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Reducing Emergency Department Length of Stay by System Change

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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,
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Project Submitted in Partial Fulfillment

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Abstract

Emergency departments (ED) are exceeding the Centers for Medicare and Medicaid Services and The Joint Commission's recommended 4-hour door-to-admission and 2-hour door-to-discharge for patients. The purpose of this project was to look for factors that decrease door-to-admission and door-to-discharge times and offer recommendations to the Patient Flow Committee (PFC) at the health care facility that may reduce overcrowding, diversion, and patient boarding. The 7-step Iowa model of evidence-based practice (EBP) was used to concentrate on problem-focused triggers that initiate the need for change. The project focused on decreasing door-to-admission and door-to discharge times: by opening an observation unit run by the ED to decrease door-to-admission and door-to-discharge times, increasing point-of-care testing (POCT) within the ED to decrease patients' door-to-admission and door-to-discharge times, and placing a provider in triage to decrease the number of non-urgent patients seen in the ED. A systematic literature review was conducted to gather evidence-based practices other organizations have implemented to decrease the ED patients' length of stay. Article inclusion was based on those strategies that would best fit the milieu of the ED and would be sustainable. Four themes including guidelines, algorithms, expanded services, and modified processes were identified through comprehensive analysis of pertinent literature. A presentation to the 20 member multidisciplinary PFC team presented changes to the current system that may meet goals of reducing overcrowding, diversion, and patient boarding. Since door-to-admission and door-to-discharge times are reported quarterly to the PFC, members will be able to see the impact of the changes and on decreased times for ED patients.

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Section 1: Overview

Introduction

The literature suggests that when the flow of patients through the emergency department (ED) ceases to progress seamlessly, a backup of patients occurs in the waiting room and triage area (McHugh, VanDyke, McClelland, & Moss, 2011). An influx of patients via ground and air emergency services worsens the situation (McHugh et al., 2011) by adding more patients to a department that is at maximum capacity or close to it. Patients in the waiting room have been triaged, but their chief complaint or condition can deteriorate within minutes of the nurse triage, causing poor outcomes for some patients ("Patients Are at Risk," 2010).

Background

In 2009, an integrated health care system in northeast Kansas examined ED patient length of stay (LOS) exceeding four hours for door-to-admission and two hours for door-to-discharge. The number of patients who left without being seen (LWBS), who left before treatment is complete (LBTC), and or who left against medical advice (AMA) was above the goal of 2% set by the organization. As continued performance issues existed with regards to ED patient LOS, the organization sent the ED administrative director and medical director to attend an Institute for Healthcare Improvement (IHI) conference in an attempt to improve management of patient flow throughout the organization. Patient flow is defined by Konnyu, Turner, Skidmore, Daniel, Forster, & Moher, 2011 as:

> A concept reflecting the movement of patients through a sequence of processes as part of their pathway of care. Patient flow is considered to be central to understanding key components pertinent to hospital performance (including queues, redundancies, capacity, and demand) (p. 3).

A modified version of the "Real-Time Demand/Capacity (RTDC) Management," a structured system, was implemented and patient flow was improved throughout the organization. However, the RTDC Management system did not affect the LOS in the ED, which continued to be excessive.

Problem Statement

Poor door-to-admission times and door-to-discharge times cause waiting rooms in emergency departments to back up with patients. The resulting overcrowding can increase length of stay (LOS) and has been shown to cause delays in the provider's diagnosis of, and early intervention for, three conditions: ST segment elevation myocardial infarction (STEMI), stroke, and pneumonia (Bernstein et al., 2008). Poor outcomes have been noted for critical care patients admitted through the emergency room due to delays in the initiation of early therapy (Bernstein et al., 2008).

The Centers for Medicare and Medicaid Services (CMS) and some third-party payers have begun tracking and posting patient times within EDs quarterly on its Hospital Compare website. Third-party payers have begun assessing penalties when ED LOS goal times are unmet.

Purpose Statement

The vision statement of this integrated health care system in northeast Kansas was "to provide the safest and highest quality care in Kansas." One way to help achieve this vision was to improve patient flow (also called "throughput") in the organization. Patient flow is a system-wide process. If one part is broken, the whole process can come to a standstill. A broken system leads to safety and quality concerns, poor patient satisfaction, "pay-for-performance" penalties for not meeting CMS quality measures, and penalties assessed by third-party payers for not meeting the contracted times in the ED. Additionally, patients may leave the ED before being seen by a provider or before completing diagnostic testing. This integrated health care system in northeast Kansas uses these benchmarks in addition to collecting LOS times as a way of monitoring patient flow.

The main purpose of this study was to recognize issues that contribute to delays in the throughput process of patients in the ED; other purposes were to develop guidelines and algorithms, expand services, and modify processes in order to meet expected outcomes and goals. By developing strategies to improve ED LOS, the ED will deliver safer quality care. Thus, patient satisfaction can be improved significantly, while meeting the time intervals set by third-party contractors, the CMS, and the Joint Commission.

Project Objectives

The project objectives were

- to develop processes to decrease times for ED IPs

  - from arrival to ED departure, and
  - from admission decision to ED departure;
- to develop processes to decrease times for ED outpatients (OPs)
  - from arrival to ED departure,
  - from door-to-diagnostic evaluation, and
  - from arrival to administration of pain medication.

Project Questions

In order to identify strategies that an integrated health care system in northeast Kansas can use to decrease door-to-admission and door-to-discharge times for ED patients, the following questions were posed:

- Can limiting admitting physicians' face-to-face visits in the ED (except for critical care admitting) decrease admission times?
- Will opening an observation unit run by the ED decrease door-to-admission and door-to-discharge times?
- What are the current turnaround times (TATs) for laboratory results in the ED?
- Can increasing point-of-care testing (POCT) within the ED decrease patients' door-to-admission and door-to-discharge times?
- Will placing a provider in triage decrease the number of non-urgent patients needing to be seen in the ED treatment area and decrease these triage level 5 discharge times?

Theoretical Foundation

General systems theory, developed by von Bertalanffy in 1936, was used as the theoretical framework for this project. He was looking for a theory to guides researchers in disciplines that concentrated on the developments of research and theory. One theory could work for many systems, enabling researchers to better communicate their research findings and build on each other's work (von Bertalanffy, 1972). General systems theory was used in this study as a theoretical foundation in reducing ED LOS by system change. Petula (2005) stated that, when the team looks at the whole system, they identify the significance of its elements and change can occur through concept mapping and an analysis of the literature (p. 5). The end result of using this theoretical foundation will be improved outcomes and reduced patient LOS in the ED, thus meeting the arbitrary times that have been set for door-to-admission and door-to-discharge times.

