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Perfecting Patient Bed Flow in the Emergency Department

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This is to certify that the doctoral study by

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has been found to be complete and satisfactory in all respects,
and that any and all revisions required by
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Abstract

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MSN, Walden University, 2012

BSN, Hampton University, 2006

Project Submitted in Partial Fulfillment

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Abstract

Emergency department (ED) crowding is a serious problem in the United States. Crowding in the ED can result in delays that may negatively affect patient outcomes and increase the cost of care. The purpose of this project was to understand strategies that can help to improve patient flow in the ED. The plan-to-do-study act model for process improvement influenced this project. Secondary data were collected for a 2-month period to determine the impact of workflow processes (patient boarding time in ED, surge capacity and workflow processes including the impact of ancillary departments) on the movement of admitted patients from the ED to the inpatient units. Descriptive statistics were used to provide numerical summaries, frequencies, and percentages for the identified variables. The findings were consistent with an increased length of stay and longer ED boarding of patients due to the workflow process. Resulting recommendations included standardized calls for report on admitted patients within 30 minutes, timely discharge of patients, collaboration with attending physicians to facilitate evaluation of patients and orders, modification of staffing roles to ensure adequate staff, and identification of staff transporters to ensure timely transport of patients to their rooms. The findings helped to inform the development of a Bed Utilization Policy. The policy has been shared with the organization with the recommendation to implement and further evaluate to help manage bed flow. Development of utilization strategies that contribute to facilitating throughput will promote positive social change by providing nurses with the tools to help prepare for and respond to unexpected increases in patient volume. Improving efficiency with flow can help to improve patient care, timeliness, and safety.

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Acknowledgments

I would like to dedicate this project to my father, Gary Snider, for being inspirational and reminding me, "you can do anything you set your mind to!" Dad, thank you for being my biggest supporter--the wind beneath my wings--Love you more! I also would like to dedicate this to my husband, Jamie, and my son, Tristen, for their endless support, patience, encouragement, and love!

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Section 1: Overview of the Evidence-Based Project

Introduction

The purpose of this scholarly project was to appraise current evidence and concerns centered around emergency crowding that addressed best practices and evolving issues in my area of nursing practice. Crowding in the emergency department (ED) has become a critical situation across the United States. Many emergency room departments face crucial decisions on how to handle this crisis with a growing number of visits on the rise coupled with disasters and acts of terrorism that affect crowding (American College of Emergency Physicians [ACEP], 2014). Identifying policies to help implement strategies to facilitate flow is essential to improve patient flow from triage to discharge, helping to provide efficient and safe access to emergency care.

Purpose Statement and Project Objectives

The purpose of this project was to understand the relationship between emergency room crowding and patient flow throughout the organization. My goal with this project was to identify the barriers that impact patient throughput in a timely manner that has affected patient care and safety in the emergency room. Once I determined the barriers, I was able to develop a hospital wide policy can be developed to help improve patient flow. The objectives of this study were the following: Measures of success can be demonstrated by reviewing barriers to delays in patients being taken to their rooms in relation to their time of admission, looking at barriers on the floors that impeded patients arriving in a timely manner, and reviewing and identifying workflow of patients being admitted and discharged.

Statement of the Problem

ED overcrowding has gained much attention across the United States over the last several years and has illuminated the major problems and challenges that are affecting quality care and safety. According to the Centers for Disease and Prevention (CDC) from 1999 through 2009, the number of visits increased 32%, from 102.8 million visits in 1999 to 136.1 million visits in 2009 (Hing & Bhuiya, 2012). In this project, I addressed strategies to improve patient bed flow in the ED.

Overcrowding in the ED poses many concerns regarding patient safety and quality care. The impact of patient flow in the ED is an important issue to address because ED crowding can compromise quality of care, increase length of stay (LOS), increase medication errors, and compromise community trust (McHugh, Van Dyke, McClelland, & Moss, 2011).

Another area of concern is the fact that overcrowding in the ED can lead to increased mortality rates. Mortality rates are increased when patients have increased LOS in the ED (Plunkett, Byrne, Breslin, Bennett, & Silke, 2011). Once patients are admitted they need specialized care to help facilitate their plan of care, providing them with continuity (of care) that would not be met staying in the ED.

Significance/Relevance to Practice

Management of the flow of the ED patients can help improve patient outcomes by providing efficiency that optimizes and maximizes bed capacity and bed turnover (Popvich, Boyd, Dachenhaus, & Kusler, 2012). Moreover, the improvement of policies can help to improve patient flow throughout the hospital. Research has shown that

reviewing workflow patterns can help to improve *front-end* processes (i.e., triage, bedside registration, and door to bed, shorter wait times) and *back-end* processes (i.e., discharges, admissions, and door to admit time) by helping to implement strategies that deal with the management of patient flow, which can greatly reduce length of stay for discharged and admitted patients in the ED (Popvich et al., 2012). The flow of these steps is presented in Appendix A. Utilization of best practices to help guide clinical decisions based on evidence-based leadership can help to improve flow (McHugh et al., 2011).

Overcrowding in the ED can lead to increased morbidity and mortality due to transport delays, medic diversions, delays of patients waiting to be bedded, boarding, patients leaving without being seen, and medication errors (Melnyk, & Fineout-Overholt,2011) Patient safety and quality care is greatly compromised when you have a combination of boarders, mixed with a high acuity. These errors occur more often due to lack of team structure, nurse to patient ratio mix, poor task prioritization, poor communication, decrease in assertiveness, and lack of team members checking each other's work (i.e., critical drips, lab draws, review of orders, and point of care testing; Kulstad, Sikka, Sweis, Kelley, & Rzechula, 2010).

