakeholders
- EBP research
- Developed protocol
- Obtained baseline data

- Changed wording
- Adjusted font size



- Educated nursing staff
- Posted protocol in triage areas
- Provided guidance

- Obtained post-implementation data
- Obtained feedback from stakeholders

Appendix J
Root Cause Analysis
Fishbone