Conceptual Framework

Watson's nursing theory of human caring has been integrated into a health care system in northeast Kansas. The theory is based on three essential concepts: transpersonal caring, the caring moment, and 10 caritas processes. Watson (2007) stated,

> Caritas is a Latin word connecting authentic human caring with love and deeper ethical meanings, honoring the preciousness and fragility of human caring. The 10 Caritas Processes of the theory are embedded in a framework of Caring Science as sacred science. (p. 4)

Organizations readily adopt the human caring framework because it can be applied to direct patient care, education, research, administration, and leadership (Caruso, Cisar, & Pipe, 2008; Quinn, Smith, Ritenbaugh, Swanson, & Watson, 2003). The Ten Caritas Processes™ are the following:

1. Embrace altruistic values and practice loving kindness with self and others.
2. Instill faith and hope and honor in others.
3. Be sensitive to self and others by nurturing individual beliefs and practices.
4. Develop helping, trusting, and caring relationships.
5. Promote and accept positive and negative feelings as you authentically listen to another's story.
6. Use creative scientific problem-solving methods for caring decision making.
7. Share teaching and learning that addresses the individual needs and comprehension styles.
8. Create a healing environment for the physical and spiritual self, which respects human dignity.
9. Assist with basic physical, emotional, and spiritual human needs.
10. Be open to mystery and allow miracles to enter.

(Watson, 2007).

The theory framework to re-establish "nursing's value-guided vision of care" (Watson, 2006) was applied to allow this author to provide ethical and moral support

when addressing problems in the delivery of patient care. Decreasing door-to-admission and door-to-discharge times within the ED was expected to improve patient outcomes.

Nature of the Project

The project was designed to decrease LOS in the ED by decreasing door-to-admission (4 hours) and door-to-discharge times (2 hours), which are arbitrary times set by EDs across the nation. Data were collected via electronic reports, written and retrieved through the electronic medical record (EMR) on 100% of patients presenting to the ED for care and/or treatment. The data were then presented to the patient flow committee (PFC) for review. A review of literature was completed to identify best practices that have been tried and were successful in the field. These included guidelines, algorithms, and expanded services within the ED. By instituting or adapting such processes, the ED will be successful in decreasing ED LOS and improving patient outcomes.

Definition of Terms

Boarding: "The practice of holding patients in the emergency department or another temporary location after the decision to admit or transfer has been made; it was recommended that boarding time frames not exceed four hours in the interest of patient safety and quality of care" (Joint Commission, 2013).

Arrival-to-provider time (a.k.a. "door-to-doc time"): The time from the arrival of the patient to when provider contact is initiated (Welch, 2012).

Left without being seen (LWBS): This describes all patients who leave the ED before being seen by a provider (Welch, 2012).

Left before treatment is complete (LBTC): This involves all patients who leave the ED before a formal disposition is made (Welch, 2012).

Limitations

This project is limited to one healthcare setting and thus, findings cannot be generalized to other facilities. In addition, findings are limited to the quality and quantity of data collected by the healthcare organization.

Assumptions

The assumption for this project was to identify issues that contribute to delays in the throughput process of patients in the ED causing an increased LOS. The following items were assumed:

- Implementing guidelines, algorithms, and an expansion of services would decrease door-to-admission and door-to discharge times.
- Limiting the admitting physicians' face-to-face visits in the ED (except for critical care admitting) would decrease admission times.
- Opening an observation unit run by the ED would decrease door-to-admission and door-to-discharge times.
- Increasing POCT within the ED would decrease patients' door-to-admission and door-to-discharge times.

Placing a provider in triage would decrease the number of non-urgent patients needing to be seen in the ED treatment area and would thus decrease these triage level-5 discharge times.

Scope and Delimitations

In 2006, the Institute of Medicine's report on emergency care stated, "While many of the factors contributing to ED crowding are outside the immediate control of the hospital, many more are the result of operational inefficiencies in the management of hospital patient flow" (IOM, 2007). In 2005, the Joint Commission began directing hospital leadership to start devising plans that would address patient flow throughout their organizations, and surveyors began holding organizations to these standards during accreditation visits that year. In 2012, the leadership and provision of care standards pertaining to ED patient flow were again revised with organizations being held to all but two standards in 2013; the last two revised standards pertaining to mental health patients began in 2014 (Joint Commission, 2012). One of the goals at the integrated health care system in northeast Kansas was to do "what is right for the patient"; thus, key stakeholders began to closely examine patient flow. The administrative director of the ED and I were assigned this project by the chief nursing officer to improve patient flow throughout the organization and to decrease LOS in the ED. This study was delimited to an integrated health care system in northeast Kansas and the patients who chose to seek medical care and treatment within the organization. To improve patient flow, it was

critical that the medical and nursing staff supported and sustained process change (Titler, 2008).

Evidence-Based Significance of the Project

When admission and discharge times are slow, the organization has a throughput problem, whether because of problems on the IP side, the ED side, or both (Cesta, 2013). Regardless of origin, long wait times in the ED cause a backup at triage. In a large majority of EDs, overcrowding can lead to ambulance diversion, placing a burden on the community health care systems (McHugh et al., 2011). Other area hospitals must accept and treat these patients, resulting in lost revenue for organizations with overcrowded EDs (McHugh et al., 2011). Patients diverted to another hospital do not usually return to the hospital from where they were diverted (Handel et al., 2010). It was therefore essential to identify processes that were no longer successful or had become obsolete over time and to develop policies, processes, services, or guidelines to expedite a patient's movement through the organization. By improving throughput processes in the ED, the delivery of safe, quality care will be enhanced and patient satisfaction scores will raise.

According to the Emergency Department Benchmarking Alliance (EDBA), which collected statistics from 1,000 hospitals in 2012, 16% of patients treated in EDs arrived via emergency medical services; of these, 40% were admitted to the hospital (EDBA, 2012). If, for example, an ED receives two transported patients per hour via emergency medical services, the direct revenue loss due to diversion would be around $5,400 per hour (Augustine, 2013).

This study has implications for social change in practice. The ED performs a vital role in the community by providing care and treatment to anyone at any time. Communities trust EDs; when disasters and public health emergencies arise, communities depend on their promptness and high functioning (McHugh et al., 2011). As the front door to the hospital, EDs set the tone for what the community sees. Overcrowding, long wait times, diversion, and boarding all decrease the community's confidence and trust in the hospital and compromise its image (McHugh et al., 2011, p. 6). This integrated health care system in northeast Kansas in 2014 has a market share in the community greater than 69%. To continue this trend, this organization must retain the trust and confidence of its customers.

The organization's mission was "working together to improve the health of our community" (SVHC Marketing Department, 2013). The ED staff was actively involved in the community: the ED clinical nurse leader was chairperson for the community "Safe Kids of Shawnee County" committee; the nurse manager provided trauma lectures on safety at schools and numerous civic organizations; the sexual assault examiner/sexual assault response team (SANE/SART) was an active member in several law enforcement committees concerning sexual assault and community agencies concerning adult and child assault; and the department director and an emergency room physician (ERP) sit on the community emergency medical service (EMS) board to discuss ambulance issues and protocols. These individuals sat on boards and committees within the community to elicit

a transformation in social behaviors and relations in the area of community safe kids and to improve emergency medical response and treatment within the community.