Increased LOS can also significantly impact the constraints of bed availability in the ED. Issues with LOS can lead to limited space preventing patients being brought back to that are waiting in the lobby and ambulances delivering patients needing to be evaluated (Eitel, Rudkin, Malvehy, Killeen, & Pines, 2010). When there is an increase in the LOS, there will also be a corresponding increase of patients leaving before being

medically evaluated and ambulances being diverted due to lack of space (Plunkett et al., 2011).

In 2010, the Center for Medicare and Medicaid Services (CMS) revealed that it would be considering linking specific ED-related measures to service reimbursement (Barrett, Ford, & Ward-Smith, 2012). At this time, EDs are required to report ED crowding measures to CMS, these measures include door-to-diagnostic evaluation by a provider, patients who leave without being seen, and time from admit decision time to the time of departure for admitted patients only (Khanna, Boyle, Good, & Lind, 2013). Hospitals will be obliged to communicate these measures to CMS to receive the full Medicare payment (Melnyk & Fineout-Overholdt, 2011). These measures will be used to help researchers assess changes in ED crowding and help visualize patient flow (Khanna et al., 2013).

A review of workflow policies can also help to identify flow issues hospital-wide that may contribute to overcrowding in the ED. Contributing factors on the inpatient side include a delay in discharges by physicians and nurses, delays in rooms being cleaned, and physicians delays in downgrading patients from a critical unit. The factors I have listed in this subsection were necessary for me to review to create a change for improvement that will help address patient flow issues within the study site organization. These factors also helped me develop the following project question to guide this study: What can be done to help improve patient flow in the ED?

Evidence-Based Significance of the Project

Perfecting patient flow in the ED is key to ensure quality and safe care. When flow is compromised time-sensitive clinical processes, evaluation, and treatments for patients with serious illnesses can be delayed for long periods of time (Baker, Shupe, & Smith, 2013). These delays can affect quality measure times such as myocardial infarction (meeting door to table to balloon time); strokes (meeting protocols for computed tomography scan time to TPA administration for eligible patients); and septic work ups (fluid resuscitation, collection of blood cultures, and hanging of the first antibiotic). These time sensitive processes were implemented to help decrease mortality and improve patient outcomes (Jihan & Jordan, 2014). However, delays can greatly increase the mortality rate and have negative outcomes for the patients (Institute of Medicine, 2006).

Another significant issue related to operational efficiencies that have been linked to increase sentinel events in the ED is ED crowding. According to Moskop, Sklar, Geidermand, Schears, and Bookman (2009), ED crowding contributed to 31% of sentinel events from boarded patients. Boarded patients could have great consequences related to increased delays as patients that are boarded require the greatest need of specialized inpatient care services, such as intensive care unit, progressive care unit, telemetry, or the operating room. These can place both ED and boarded patients at increased risk for delays due to the following: medication delay, delay in patient access/assessments, hurried decisions, delay in transfer of information (physician to physician), increase for medication error, decrease of attention (neglect of boarders), delay in tests, delay in

procedures, delay in seeing consulting physicians, delay in specialized equipment, and untimely discharges (Moskop et al., 2009).

Overcrowding of patients can predispose an increase in medication errors in the ED, especially when there is overcrowding of patients combined with high acuity, increased nurse patient ratio, decreased staff, and increased nurse workload (George & Evridiki, 2015). Unfortunately, during these times nursing staff may take short cuts in being vigilant ensuring the five rights of medication administration, reviewing of medications that require a second nurse (i.e., critical drips, pediatric medications, and insulin injections. Research has shown a positive correlation of medication error frequency and ED crowding with the utilization of emergency department work index score (Kulstad et al., 2010). This score has been implemented to measure ED crowding and occupancy rate.

Process mapping has been a promising tool to help plan and respond to the influx of patients and holding patterns in the ED. Surge capacity is a means to help assist ED with identifying staff, structure, and space (Scrivens, 2010). The process mapping contributes to guiding decisions on staff utilization and space based on patient volumes. The initiating of the improvement tools can help guide process improvements for nurse managers and charge nurses to work proactively instead of reactively. A policy for improvement requires a multidisciplinary approach that requires nurse managers, nursing supervisors, physicians, housekeeping, and staff to work together to ensure timely discharges, availability of beds, and use of available resources wisely.

Implications for Social Change in Practice

Perfecting the flow in the ED is going to be even more important to address as the problem continues to escalate. Implementing a process tool to address the barriers to flow in the ED can help alleviate this increasing problem occurring in the United States. The processes and practices that are currently utilized in the ED needed to be evaluated and examined in an effort to identify barriers to throughput. A big piece of the management for flow includes the boarding of patients, which is considered a hospital-wide issue (Hoot & Aronksy, 2008). Any type of constraint can limit the performance of a process that has been implemented causing inefficient processes. In order to optimize patient flow in the ED, strategies need to be managed throughout the hospital to maximize the variation of throughput.

In this project study, my review process started within the ED. Process improvements were reviewed and evaluated for the following, triage, registration, door to triage, doctor to door, door to bed decision to admit and discharge, discharge to home or admission, staffing mix, and patient demand (Popvich et al., 2012). I also evaluated and reviewed inpatient improvement processes such as discharge times, barriers in receiving beds, IT barriers, handoff of report (nurse to nurse), and needs of inpatient bed from other departments (unit to unit transfer/operating room patients).

Definitions of Terms

In any research design, it is important to ensure a clear understanding. In this subsection, I will define and clarify the meanings of the following terms in the context of

this project: *Boarding:* The practice of holding a patient in the ED after they have been admitted to the hospital because there are no inpatient beds available (ACEP, 2014).

Length of stay (LOS): A measure of time of how long the patient remains in the department (Asha & Ajami, 2014).

Overcrowding: When no space is left to meet the timely needs of the next patient who needs emergency care (ACEP, 2014).