Summary

The ED in an integrated health care system in northeast Kansas was surpassing four-hour door-to-admission and two-hour door-to-discharge times, which are arbitrary times followed by EDs across the United States. ED crowding often leads to diversion and increased numbers of patients LWBS, LBTC, left AMA was above the 2% threshold set by the organization. An increase in admission and discharge times has been shown to cause delays in diagnosis and early interventions for time critical conditions, which can lead to poor patient outcomes (Mullin & Pines, 2014). The Joint Commission, CMS, and some third party payers have taken increased interest in organizational and ED patient flow and the latter two have begun assessing penalties when the ED LOS goals are not met.

The purpose of this study was to distinguish issues that contribute to delays in the throughput process for patients presenting for care and/or treatment in the ED. The project developed strategies to decrease ED LOS through guidelines, algorithms, and an expansion of services, therefore improving the delivery of safe, quality care. Watson's nursing theory of human caring, used as the conceptual framework, can be utilized in direct patient care, education, research, administration, and leadership (Caruso, Cisar, & Pipe, 2008; Quinn et al., 2003).

Section 2 will review the literature as it pertains to ED LOS. By reviewing the collected data, the organization can develop guidelines and algorithms, expand services, and implement processes specifically targeting improvements in door-to-admission and door-to-discharge times.

Section 2: Review of Scholarly Evidence

Introduction

The purpose of the project was to identify factors that increase ED LOS and improve workflow to decrease door-to-admission and door-to-discharge times. This section presents a review of the literature specific to patient flow. A literature search was conducted to address patient flow problems in an integrated health care system in northeast Kansas with emphasis on decreasing patient LOS within the ED.

Literature Search Strategy

A literature search was conducted using the following terms: *emergency department, patient flow, patient throughput, point-of-care testing, observation units, providers at triage, boarding, crowding, operational efficiencies, patient safety, waiting management, and length of stay*. The following databases were used: Cumulative Index to Nursing and Allied Health Literature (CINAHL), Cochrane Library, MEDLINE, and the British Nursing Index. For the years 2000–2014, the number of articles retrieved was 1,567. Of these, 275 were reviewed and 18 were selected for the literature review.

General Literature Review

The general review focused on the project questions presented in Section 1. EDs have experienced excessive LOS that has led to overcrowding, boarding, diversion, elopements, leaving AMA, and poor satisfaction scores (Mullins, & Pines, 2014). Through its Leadership Standard, LD.04.03.11, the Joint Commission in 2005 addressed the management of patient flow throughout an organization. In response, the IHI

developed the structured RTDC management system (Resar, Nolan, Kaczynski, & Jensen, 2011), which was built on the following four steps:

- Predicting capacity; this occurs when units and departments assess patient populations and identify patients that will be discharged.
- Predicting demand; this examines patients in emergency, surgery, critical care, and other departments to determine possible admissions.
- Developing a plan after predicting capacity and demand; a strategy can then be developed to meet the projected demands for the day.
- Evaluating the plan, which was identified as the most important part of the RTDC process; this involves examining the plan to see what worked and what did not work so that improvements can be made for the future (Resar, Nolan, Kaczynski, & Jensen, 2011, p. 219–222)

The University of Pittsburgh at Shadyside, which applied RTDC management on a trial basis, observed sustainable improvements between 2007 and 2011: LWBS patients decreased to less than 0.5% and boarding was eliminated for patients in the post-anesthesia unit (Resar et al., 2011). An integrated health care system in northeast Kansas has used a modified RTDC process for several years. The greatest problem was predicting whether patients would be discharged by 1400 in anticipation of the ED surge that typically occurs at that time.

An integrated health care system in northeast Kansas modified the RTDC in order to maximize patient flow throughout the organization and provide safe care. Between

06:00 and 07:00 daily, each unit/department performs a "bed huddle" in which the charge nurse meets with staff nurses to identify projected patient discharges and ascertain how many of those will occur before 14:00. At 09:30, all charge nurses meet at a "bed meeting" to assess their departments/unit's open beds, projected discharges, and how many patients will leave by 14:00. If the units are at capacity, the charge nurses present a plan of how to open the required beds. Sometimes directors assist with the various physician services to expedite discharges.

Opportunities exist to improve predictions given to the departments by the "givers and takers." Givers are the ED, trauma, surgery, critical care, and cardiac catheterization lab, while takers are post-surgical, cardiology, and medical/telemetry. If these numbers do not represent a true picture of admissions and transfers from the givers, and if the takers have misrepresented their open beds, discharges, and those leaving by 14:00, any plan that was devised will fail.

As a result of discussions that took place at the IHI conference in August 2011, modifications to the framework were identified. Instead of focusing on discharges by 14:00, nurses and patient placement looked at how many admissions/transfers were expected each day by 14:00. Because many discharge orders are dependent upon the evaluations of the director on beds for the day, case management, and occupational/physical therapists, there are plans to include them at the bed meeting.

Within an integrated health care system in northeast Kansas, the RTDC improved the number of available beds within the IP division but did not improve patient LOS or

patient flow within the ED. A community hospital in Ohio used the lean model Kaizen approach to improve its admission process: “The word Kaizen means change (kai) for better (zen)” (Athawale, Wang, & Magill, 2013, p. 643). The pre-work focused only on the ED admission processes using value stream mapping and a fishbone diagram visualizing delays, “non-value” added actions, and process waste from a lean perspective (p. 643). The hospital in Ohio was able to identify elements in their flow that caused bottlenecks and restructured the processes, removing “waste or non-valued activities and eliminating rework” (p. 649). The ED was able to improve its admission times by 43% and increase patient safety and satisfaction (Athawale et al., 2013).

In 2009, Wong, Morra, Caesar, Carter, and Abrams (2010) conducted research on ED bottlenecks and trends in IP admissions and bed resources (p. 18). The study looked at three specialties: cardiology, oncology, and internal medicine. The four-year retrospective review indicated that the internal medicine service admissions increased and were a primary cause of bottlenecks. This study found that specialties have increased the number of patients but bed space has remained the same; in essence, cutting the number of IP beds led to bottlenecks in the ED, which in turn led to boarding (Wong et al., 2010).

In mid-2000, Stanford University designed and implemented a “rapid admission policy” to improve ED patient LOS. Upon deciding that a patient needs to be admitted, the ERP calls the admitting service to decide on the type of bed the patient needs and writes basic admission orders to cover the patient until the patient is seen by the admitting service. This process works well in organizations that do not have problems

with open IP beds and have residents that can quickly see the patient in the IP unit. A 10.1 minute decrease in admitting time was realized through this process, computing a 25-patient admission rate resulting in 4.2 hours of additional ED bed space (Quinn, Mahadevan, Eggers, Ouyang, & Norris, 2007).