Process mapping: A tool or model used to evaluate the work or flow within a department to help decrease length of stay for discharged and admitted patients (Dyas et al., 2015).

Workflow: A process of a series of task, how they are accomplished, and in what order (Asha & Ajami, 2014)

Assumptions and Limitations

I identified assumptions and limitations that affected this project study. My main assumption in this project was that the emergency room crowding will continue to become a problematic issue with the expected number of visits to rise yearly. A limitation that required consideration was the review of a process in an uncontrolled environment. I identified the fact that patient arrival times and LOS variability needed to be evaluated, especially during high volume days of unexpected uncertainty.

Summary

My review of assumptions and limitations can help to establish the needs based on function, identification of bottlenecking, potential interventions, and intermediate measures to analyze. Improvement processes can help to build a culture of safety and

flow and implement best practice guidelines within the ED. These improvements can help to optimize care and avoid harm.

Section 2: Review of Scholarly Evidence

Specific Literature

I conducted this literature review using the electronic databases of CINHAL, ERIC, ProQuest, MEDLINE, and PUBMED to address issues and outcomes related to the resolution of the problem under study. For the review of scholarly evidence, I conducted numerous searches of key words and phrases using Boolean search strings of the following terms and criteria: *hospital policies, emergency departments/emergency services, quality improvement, program development, professional practice, evidence-based, emergency care, length of stay, risk management, patient discharge, benchmarking, crowding, patient admission, patient satisfaction, waiting rooms, outcomes,* and *nurse perceptions.*

General Literature

ED crowding affects quality when occupancy has been maximized and the opportunity for errors dramatically increase. Strategies to manage variation to improve the flow are essential in developing protocols for triage and pathways to help facilitate the admission process can help to streamline the processes (Mayer & Jensen, 2009). The Institute of Medicine (2006) identified six domains of quality care, safety, effectiveness, patient-centeredness, efficiency, and timeliness. These domains can all be compromised when there are prolonged waits, boarded patients, or ambulance diversions (Welch et al., 2011). Crowding can increase hospital cost due to increased mortality rate, delay in medications, and medication errors. Organizations can have a loss in revenue due to CMS reimbursement revenues related to crowded-related measures and patients leaving

without being seen (Barrett et al., 2012). ED capacity constraints affecting efficient flow need to be considered in efforts to reduce constraints. However, another area that affects the flow is the inpatient side, and this too needs to be assessed to facilitate movement of admitted patients.

Literature Review Matrix

I completed a literature review matrix to identify current concerns and issues in perfecting flow in the ED. By reviewing trends and evaluating other research, I could establish three relationships between patient crowding and patient outcomes and the interventions and policies that have been developed to address this significant problem. Table 1 is a review of my literature that allowed me to evaluate current research that discussed the need for process improvement tools to help combat this serious issue.

Table 1

Literature Review Matrix

Author/s and Level of Evidence	Conceptual Framework or Theory	Main Finding	Research Method	Strengths of the Study	Weaknesses
Baker, S. J., Shupe, R., & Smith, D. (2013). Level 2	Provider-in-triage model, super-track model, and split-flow model	Best practice models can help to reduce throughput intervals.	Key questions to identify where throughput challenges lie.	Ways to implement best practice models to improve flow.	Limited studies done.

George, F. & Evridiki, K, (2015) Level 7	Not specified	ED crowding is associated with poorer performance and adverse clinical outcomes.	Literature review	Identifying need for policies to be adapted for patient safety/care.	Further research is needed to fully understand the precise mechanism through which crowding adversely affect patient care.
Rotteau, et al., (2015) Level 5	Thematic framework	Develop a process improvement plan to reduce length of stay and improve patient flow.	Qualitative evaluation	Identified several key factors to help develop implementatio n for process improvement plan.	Due to the small number of hospitals included in this study, they were unable to identify factors that were present in successful hospitals but not in unsuccessfu l ones.
Naik, T., 2012). Level 5	Lean conceptual framework	The application of lean methodologies showed promise in improving care in the ED.	Lean process	Gained insight into lean methodologies to help	Uncontrolle d design and limitations with observation al, pre-and post-study design.
Hurwitz, J., Lee, E.,		Develop simulation	Qualitative evaluation		No assumptions

Lopiano, K., Mcinley, S., Keesling, J., & Tyndall, A., (2014). Level 5	Operations research theory	frameworks to help minimize bottlenecking and patient boarding.		Development of a patient flow model.	regarding registration or triage delays, which may cause some variation to time.
McCaughey, D., Erwin, C.O., DelliFraine, J.L., (2015). Level 7	Not specified	To identify strength and weaknesses of capacity management in the emergency room and recommendations.	Literature review	Implementation of tools has been shown to optimize ED capacity, and improve efficiency.	A limited number of articles retrieved on capacity management.
Carmen, R., Defraeye, M., & Nieuwenhuyse, L. (2015). Level 4	Discrete-event simulation	Develop a decision support system to improve patient flow.	Qualitative	DSS allows to analyze the impact of different capacity changes on patient flow, and to detect efficient capacity combinations using data envelopment analysis (DEA).	Reducing boarding times has a negative loop effect, which may increase length stay and increase workload.

Tools for helping to perfect flow in the ED have proven to improve patient satisfaction, sentinel events, and decrease wait times (Baker, Shupe, & Smith, 2013). George and Evridiki (2015) conducted an extensive research reviewing medical literature related to the terms *emergency department* and *crowding* from the dates of January 1, 2003 to January 1, 2013. Their reviews of the articles were separated into three categories

increased delays in treatment, increased medical errors and adverse events and increased mortality. They concluded that there was strong evidence to suggest that overcrowding is associated with poorer patient outcomes that can negatively impact care. They believed that policies must be put in place to help manage emergency care and that further research was needed to determine the exact mechanism between crowding and adverse events that affect patient care.

Baker et al.'s (2013) research addressed questions in order to identify where throughput challenges occurred using practice models. Several studies they reviewed noted that a key factor of overcrowding is a systemic issue that must be addressed by the entire organization to evaluate and identify flow challenges. The researchers evaluated the three different areas of flow in the ED: door-to-bed, bed-to-disposition, and disposition-to-discharge and/or admission. They mentioned these areas to utilize as communication tools to help improve efficiency by diagnosing and tracking the surge of patients being seen. Their study showed that using these areas as a communication tool has helped to deploy tactics and efficiency tips to best fit one of the models to help accelerate flow based on matching capacity with demand. These flow models help to decompress the ED by aligning goals based on challenges that the department maybe facing (i.e., lack of resources, not having patients discharged timely, or lack of bed availability).

In a patient flow model study completed by Hurwitz, Lee, Lopiano, McKinley, Keesling, and Tyndall (2014), the researchers conducted interviews with frontline staff and physicians and looked at their day-to-day operations to access ED metrics, and

bottlenecking due to patient boarding and compared this information to national data provided from academic hospitals. Based on the results of their study, they concluded that building a robust framework unique to the ED and its environment could help to implement decision support policies for managers to utilize, helping to make proactive decisions rather than reactive to the influx of patients and volume. They did note that the two hospitals they encountered had their own challenges within their day-to-day operations; however, their tool did provide a means to identify and address areas that affected patient flow. The issues with bottlenecking and boarding did not appear to be a driving factor in increasing length of stay for patients in the ED.

Policy improvement models have been widely discussed in ED. One in particular is LEAN management because it helps to identify and minimize steps in a process. Rotteau et al. (2015) completed a qualitative evaluation where they interviewed physicians and executives at 10 selected hospitals. The hospitals were selected based on their length of stays of patients in the ED. They grouped the hospitals by developing a coding framework based on participants' experience and role and reviewing their annual number of ED visits, acuity volume, number of admitted patients, and median length of stay. The researchers examined the hospital-based teams' perception and influences and what helped to make it a success or failure (Rotteau et al., 2015).

A common theme throughout many of the peer-reviewed articles I reviewed was the need to have buy-in from the executive level, physicians, nursing, ancillary departments, and nursing leadership. The ED has a multidisciplinary approach for

improvement needs support and partnership from many departments within the organization to be successful in maintaining patient flow.

There have been many findings through research that demonstrated a great sense of urgency to improve patient flow and to reduce ED crowding. Breakthrough practices have been implemented to improve patient throughput in the ED. One of the best ways to identify a problem with patient and workflow is through process mapping. Processing mapping is a tool that systematically and visually identifies inefficiencies of steps.

One area of importance is the clinical workflow, which has repeatedly been shown to impede workflow processes (redundant steps) that can waste time and resources (Migita, Del Beccaro, Cotter, & Woodard, 2011). Finding and identifying barriers for patients having to wait (i.e., delays in seeing a doctor, being brought back to the room, admit time to departure) is important during process mapping to help execute policies. One tool that has been useful in helping to plan a change or test change is the plan-do-study-act (PDSA) model. The PDSA model has been used by many health care organizations to help accelerate improvement by utilizing quantitative measures to identify areas of improvement and testing. Utilization of this framework can help a researcher or organization ensure that they do not deviate from the objectives and that they have achievable measures that show validity (Peter & Paul, 2015).

Conceptual Models and Theoretical Frameworks

The evidence-based practice model that supported my research was the Iowa Model. The Iowa Model can be useful for organizations to initiate change and quality improvement and making those changes based on best evidence (Polit & Beck, 2009). In

addition, the Iowa model defines the need for a team approach, preferably

interdisciplinary, to assemble, appraise, and synthesize available research into practice

(Melnyk & Fineout-Overholt, 2011). These initiatives help to drive research-based

protocols for practices to developed evidence-based guidelines. In this study, they helped

me to guide interventions to help alleviate and prevent ED crowding.

I developed a literature review matrix to help summarize the history and purpose

of the problem statement: What can be done to help improve patient bed flow in the ED?

My search goal was an analysis of literature studies that introduced or assessed causes of

emergency room crowding and literature reviews of interventions that reduced the

adverse consequences of crowding.

Role of the DNP Student

As an emergency room nurse and a manager, my greatest passion involves

improving patient safety initiatives. I want to share my knowledge and experience with

other emergency room nurses to help increase awareness to improve processes with

patient flow, enabling them to provide safe care. My involvement during this project was

to help implement a process improvement tool that would improve patient throughput by

bringing recommendations for efficiency with movement of patients.

Summary

Many of the studies I located in my literature review were aimed at actions,

processes, and policies that would improve patient flow. Researchers have shown robust

policies that implement process mapping to be successful with the buy-in from the

executive team, nursing staff, physicians, and nurse managers. To execute this type of

process, a healthcare organization must have a delicate balance amongst its employees and other departments. Some variables can cause the process change to have an adverse effect. According to a literature review conducted by Hunsaker, Chen, Maughan, and Heaston (2015), staffing can play a significant role due to turnover and the shifting of patients to other departments that may also be experiencing hardships with staffing. Reduction of throughput times can also cause the same effect, especially when staff is feeling the push move patients in and out of the ED.

Staff may feel unappreciated, overworked, and quickly burn out because of the push to have the patients being placed in bed, discharged, or moved to the floor. Furthermore, this could lead to a decrease in patient satisfaction scores because excessive waits, the perception of being rushed in and out, and not being seen promptly. This frustration may trickle down from patients being boarded in the ED.