Hospitalists struggle with how to ensure that patients leave the ED more rapidly. Some hospitals send patients to the floor without orders, which can cause safety and quality issues, as hospitalists do not want to give orders on patients they have not yet assessed. Other hospitals have tried implementing bridging orders, which are an order set implemented by the emergency room physician they are used by the receiving unit until seen by the admitting physician, it has been found that nursing units are not prepared to complete workups similar to those in the ED. Although problematic, to date, this represents the best compromise for both the hospitalist and the patient, while benefitting the ED. Those hospitalists who feel uncomfortable with bridging orders are given a specific time in which to see the patient; if this requirement is not met, the patient is sent to the unit (Gesensway, 2011).

Observation units have become an essential element for opening beds in emergency rooms (Schrock, Reznikova, & Weller, 2010), as they allow ERPs more time for additional testing, treatment, and surveillance. Many third party payers are denying one-day stays; however, CMS covers stays in observation units. This was a motivator to consider observation units for organizations with high, 30-day readmission rates. There are two types of observation units: open and closed. Open units are set up so that any

physician can place a patient there, while closed units are restricted in terms of who is allowed to admit there. Some observation units are supervised by ERPs, while others are supervised, for example, by hospitalist services. As many as 56% of observation units are administratively managed by EDs (Pena et al., 2013). Overcrowding in the ED negatively influences care since analgesia, antibiotic therapy, and procedures such as thrombolysis or percutaneous coronary interventions are delayed. Patients with more critical needs are more likely to be boarded in the department and they are therefore cared for by nurses who are more familiar with episodic care than a singular full-shift patient assignment. Crowding also compromises patient dignity, privacy, and completeness of care (Boyle, Beniuk, Higginson, & Atkinson, 2011).

As observation units have increased in the United States, Medicare has also seen a steady rise in its subscribers being placed in such units. Observation units are covered by Medicare Part B but only if proper documentation has been placed in the chart by a physician and only if the necessity of placement is clear. Unfortunately, part B only covers 80% of the patient with 20% out-of-pocket plus prescription costs (Carlson, 2013, Feng, Wright, & Mor, 2012). The utilization of observation units has reduced some hospital admissions and 30-day readmission rates, although they do not completely fit the vision for which CMS had intended (Carlson, 2013).

Observation units are a middle ground for hospital patients who are too sick to send home, but not sick enough to admit as full-fledged IPs. The CMS originally intended the use of outpatient observation care to be relatively rare and short, but in recent years its

use has accelerated—so much that some hospitals are establishing dedicated observation units for those patients (Carlson, 2013).

Feng et al. (2012) stated that one concern was that observation units may interfere with the admission of patients to skilled nursing units, as it affects the three midnight rule, and that these patients are being held longer than the allotted timeframe of less than 24 hours. The second concern was that, while it shows a decrease in IP admissions, observation admissions rise. This is in contrast with the Affordable Care Act, which now penalizes hospitals for high readmission rates (Feng et al., 2012). Pallin (2012) created a mathematical model indicating that 2.4 million IPs could be treated in the observational setting with a net cost saving of $3.1 billion annually (Pallin, 2012).

As EDs began to look for ways to decrease the patient LOS and improve patient flow, one of the first things brought up was the TAT for laboratory results. In response, laboratories began initiating workflow improvements such as pneumatic tube systems for laboratory specimens, barcoding, specimen labels printing on the unit, teaching phlebotomy skills to nurses, and the purchase of middleware to improve laboratory processes (Blick, 2013). Nanduri, Tayal, Hegde, Shang, and Venkat (2012) conducted a study on POCT on acute cerebrovascular disease patients, looking specifically at the POCT for international normalized ratio. Compared to central laboratory results, the study found that the accuracy decreased when the test value was over 2 or when the patient was anemic or on oral anticoagulants. Education to increase practitioners' awareness of these variables should be completed. A study of the quality error rate

conducted in the United Kingdom found the quality error range to be 0% for ketones to 0.65% for hemoglobin A_{1C} (O'Kane, McManus, McGowan, & Lynch, 2011).

ED POCT has not been universally adopted. While there are significant administrative, cost, and billing challenges, a substantial impediment continues to be the interpretation of the published literature on clinical and other outcome measures. POCT is the perfect venue for the quick return of selected laboratory values. Existing literature does not currently support fast TATs with hastened ERP dispositions or decreases in the ED patients LOS. Further research trials would need to be conducted specifically related to POCT and the patients LOS (Storrow et al., 2008). Throughout the United States, most EDs use the emergency severity index ranging from 1 (highest acuity) to 5 (lowest acuity). Some EDs incorporate nurse or physician protocols including laboratory tests that help to increase the accuracy of triage and decrease LOS. The utility of POCT at triage can be seen with time-sensitive conditions such as STEMI and heart failure; it can also be considered helpful when long wait times occur, as patients wait to be assessed by a provider (Soremekun, Datner, Banh, Becker, & Pines, 2013). When reviewing laboratory TATs from computer-generated reports, Stotler and Kratz (2012) found that lag times between the specimen arriving at the lab and being logged in are not always captured. The most commonly used instrument for POCT is i-STAT. Using this instrumentation test results are returned within the following timeframes: basic metabolic status in two minutes, brain natriuretic peptide (BNP), an indicator of congestive heart failure in 10 minutes, troponin (TNI), an indicator for acute coronary syndrome in 10

minutes, lactate in 2 minutes, and anticoagulation within 5 minutes or less (Abbott Point-of-Care, n.d.). The Abbott Corporation claims to decrease blood-processing costs by 48% and lower TATs by 74% (Abbott Point-of-Care, n.d.). However, few data support the belief that POCT enhances outcomes, improves times to disposition, or decreases LOS in the ED (Storrow et al., 2008).

As workflows are examined to improve patient flow, triage has been assessed to more efficiently handle periods of large patient influx. Most EDs have standing orders/protocols that can be implemented during these times. Some have begun placing practitioners at triage to decrease those patients that LWBS. Hayden, Burlingame, Thompson, and Sabol (2014) stated that using midlevels at triage was advantageous because they are less expensive than a physician, are readily accepted by patients, and collaborate with the ERP. Only by evaluating ED metrics can the true benefits be realized, such as evaluating LWBS, decreasing door-to-provider time, and shortening LOS. Harris and Wood (2012) described the "physician-in-triage" model, stating that by doing a focused assessment, tests can be ordered while the patient waits for bed availability. This model does not necessarily decrease overall LOS but has been shown to improve satisfaction somewhat. Harris and Wood (2012) also described a "split-flow" design in which the patient arrives at the ED and a pivot nurse greets the patient and ascertains the patient's level category. Acute patients are taken to the ED proper, bypassing triage. Patients who fall into a triage level 5 also bypass triage and are assigned to the split-flow intake, enabling the patient to be seen quickly by a provider. Then, if

tests need to be completed, the patient is placed in a waiting room specified for the pending results or sent to the discharge room for completion of paperwork. Only when the pivot nurse is unsure of a patient's level category is a full triage completed and the disposition assigned (Harris & Wood, 2012).

An interesting use of telemedicine called "telepresence" has been used in a pediatric ED. Telepresence at triage is used in lieu of the traditional triage nurse. A study found that this alternative way to triage was acceptable with "little differences in time, triage scores, errors, and parent satisfaction" (Marconi, Chang, Pham, Grajower, & Nager, 2014, p. 328). The information technology department at Vanderbilt University has begun working on a system called Triagebot, which has been programmed to perform many of the tasks that are currently completed by the triage nurse (Marconi et al., 2014).

As the literature shows, there are advantages to having a provider at triage, most likely a midlevel because of the hourly difference between the two: emergency room physicians make around $240 per hour, whereas midlevels' or physician extenders' median salary is around $32 per hour. Both are qualified to carry out the emergency screening required by EMTALA, and community perception related to high quality care could be positively impacted by the knowledge that a triage provider was promptly available ("Competitive Concerns," 2008). Often, patients can be seen quickly without diagnostic tests and returned to the street without ever entering the ED treatment area. Triage providers can also initiate testing from their screening, thereby expediting diagnosis and disposition. A pre-experimental study with retrospective data indicated that

orders initiated at triage reduce the time patients spend in the ED ("Emergency Medicine," 2010). Imperato et al. (2012) stated that, as having a provider at triage is expensive, the department is unable to recover this expenditure, except through the improvement of admitting and discharging patients.

Specific Literature Review

Patient throughput is not only an ED problem, but rather a system-wide problem that requires communication with multiple departments to make it seamless. Failure to communicate causes patients to back up in the ED, leading to boarding. Where to place priorities can be determined through the organization and its leadership; many times, the payer mix will determine this. If a large portion of reimbursement comes from the ED, the priority will be to accelerate throughput; alternatively, importance will be placed on admissions and direct admitting ("Hospitals Struggle", 2012). Many organizations have implemented a bed czar to coordinate communication throughout the organization. This individual has an overall view of what is going on in each of the units and the ED, and is thus better able to expedite patient movement by working with housekeeping and unit charge nurses.

In 2006, the Institute of Medicine declared ED overcrowding to be a national epidemic. Overcrowding leads to associations with higher morbidity and mortality rates, delayed pain control, and inferior health care (Rabin et al., 2012, p. 1757). Rabin et al. (2012) indicated that overcrowding in hospitals can also lead to problems "meeting

national safety and quality goals, can limit disaster response and compromises the health and safety net" (Rabin et al., 2012, p. 1757).

Epstein et al. (2012) conducted a non-linear study at four Massachusetts EDs on overcrowding and preventable medical errors. The study focused on three diagnoses: asthma, myocardial infarction, and dislocations requiring procedural sedation. The study found that most errors occur with patients requiring procedural sedation, while myocardial infarction has the least errors. It was suggested that, even though myocardial infarction is a more critical and time-sensitive condition, the care is protocol-driven to ensure compliance with the standards of care, leaving no room for deviation. While dislocations are not usually time-sensitive unless neurovascular compromise is noted, attention should be paid to both sedation and the dislocation (Epstein et al., 2012, p. 178). The study demonstrated a correlation between overcrowding and increases in preventable medical errors.

In today's healthcare environment, the impact of a patient's LOS in the ED has become an important aspect of ED operations. Beginning in 2005, the Joint Commission began looking at patient flow issues in hospitals with recommended revisions to the elements of performance under the leadership chapter. Joining the Joint Commission, the CMS began looking at ED LOS and placed penalties through "pay for performance" measures. Martin, Champion, Kinsman, and Masman (2011) conducted a study in an ED looking for causative factors for overcrowding. The study singled out the time between

requesting a bed and the patient's departure from the ED, indicating that overcrowding and patient flow have a strong correlation.

Another study developed and trialed a discharge facilitator team in which patients identified as low-acuity were rapidly treated and discharged, similar to express care. The trial saw a 35% decrease in LOS for these patients (Sharma et al., 2013). This concept could be assimilated by placing a provider at triage or designating a zone in the ED to see these patients.

Cesta (2013) discussed "queuing theory", which is based on four premises:

- As occupancy increases, wait times and service delays increase exponentially.
- Unscheduled or uncontrolled arrivals will behave in characteristic fashion.
- A balk is an arriving customer who sees a long line and does not seek service.
- Reneging occurs when a customer gets off a line (p. 3).

EDs can apply this theory to bottlenecks found in areas of patient flow.

Background and Context

The setting for the project was a 586-bed hospital serving 12 Northeastern counties in Kansas as an integrated referral center. The organization was re-designated as a Magnet facility in 2014 through the American Nurses Credentialing Center (ANCC) representing the safe, quality care that is provided to patients as verified by 35 focus areas designed by the ANCC (Ayhan & Munroe, 2005).The organization is a certified center

for chest pain, stroke, and heart failure through national accrediting organizations, and the Joint Commission has verified this hospital as a Center of Excellence for Total Joints and one of only eight facilities in the country to earn the Joint Commission's disease-specific certification in the care of premature infants. The organization is the leading nongovernmental employer in the area with 210 physicians, 1,150 registered nurses, 330 licensed practical nurses, 13 licensed mental health technicians, and 516 patient care technicians representing 54% of the organizations 4,100 employees.

The ED has an annual census of 62,000 patients per year and is the only Level II Trauma Center, verified by the American College of Surgeons, serving 12 northeastern Kansas counties. In 2009, this integrated health care system in northeast Kansas opened a new addition to the main campus hospital, which houses the 34,000 square foot ED with 28 treatment rooms, six minimum care rooms, and a two-bed trauma bay. The ED uses staggered shifts to meet the department's census needs. During peak hours, the department is staffed with four physicians, five midlevel practitioners, 18 registered nurses, two trauma nurses, two triage nurses, eight patient care technicians, one case manager, one utilization review nurse, and one clinical secretary.

Summary and Conclusion

The literature suggests that overcrowding leads EDs to diversion, causing a burden on the community and stressing local hospitals with an above average influx of patients. EDs across the nation are looking for strategies to increase patient flow throughout the organization. The IHI has developed a structured system called RTDC

Management to manage patient flow. Observation units have been found to decrease the LOS by moving a patient out of the department, allowing the ED physician to complete testing and procedures in a less rushed environment before making a diagnosis and disposition. Bridging orders allow patients to be sent to the unit without the admitting physician seeing them in the ED, thereby decreasing door-to-admission times. Increasing POCT in the ED decreases lab TATs and can be instrumental for time-sensitive diagnoses, such as heart failure and STEMI. However, research has not shown that decreasing TATs will result in speedier diagnoses and dispositions. Having a physician at triage can expedite care and result in a more accurate triage level. Unfortunately, the cost of having a provider at triage cannot be recouped. Section 3 will look at the methodology used in the project to concentrate on problem-focused triggers that lead to increases in door-to-admission and door-to-discharge times.