Improvement methodologies such as LEAN have proven to improve efficiency and quality care by examining process, data, customer needs, and review of deficiencies (Eitel, Rudkin, Malyehy, Killeen, & Pines, 2010). Mapping processes are different for each organization because every organization must find the solution to each deficiency that is causing situations within in the ED and are impacting throughput. Overall, the tool is quite useful in managing flow but is only as good as the people behind it that are executing plans and reinforcing change.

Section 3: Approach

Project Design and Evaluation Plan

Determining the right strategy and goals for emergency room crowding is crucial to facilitating change that will address the issues with overcrowding and patient safety. Developing policy and procedures can help to improve the method of movement of admitted patients that cannot get out of the ED and effectively to their rooms. It is well known that ED crowding is commonly related to LOS and boarding of admitted patients (Khanna et al., 2016). Establishing a policy improvement guideline that outlines a robust process of addressing the issue of ED overcrowding can help to eliminate redundancy, poor communication, and inpatient care delays.

In this study, my workflow process assessment informed the initial development of a patient flow process addressing areas of breakdown causing delays. I obtained the workflow assessment through reviewing the ED process and workflow to review the measures that are contributing to ED crowding that affected patient flow. These measures included: arrival time to bed, time to door to provider, admit decision to departure, barriers in moving patients to the floor, boarding of patients in the ED, and the use of surge capacity.

I collected and reviewed the workflow assessment from secondary data for a 2-month period from April 1 through May 31, 2016. My focus on the items that were working and items that were not working were keys to improving operational performance and maximizing service capacity. Once I identified and defined the areas, the next step was to implement steps by planning interventions and testing them.

I ultimately used the information gained through this secondary data analysis to devise a policy-improving throughput of admitted patients. I also reviewed data from the study site to track and trend drive accountability (i.e., boarding of patients, census status, and use of the surge capacity). These processes helped to provide tools and tactics to facilitate strategies to improve patient outcomes and clinical-decision making choices based on evidence-based research studies to improve efficiency.

Population and Sampling

The data sample was from a community hospital with approximately 78,000 ED visits. The ED was known for high volume and high acuity, and the average yearly percentage of admissions from the ED was 55%. The average LOS for admitted patients being held in the ED was 5 to 6 hours. Patients who were admitted and had a ready bed usually had a 2 to 3-hour wait in the ED before they were transferred to their assigned beds. I collected data for the month of October 2016 and obtained Walden University IRB approval before the study was initiated.

Data Collection

I derived the data from reports of de-identified data for a 1-month period for review from the ED director. The information allowed me to review the metrics that affect the LOS in the department. These reports were obtained electronically through their operating system database. By a review of the information, I established the areas of times where they're impacting time and distinguished areas for the greatest need assessment for improvement process plans that could help to provide strategies utilizing evidence-based methodologies to perfect flow. I used the information to determine the

needs to develop a policy to improve inefficiencies of moving admitted patients in a

timely manner. Furthermore, it helped to prevent surges of patients being held in the ED,

which can compromise care and lead to poor handoffs and delays of care.

In the study, I evaluated and reviewed the following variables for inefficiencies:

- Boarding of patients;

- Surge capacity;

- Ancillary departments (radiology, laboratory, and bed board); and

- Workflow processes.

Identifying any gaps helped me determine the areas that were working well and those not

working well together, especially with time-sensitive items such as blood work and

radiology results. Information was collected over a 2-month period to gauge areas I

identified as opportunities for improvement.

Data Analysis

Statistical analysis can be used to create descriptive statistics for any relevant

data. I identified several ED measures that affected throughput by collecting data through

the hospital system that captures these measures. Multiple frequency tables were used to

display numerical summaries, frequencies, and percentages for the identified variables.

This data helped to track and trend concerns and measures of variation that impacted

throughput in the ED, such as discharge times, daily census, and admit to departure.

Project Evaluation Plan

The implementation of the process mapping has been highly successful in EDs

across the United States (Eitel et al., 2010). The short-term goals of process mapping in

this study were assessing the problems and issues and creating better workflow processes. The long-term goals were validating the efficiencies that had been identified and the effects they had made on the throughput.

To achieve the ultimate desired outcomes, I used PDSA model. The PDSA is a structured approach to gain valuable insight and knowledge in testing change (Reed & Card, 2016). This cycle can help to ensure continuous improvement of a process (see Appendix A). The first step in the cycle was identifying the focus of the problem, which in this study was what can be done to help improve the bed flow in the ED to prevent overcrowding. This focus related to patients who were admitted and waiting to leave the ED in a timely manner to help decrease bottlenecking in the ED causing overcrowding.

My ultimate goal was to develop a policy once my project was complete. I worked closely with my mentor to develop a policy based on the identified ED metrics. I received approval through the health information technologist of the study site hospital to review and use the records. The information was all based off ED statistical reports that display the name of measures and median times. The information reviewed did not obtain patient names or medical record numbers. The data were collected and provided to me by my mentor using their electronic health records to obtain ED reporting measures through their report centering. The collection of data did not begin until approval was received from the Walden IRB.

My mentor and I worked closely to develop working relationships with the ED staff and physicians, bed board, nurse managers, nurses, and hospitalists. Once gaps were identified, I created a need for a bed flow committee. This committee was made up of key

stakeholders who were involved and invested in improving inefficiencies within the organization that cause substantial delays in admitted patients leaving the ED in a reasonable period. When approval and buy-in from the key stakeholders and the executive team came together, I then moved to the *do* step of PDSA. When the *do* phase was implemented and put into action, the study phase was initiated. During this period, I evaluated and monitored outcomes to review and test the validity of the plan for any deficiencies or successes. I gauged these outcomes to modify or adjust areas for improvement. After this phase, I presented the information to the bed committee and executive team to review and ask questions regarding the findings. This can lead to the final step, do step should they elect to implement the policy and procedure of the tool.

Summary

Policies can positively influence decisions that drive emergency health care and the population it serves. Evidence-based practice and nursing research help to expand the knowledge of emergency room nurses to think critically and make clinical-decision choices that help ensure quality care and patient safety. The ultimate goal of this study was to develop a policy for the future to improve patient flow and overcrowding in the ED.

Section 4: Findings and Recommendations

Discussion and Implications

Overcrowding in emergency rooms is a nationwide epidemic that has impacted patient throughput and imperiled care and safety (Emeny & Connolly, 2013). Inefficient flow can prolong excessive LOS, increase patient mortality rates, add to costly readmissions, and increase bed shortages and unmet patient expectations. Improving throughput can significantly help to improve reduction of LOS, bed turnover, and increased return of ED visits (Wang et al., 2014). The goal of this project was to develop a policy to help with ED overcrowding.

According to Nippak, Isaac, Ikeda-Douglas, Marion, and VandenBroek's (2014) literature review, there is a strong relationship between ED overcrowding and an increase in LOS for inpatients. Their study identified that flow in the ED needs to be addressed and paralleled to intradepartmental processes to help decrease LOS, starting in the ED (Nippak et al., 2014). Even though there has been an increase in literature reporting on the growing concerns of ED overcrowding, there is still no operational identification for ED overcrowding (Wang et al., 2014). Improved early identifier tools and strategies could be useful in helping to improve patient flow.

In this study, I collected data over a 1-month period and reviewed metrics that affected the LOS in the study site's ED. A review of the literature was completed to establish concerns and issues in perfecting flow in the ED. The information provided me with material to help establish three relationships between patient crowding, patient outcomes, and interventions and policies that were being developed. I used statistical

analysis was used to create descriptive statistics. The ED measures that affected

throughput are displayed in a scorecard to track and trend different variables that

impacted throughput (Table 2).

Table 2

ED Scorecard FY16 Reduce ED Wait Times (Time to Minutes Average)

	Goal	October
Average Time from ED Arrival to ED Departure for Admitted Patients (IBEX)	240 min.	317
Average Admit Decision Time to ED Departure Time for Admitted Patients (IBEX)	126.5 min.	111
AVG Door to Bed	26 min.	10
AVG Door to Provider	35 min.	22

Findings and Implications

Stage 1: Plan

PDSA uses a four-stage problem-solving model to identify a goal or process to

implement change (Reed & Card, 2016). The focus problem I identified was: What can

be done to help improve the bed flow in the ED to prevent overcrowding? The focuses of

this question allowed me to review the measures that were contributing to ED crowding

and that affected patient flow.

I obtained information for this study using the operating hospital information

system, IBEX, to collect the average daily census and times for arrival time to bed, time

to door to provider, and admit decision to departure. These times were reviewed to help

determine areas of opportunity for improvement about the use of the operational flow.

Stage 2: Do

  I used a checklist for surge capacity to help the charge nurses proactively plan for managing the assignment of patients to inpatient beds during times of high volumes with the ED. My mentor met with stakeholders (nurses, mangers, ED physicians, and frontline staff) and identified barriers impacting bed flow. She also met with them to identify concerns or issues and to compile a list of collectively shared thoughts.

  The ED had several challenges that combined to contribute to ineffective flow in their department. Their door-to-provider times were exceeding their goals; however, the admit decision to departure, ED departure for admitted patients, and ED discharges had been significantly above their goal in moving outpatients promptly. The inability to move patients out of the ED when they were admitted increased the supply and demand for the patients that are waiting to come to the back to receive care. The need for beds on the unit was further complicated by the untimely discharges and appropriate downgrades to a lower level of care for admitted patients.

  Fast track was utilized to bed and quickly access the lower acuity patients; however, the lower acuity patients were being placed in the main core resulting in sicker patients waiting in the ED lobby because there were no beds to place the patients. Because demand and capacity was an issue, an executive decision was made to establish physician in triage model. The initiating of physician in triage helped to streamline the lower acuity patients from being seen in the main core where the sicker patients are primarily housed. Furthermore, having the ability to bed patients in the main ED helped

improve patient delivery of care and cut LOS (see van der Linden, Meester & van der Linden, 2016).

Another area of concern was the ability for the charge nurse to be able to communicate in real time with the house-nursing supervisor and managers to bring awareness for throughput issues in the ED and escalate any issues that may cause longer wait times to triage patients and greater LOS. Greater LOS can increase the left without being seen rate, which amounts to lost revenue and potentially increased liability because these patients are at a greater risk because they have not been evaluated by a physician in the emergency department (Hsia et al., 2011).

Gaining timely admission orders and departure of admitted patients to their bedded assignments were difficult to keep at the goal of 240 minutes or less. The hospitalist admitted having difficulty managing their times due to admitting, discharging, and evaluating patients. The ED physicians also had great difficulty managing their time when there were high volume and acuity. These backups also had an impact on times involving patient test results that required diagnostic exams and labs because the ancillary departments (lab and radiology) were not able to keep up with the demand secondary to high volume and same amount of staff to complete workload.

Stage 3: Study

The data showed that there were areas of management that needed to be addressed to help address issues with delays. Within the ED information system, IBEX, nurses are required to document "reasons for delay" in transporting patients to admission floor. Once the nurses document the "reasons for delay," data can be captured and pulled for

analysis. I pulled this data for a baseline. Table 3 demonstrates data abstraction from the one-month period of October 2016.