Section 3: Methodology

Introduction

This project was designed in response to increasing patient LOS in the ED, specifically door-to-admission and door-to discharge times. The project's likelihood of success would increase if the committee members of an interdisciplinary partnership were used with the conceptual model discussed in section one.

Approach and Rationale

Project Approach: The Evidence-Based Model

Over the years, decision-making has changed dramatically, and nurses are now expected to (a) make choices based on existing evidence and (b) continually review the literature as new evidence becomes available. The Iowa model centers on organization and collaboration including the performance and use of research and other types of evidence. It allows leaders to concentrate on knowledge and problem-focused triggers, and thus leads staff to investigate current practices and determine whether care could be enhanced via current research findings. The Iowa model uses the following seven steps, which are discussed with respect to this project's goals.

1. *Selection of a topic*. The topic selected for this project was to decrease door-to-admission and door-to-discharge times by decreasing ED LOS. Across the nation, EDs have set a time of four hours for admitted patients and two hours for those that will be discharged. In developing a topic for evidence-based practice (EBP), the first step in the Iowa Model of EBP is to identify either a

problem-focused trigger or a knowledge-focused trigger that will *initiate* the need for change. I chose the problem-focused trigger.

2. *Forming a team*. It is important to make sure the team consists of the needed players. The team for this project included the administrative director of the ED, Trauma, and Patient Placement and the chief operations officer, chief nursing officer, and representatives from all major departments, including cardiology and hospitalist services. This team was responsible for the development, implementation, and evaluation of processes to improve patient flow (Lo Biondo-Wood & Haber, 2006).
3. *Evidence retrieval*. The committee brainstormed as a group, and with key stakeholders on a one-to-one basis, to formulate and identify areas that could be improved to facilitate throughput within the department. We retrieved data from the EMR via reports from the system and manual extrapolation for IP and OP quality analysis. The identified populations are those patients presenting to the emergency room for evaluation and treatment.
4. *Grading the evidence*. In order to grade the evidence, I reviewed the data submitted by the quality analysis and laboratory, and presented to the team the possible strategies identified through the literature review of EBP that we may wish to implement. Research data can be categorized as qualitative or quantitative. Polit and Beck (2012) defined qualitative analysis as the "organization and interpretation of narrative data for the purpose of

discovering important underlying themes, categories, and patterns of relationship," and quantitative analysis as the "manipulation of numeric data through statistical procedures for the purpose of describing phenomena or assessing the magnitude and reliability of relationships among them" (p. 739).

5. *Developing an EBP standard*. A review of the literature was completed and summarized for presentation to the PFC members for recommendations for practice guidelines. Lo Biondo-Wood and Haber (2006) stated that the evidence used should be clear, strong, and easily replicated. The guideline changes should be patient-centered, viable, meaningful, and effective for emergency room practice (Pearson, Field, & Jordan, 2007). Any practice change that does not consider the patient is not evidence-based; therefore, an appropriate method was needed that focused on patient autonomy, choice, and preferences to be expressed (van Hooren, Widdershoven, Borne, & Curfs, 2002).
6. *Implementing EPB.* This project is not planned for immediate implementation but will instead be presented to the PFC for their review and will only be carried out if they see it fitting into the ED milieu. For successful implementation to occur, written guidelines must first be generated utilizing the EBP developed in step 5. A concentrated educational program must be developed for anyone involved with ED throughput, such as direct care providers. Physicians and midlevels will be educated during their quarterly

section meetings, and the remainder of the staff will be educated through unit general report and staff meetings. Success will only be achieved if there is a clear understanding of the guidelines, demonstrated by reduced ED times on the department scorecard.

7. *Evaluation*. Without implementation, evaluation cannot occur. If the committee implements this project, as with any process change that is created, an evaluation of the interventions must be completed and documented to show that ED throughput has indeed improved. This will be evident by decreases in the following times:
    - ED arrival to ED departure to IP units
    - ED admitting decision to IP unit to ED departure
    - ED arrival to ED departure
    - ED door-to-diagnostic evaluation in an OP setting

The scorecard should also highlight areas in which possible barriers may develop that the committee will need to address; success will not be achieved without support from frontline leaders and the organization (Baggs & Mick, 2000; Carr & Schott, 2002). Sometimes it takes a considerable amount of time to recognize the success of practice change. An impact evaluation will therefore be conducted to obtain an immediate view of the practice changes to check for backsliding and the necessity for re-education.

Population and Sampling

The population for this project was any person presenting to the ED for treatment, regardless of age or conveyance. The current sampling size was 100% of all patients treated in the ED; the sampling size for the CMS was based on a percentage of Medicare and Medicaid patients seen. The monthly sample size for the organization, as determined by the CMS, was 102 patients, and the total was reported quarterly (CMS & Joint Commission, 2010).

Human Subjects Protection

Human rights that require protection in research include the right to confidentiality and privacy (Polit & Beck, 2012, p. 165). This study poses minimal threats, with no apparent physical, psychological, emotional, or economic risks to the subjects or their EMRs. Review of records and retrieval of ED interval data are carried out through IP and OP quality analysis. Laboratory TATs are provided quarterly through a computer-generated report. The integrated health care system in northeast Kansas EMRs and reports are password-protected with access on a need-to-know basis. The Walden University Investigation Review Board reviewed and approved this study (approval number 05-07-14-0111203). Since the project was not to be implemented, the organization's IRB was not obtained (with approval of the CNO).

Key Stakeholders

The external stakeholder is the patient who comes to the organization for medical care and treatment, while the internal stakeholders are the providers, nursing, and

ancillary staff. These individuals have the ability to make patients flow through the organization with ease or place barriers and bring flow to a standstill. As each of the internal stakeholder groups are represented on the PFC, they have a voice in the implementation of plans by giving feedback on what they feel will work and what will not. All members of the organization are motivated and want to do what is right for the patient; they have minimal resistance to plans that will decrease LOS and promote patient flow throughout the organization.

Data Analysis

Descriptive data analysis showing median time intervals for all times will be collected following the implementation of new processes. Decreases and sustainment can be tracked by reviewing reports that are generated by IP and OP quality analysis; our data are displayed in tables and bar graphs. I expect to see a decrease in times for IP arrival to departure time, IP admission decision-to-departure time, OP arrival-to-departure, OP door-to-diagnostic evaluation, and OP arrival-to-pain medication. See Appendix G for the second quarter door times, which represent the times used for developing strategies to decrease door-to-admission and door-to-discharge times. While the laboratory TATs are not out of the desired range (see Appendices A-E), an i-STAT POCT, which would be tracked by the laboratory system, as it does for all processed specimens, would dramatically decrease these times. It is unknown whether expedited results would assist providers in making diagnoses and dispositions in a more timely fashion.

The Project Evaluation Plan

Following the suggestion of the Centers for Disease Control and Prevention (CDC) for an evaluation framework, the logic model was chosen for its graphic depiction of the program organization, structure, assumptions, associations, and guide for evaluation (Cooksy, Gill, & Kelly, 2001). On implementation, program evaluation will begin at a very early stage to ensure that the program design is meeting the set goals and objectives and that the internal/external stakeholders are using it as a tool to conceptualize the actions taken to decrease our times (Ellerman, Kataoka-Yahiro, & Wong, 2006). By following monthly admission and discharge times, the organizations leaders should begin to see a decrease by month two and a sustained level in months four, six, eight, and 10. If regression is noted, an evaluation of the algorithm and fine-tuning of the product with input from the service managers and providers will be elicited. Results from the observation unit may be more subtle and it may take several quarters to recognize the savings and benefits of the program. There may be a loss from the hospital service, since they are paid by the relative value units (RVUs), whereas ERPs are paid by the hour; thus, the number of patients placed in the observation unit is irrelevant.

Summary

This project concentrates on the causes of delays in admitting patients to the hospital or discharging them home. The Iowa model was chosen as the evidence-based model in this study because it allows leaders to concentrate on knowledge and problem-

focused triggers. The model uses seven steps to systematically work through the patient flow process.

The project included a 100% sampling of individuals presenting to the ED for treatment regardless of age or conveyance.

The project consisted of internal and external stakeholders, each of equal value. External stakeholders, representing the patients and community, influence the internal stakeholders such as provider, nursing, and ancillary staff. Data analysis will be conducted following the implementation of guidelines, algorithms, the expansion of services, and modified processes.

The logic model was chosen for project evaluation because of its graphic depiction of the program through organization, structure, assumptions, associations, and guide to evaluation. As guidelines, algorithms, expanded services, and modified processes are implemented, leadership should expect to see a decrease in the LOS of ED admitted and discharged patients.

Section 4 will provide a discussion and implications of the project looking at decreasing patient LOS by reducing door-to-admission and door-to-discharge times.

Section 4: Discussion and Implications

Introduction

The main purpose of this study was to recognize issues that contribute to delays in the throughput process of patients in the ED; other purposes were to develop guidelines and algorithms, expand services, and modify processes to meet expected outcomes and goals. The aim of the project was to develop strategies that the ED in an integrated health care system in northeast Kansas could use to decrease a patient's LOS, thereby improving safety, quality of care, patient satisfaction, and maintaining or improving the community's trust in the ED. A literature search was conducted to help develop strategies and to support recommendations for reducing ED LOS. The Iowa model of EBP was used because it looks at the complete clinical picture or system from the perspective of the provider, patient, and organization. The seven-step process of the Iowa model was used to identify the problem, develop a resolution to the problem, and use evidence-based findings to put recommendations into practice (Everett & Titler, 2006).

Evaluation and Discussion

The project reviewed statistical data from the integrated health care system in northeast Kansas, which looked at second quarter 2013 data (see Appendix G and H). The tables confirmed the LOS in the ED at this organization exceeded the LOS for both admitted patients and those discharged compared to the LOS of the national standard, the Voluntary Hospital Association Inc., and the CDC. The statistics in Appendix G and H were used as a starting point to determine LOS times for the following:

- ED arrival to ED departure to IP units (239 minutes).
- ED admitting decision to IP unit to ED departure (31 minutes).
- ED arrival to ED departure (158 minutes).
- ED door-to-diagnostic evaluation in an OP setting (16 minutes).

Appendix G shows the first 10 months of 2013 divided into two areas. The first area is "safest hospitals," in which all 2013 goals were met except for leaving AMA, elopements, LBTC, and LWBS. The second area is "best patient experience," in which all goals were met except LOS for discharged patients and LOS for admitted patients. The three indicators that fell below the organizations goals pointed toward slow patient flow. Appendix H shows second quarter 2013 times but this appendix represents the data presented to the CMS Hospital Compare website and pay-for-performance evaluations to determine what penalties, if any, will be deducted from Medicare payments.

Recommendations were made to the PFC to develop guidelines, algorithms, expand services, and modify processes to reduce ED patient LOS. These were in the form of bridging orders, which are an order set that can be implemented by the ERP to cover the patient's basic needs until seen by the admitting service on the patient's admitted floor. Algorithms for the cardiology and hospitalist service were developed since they admit over 95% of hospitalized patients from the ED.

The committee began by brainstorming what it perceived were triggers for increasing patient LOS. These concepts led to creative ideas for implementation within the ED and later formed the project questions. A literature search was conducted for the

years 2000–2014; the number of articles retrieved was 1,567. Using the databases CINAHL, Cochrane Library, MEDLINE, and the British Nursing Index, 275 abstracts from the articles were reviewed; 18 of those articles were used in developing recommendations for decreasing ED LOS, as they best fit the standards for leadership acceptance and the milieu of the ED department and organization.

The general literature review presented many ideas but not all of them would work within the integrated health care system in northeast Kansas. In one organization, the hospitalist program took charge of patient flow and assigned a hospitalist to the ED (Howell, Bessman, Marshall, & Wright, 2010). Rasheed, Lee, Kim, and Park (2012) developed a simulation model to look at ED patient flow focusing on capacity improvement, while keeping quality of care at the forefront. Cesta (2013) described the queuing theory, explained in section two, which can be applied to bottlenecks in ED patient flow.

Emphasis on patient flow began at this organization in 2009 with the ED director and medical director attending a conference held by IHI, which presented a patient flow platform based on RTDC. A modified version of the platform was implemented within the organization and had some positive outcomes on the IP side but did not address some of the ED processes that affected LOS within the ED.

An area that was identified as contributing to extended LOSs for admitted patients was the admitting providers desire to see patients in the ED, finish the workups, and write orders prior to transferring patients to the unit, which could increase the stay by one to

two hours; 88% of our admissions are admitted under the hospitalist or cardiology services. Gesensway (2011) found that by implementing bridging orders, patients could be sent to the unit safely with orders covering the patient until the admitting service could see the patient. This was the first recommendation to be presented to the PFC, along with the associated algorithms (see Appendix A). This type of change, if adopted, will meet resistance from the cardiologist and hospitalist groups; support from the chief medical officer and medical executive committee will be needed to make this change. Lab TATs were also identified as another area that increases decision to admit and discharge times. Soremekun et al. (2013) indicated that POCT can improve the quality of care for diagnoses with time-sensitive indicators. The field was debating whether improved TATs for labs would actually facilitate the ERP to make more rapid diagnoses and dispositions (Storrow et al., 2008). From a quality standpoint, this additional service within the ED would be an advantage, but from an ERP position, diagnosis and disposition would not be hastened.