Table 3

Barriers to Transporting Admitted Patients to Floor for October 2016

Barriers	Listed as Reason for Delay by Nursing
No Bed Available Due to Being Full	52%
Unable to call Report (Inpatient nurse unavailable)	28%
Delay in Transport by ED Staff	8%
Awaiting Admission Orders	10%
Hospitalist Evaluating Patients in the ED	2%

Note. Data Source: IBEX-ED Information System

To evaluate the number of patients boarding in the ED, I had the study site healthcare organization define the term *boarding*. Patients that are admitted and are unable to receive an inpatient bed assignment within 60 minutes were considered as boarding. Once the patient was determined to be a boarder, the patient was documented as such, which initiated the time stamp. The time data are monitored from time of boarder to time departed. I measured this data for same time frame as all previously mentioned data collection. The data captured resulted in the average length of stay for boarders for October 2016 (Table 4).

Table 4

Average Length of Stay for Boarders for October 2016

October 1, 2016-	Number of Admissions-1315	Admissions in Boarder Status-35%	Average Length of Stay of Boarder Patients-320mintues

Note. Data Source: IBEX-ED Information System

In this study, I conducted a formal review of the current state surge capacity plan and checklist within the organization. After interviewing senior leadership and front-line staff, I determined that the surge capacity plan and the checklist were not being consistently used or reviewed for opportunities, and a decision was made to retool and reeducate staff on the checklist. I created another surge capacity plan and checklist to help guide the charge nurses in being proactive in helping prepare when the ED exceeds its patient capacity and patients are experience excessive waits for emergency care.

Stage 4: Act

Based on the data that I collected, my recommendations to help implement changes and perfect flow in the ED were to meet with members of the executive team to present my findings. The goal of the meeting was to receive support and approval to establish a multidisciplinary team for a bed flow committee. The purpose of the committee was to develop practical measures and actionable items that will improve patient flow through a multidisciplinary team.

The executive team provided approval, and a meeting was established. The bed flow committee members include the chief nursing officer, vice president of support operations, ED management, inpatient management, laboratory management, radiology management, environmental services, pastoral services, and quality and patient safety management. We provided a formal presentation to the committee for review and recommendations were provided as to possible solutions to the ED throughput issues. The bed flow committee served as a formal committee for the organization of policy and procedures around the use of surge capacity plan and checklist.

Discussion of Findings and Implications

My initial findings were consistent with the data collection in that there was an increase in LOS and boarding of patients due to lack of process and procedures. Therefore, the goal of my project was to reduce the average LOS through the creation of an organizational policy that leads to fewer patients in the ED and greater capability to handle surges of patients. This project provides insight on a volume-driven surge capacity tool and checklist to improve early intervention. The tools can be utilized to help implement and plan a policy to optimize proactive patient flow in the emergency department. My recommendations were based on the areas that need to be managed by developing early interventions and policy to help strategize alleviation of ED overcrowding. A strong policy for bed utilization and surge capacity can help organizations provide a strong incentive to work collaboratively while promoting a safer and efficient response to a growing crisis. Development of utilization strategies that contribute to facilitating throughput may help to promote positive social change by providing nurses with the tools to help prepare for and respond to unexpected increases in patient volume. Improving efficiency with the flow can contribute to improving patient care, timeliness, and safety.

Strengths and Limitations of the Project

One of the strengths of the project was that the results provided insight on the need to utilize and implement policies to help obstacles in patient safety and quality care in the ED during overcrowding. Additionally, a strength of the project mirrored the finding of many of the literature reviews that crowding in the ED requires hospital-wide

solutions. There were few limitations to the project. One limitation is that I did not include the variability of nursing staffing levels that may contribute to crowding. Also, I did not account for the acuity and types of patients. I would recommend that baseline data and a measure of ongoing changes should be collected for a future project and completed over a longer time to correlate greater LOS in the ED.

Analysis of Self

This project on perfecting flow in the emergency room has provided me with the opportunity to be aware of the ongoing concerns related to overcrowding, patient safety, and quality care. Over the years, I have observed an increasing concern to health care professionals and health care consumers related to crowding in the emergency room. My ongoing commitment and passion as a lifelong learner and scholar have enabled me to work on this project to help impact and promote social change by providing nurses with tools to help prepare for and respond to unexpected increases in patient volume.

Creating a policy improving tool to help with the reduction in delays for emergency room throughput has allowed me to enable others to identify volume triggers to promote early intervention and strategies to help with ED overcrowding. Although high capacity is never predictable, it will be an ongoing multidisciplinary effort for the buy-in and commitment of hospital leadership and staff to continually stay engaged and involved to facilitate and maintain changes to improve the efficient and effective flows of patients.

Summary and Conclusions

Development of a policy improving throughput of admitted patients in the ED can help to streamline the process of placing the patient in the appropriate place in a timely manner. Facilitating change to help improve a process often comes with challenges that involve taking steps that delay them. Collaboration and sharing of result internally and externally will be key to sustainability.

Section 5: Dissemination Plan

For my project, I developed a policy to address the concerns that were collectively discussed with my mentor from ED physicians, hospitalist, nurse mangers, nursing supervisors, and frontline staff. The information was combined with the workflow processes of the ED and the barriers that impacted LOS and bed placement. The resulting policy that I developed is shown in Appendix B. If the policy is put into place by the organization, it could help to build momentum for other organizations to share their results with external stakeholders, build partnerships, and conference presentations to help bring attention to address the importance of perfecting flow in the ED. Streamlining patient flow in the ED will be important to the management of a safe, high flow environment. To improve flow and reduce crowding, it will be necessary for the organization to devote leadership support for long-term success and to ensure accountability and encourage continuous improvement for ED processes. The organization has been provided the policy (Appendix B) that I created. Disseminating this scholarly project will support the need for further investigation.

Summary

There is rigorous need to continue to find solutions to effectively address ED crowding and patient flow. As my project, I have created a policy to address this issue in the study site healthcare organization. If they choose to adopt the policy, it could help them streamline the process of placing the patient in the appropriate place in the healthcare system in a timely manner.

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Appendix A: PDSA Cycle

ACT PLAN

STUDY DO

Appendix B: Policy Development

	Issued By:	Policy #:
	Prepared By:	Effective Date:
Dept.: All Departments	Approved By:	Next Review Date:
		Revision Date:
Policy Title/Subject: Bed Utilization Plan		Page 1 of 3

Purpose:

The purpose of a bed utilization plan is to facilitate and streamline the process of placing patients in the appropriate place and in a timely manner.

Policy:

I. <u>EACH SHIFT</u>

    A.   The Charge Nurse on each unit will manage bed flow effectively and efficiently.
        1. Participate in routine Bed Control Meeting and as needed in Code 30 – Tight Bed situations.
        2. Manage bed availability by anticipating upcoming activity including anticipated admissions, interdepartmental transfers, changes in the level of care, confirmed and potential discharges, and illustrating unit activity in organization's communication system (HEV, etc.).
        3. Facilitate bed utilization by maintaining clean and ready beds indicated by the prioritization of beds in the organization's communication system.
        4. Direct the use of nursing and ancillary resources with anticipated patient flow.
        5. Assist in the organization's productivity and cost containment measures by way of unit matrix and operational goals.
    B.   The Nursing Supervisor will collaborate with individual unit Charge Nurses to facilitate efficient bed flow, effective resource utilization, and appropriate placement of patients.
    C.   All Staffing will be reviewed carefully with nursing leaders, charge nurses and nursing supervisor and any additional on call staff may be utilized for High Census/Code 30 as deemed necessary.

II. <u>DAILY</u>

A. Care Management will assess patients' eligibility for current level of care and initiate the process if a change in level is indicated. (i.e. transfer, discharge)

B. All staff will assist with expediting patient throughput.

III. DURING HIGH CENSUS/CRITICAL BED STATUS

High census in critical state is defined as that time when the available beds are less than the number of anticipated admissions minus the anticipated discharges for the day.

A. In addition to the routine procedure as defined above, the Charge Nurses will call physicians regarding the patients pending discharge to expedite the process, and not wait for the physician to make rounds.

B. If the Nursing Supervisor determines the situation is approaching critical status, a High Census Alert will be initiated in HEV to notify the hospital staff of the critical bed status within the hospital.

C. A **High Census Alert** will be considered based on meeting any of the following criteria:
    1. Holding $\geq$ 3 or more critical care patients with no ability to receive bed assignments within 60 minutes of request
    2. Holding $\geq$ 3 or medical/surgical and/or telemetry patients in the Emergency Department with no ability to receive bed assignments within 60 minutes of request. *Consider Code 30 (Please see below criteria).*

D. A High Census Alert may be initiated by area of critical status:
    1. Hospital indicating house wide bed flow issues. <10 beds open
    2. ICU for <3 open critical care beds.
    3. Tele when <4 tele beds available.
    4. Med/Surg when <5 beds available.
    5. OB – High Volume without Bed Capacity

E. The initiation of a **High Census Alert** results in the following activities:
    1. All beds will be considered as "stat" cleans by the ESD staff.
    2. Evaluate patients within the specialty areas for appropriate transfer to another unit within the hospital.
    3. Nursing Leadership or Designee and/or Nursing Supervisor will call a stat bed control meeting to include charge nurses, or Nurse Managers or Directors of those areas impacted by the critical bed situation**.**

4. The Chief Medical Officer will review the critical status to determine if further action is needed
5. Nurse Managers/designee and the Nursing Supervisor will consider additional staffing requirements. Administrator On-Call may initiate Code Black – (Staffing Shortage Crisis) procedures if warranted.
6. High census alert will be visible on HEV screens.
7. The CMO, CNO, CEO/designee will review the critical bed status situation to determine the need to postpone elective procedures and the need to divert ambulance traffic from the Emergency Department for a specified time period. This meeting will take place as soon as possible after notification of the critical bed status has been received. It is expected if measures need to be enacted this decision will be made as far in advance as possible. For example, if elective procedures are to be postponed, this decision would be made the afternoon preceding postponement.
8. When the above names executives determine the need to take this action, the following will occur:
    a. The bed status is reviewed every 2 hours by either the house supervisor and the information is given to the administrator on call or the CEO's designee.
    b. The appropriate medical department chairs and members of the medical staff are notified of the situation by the designated executive.

F. **Code 30** – CRMC Emergency Department cannot the limit the number of patients seeking emergency care. When the Emergency Department exceeds its patient capacity and patients are experiencing excessive waits for Emergency Care, the ER Charge Nurse in conjunction with Nurse Manager and Nursing Supervisor may place a 30-minute admission criterion in effect. Nursing Supervisor will contact Admin On-Call and Clinical Administrative Director of Nursing to inform of Code 30.

1. **Code 30 Criteria:**
    - ER has reached capacity (50 or more patients, patients in waiting room and/or multiple admit holds in excess of over 60 minutes)
    - Holding 3 Or More Medical/Surgical and/or Telemetry
    - Not to be used for critical care holds only; unable to place critical care patients in hallways.
2. Actions to take place once a Code 30 is announced:
    - Each Medical Surgical/Telemetry Unit will identify two hallway beds and inform nursing supervisor at the 1000 bed huddle daily. ***Maximum of 16 Hallway beds will be created in Code 30***.

- The following units will be affected: 2 East, 2 West, 3 CDU, 4 West, 5 East, 5 West, 6 East, 6 West (subject to change)   - Nursing Supervisor will assign 2 hallway patients in each unit within 5 minutes of Code 30 implementation.   - Patient will arrive within 30 minutes of being assigned.   - Code 30 status can be cleared once all admitted patients have been placed.

Responsible Department: All Departments
Related Policies:
Regulatory Reference: Not Applicable