Observation units are the most beneficial if set up correctly because the clock stops when a patient is placed on observation status, allowing the ERP to stabilize and complete procedures and tests before making a diagnosis and disposition (Boyle et al., 2011). A pro-forma would be requested to accompany a business plan to see if this recommendation would be viable. Many EDs have protocols already set up for the triage nurse to use when the ED treatment area is full and extended waits in the waiting room are expected. These protocols speed up some of the testing times, but a provider still

needs to see the patients and additional testing may be required before a diagnosis and disposition can be made. By placing a provider at triage, the EMTALA emergency screening can be completed. Most triage level-5 patients can be seen quickly and discharged without ever entering the ED treatment area, lessening the burden on the treatment areas.

A drawback was that the ERP or a midlevel cannot be recouped with this move; however, a higher level of care is given beginning at the door, which is a good marketing tool (Imperato et al., 2012). The organization could never absorb the cost of an ERP at triage but it could possibly recoup the cost of a midlevel within the next couple of years.

Jean Watson's theory of human caring and the theory of shared governance were used as the conceptual models, both of which are congruent with the mission, vision, and values of the organization. The model through which these theories are actualized was the team-based model of care delivery, which enables all nursing personnel to contribute fully to the care of patients and to the support of team members ("Stormont-Vail Caring Theory," 2009). The PFC is an interdisciplinary committee modeled on nursing shared governance and supported by the shared decision-making model. The committee utilizes targeted indicators to formulate the improvement processes on which this project was based. The conceptual model has also been used to study patient flow in the ED by looking at "input, throughput, and output"; the model provides the framework for ED operations to do the appropriate research and develop policies (Asplin et al., 2003).

The following recommendations were developed and presented to the PFC for consideration: (1) integrating bridging orders for ED patients that are admitted to medical/surgical units, allowing the admitting physician to see the patient in the unit; (2) developing a business plan for opening an observation unit run by the ED; (3) reviewing current lab TATs (see Appendices B-F); (4) increasing POCT in the ED; and (5) placing a provider at triage to facilitate the prevention of non-urgent patients from entering the department treatment area. Following the adoption and implementation of these processes, the ED should see a decrease in patient's LOS within the department, as shown by a comparison of current data in Appendixes G and H.

The most vulnerable spot in an emergency room is the waiting room because we do not truly know what problems are there. After the patients have been triaged, conditions might change and patients could deteriorate within minutes, sometimes resulting in poor outcomes ("Patients Are at Risk," 2010). Long wait times are a symptom of increased door-to-admission and door-to-discharge times. These delays can cause patient dissatisfaction and impede the treatment of time-sensitive conditions.

The ED in this integrated health care system in northeast Kansas sees approximately 64,000 patients per year and has already reached the capacity of the newly built ED. It has now become paramount to improve patient flow throughout the system. We began this journey in 2009 with the implementation of a modified IHI called "Real-Time Demand Capacity Management" which has helped to improve patient movement

throughout the organization. Following the 2013 IHI conference in National Harbor, Maryland, the organization made changes to the current program to improve processes.

With the adoption and implementation of the project recommendations, the expectation would be to see a downward trend in time that falls above the 90th percentile. The analysis was a simple comparison of times looking for a downward trend. If the desired times are not met, a more in-depth review of the data will be needed, involving a review of each ERP to see where the breakdown is occurring and monitoring the development of action plans to address ED LOS.

The nurses in the ED have taken the first step to decreasing times by admitting patients to the IP units within 30 minutes of receiving a room number. This writer hopes the committee will decide to implement bridging orders, observation units, and increased POCT. If used as part of the triage processes, a nurse and midlevel or physician can achieve better accuracy in assigning triage levels, decreasing times in the ED treatment area, and/or treating patients at triage and discharging them before they enter the waiting room or treatment area.

As each of the systems is put into practice, we should begin to see decreases in door-to-admission and door-to-discharge times. This will be demonstrated by the data collected in IP and OP quality analyses, where times will be included on the ED scorecard and reported to third-party payers and the CMS. Since HCAHPS focuses on IP satisfaction through HealthStreams, Press Ganey measures our OP departments such as the ED; thus, we would expect to see an increase in these scores.

Evaluation

Following the implementation of the suggested policies, processes, services, and guidelines, an evaluation can be conducted utilizing step 7 of the Iowa model at designated intervals in order to monitor the progress and maintenance of the proposed strategy to decrease door-to-admission and door-to-discharge times. The model has been chosen to allow us to concentrate on knowledge and problem-focused triggers, steering staff towards reviewing current practices and examining whether care can be heightened through current research findings.

Can IP ED admitting decision-to-departure times be decreased by limiting hospitalists and cardiologists to seeing their patients on the floor unless patients are being admitted to critical care? Success is measured when the decision to admit is documented and the patient is transported to the unit, utilizing the bridging orders. The hospitalist group from Albany, New York, created bridging orders to cover patients until the admitting physician could see them in the unit (Gesensway, 2011). I would also recommend developing an algorithm for both hospitalist and cardiology services in order to provide a clear picture of patient flow through the emergency room for the cases they are admitting (see Appendix A).

Will opening an observation unit run by the emergency room decrease door-to-admission and door-to-discharge times? When a patient is placed on observation status, the clock for door-to-admission and door-to-discharge times stop, allowing time for further diagnostic tests and workups without placing pressure on the ERP to make a hasty

diagnosis and disposition. By so doing, this will decrease unnecessary admissions and returns to the ED with the same complaints.

What are the lab TATs for the ED? TATs are retrieved from the laboratory; Appendices B and C illustrate the comprehensive profile, Appendix D includes the complete blood count, and Appendices E and F focus on troponin. With increasing POCT, we would expect to see these times decrease dramatically.

Can increasing POCT in the emergency room decrease door-to-admission and door-to-discharge times? There was no argument that increasing POCT in the ED will expedite the return of results; however, it is certain that challenges with administrative costs and billing perspectives will exist. Few data support the widespread perception that ED POCT improves clinical outcomes. The question that still remains whether getting these results to the ERP in a speedier fashion will allow for quicker diagnosis and disposition (Storrow et al., 2008). The benefits of POCT at triage can be seen with time-sensitive conditions such as STEMI and heart failure; it can also be helpful when there are long wait times before being assessed by a provider (Soremekun et al., 2013).

Will placing a provider at triage decrease non-urgent patient discharge times? While some EDs have absorbed the cost of placing a physician at triage, from a cost-benefit perspective, it would be better to place a midlevel there. The benefits of a provider at triage are that the emergency screening is completed when the patient enters the door, many conditions can be treated at triage, and the patient could be released before entering the emergency treatment area.

Additional analysis that could be utilized was data that have already been collected for stroke, heart failure, pneumonia, and STEMI. These conditions have indicators for providing time-sensitive treatment; by decreasing these patients LOS should improve their chance for a positive outcome. Community trust in the ED was monitored through increases in ED census. For the organization, community trust was evaluated through the percentage of the community market share, which continues to increase quarterly and is currently over 69%.

Implications

Cesta (2013) stated that organizations have started to recognize the association between patient flow and quality care. There was more than a causal relationship between LOS and cost of care. The following has been shown to affect the care given: "Wrong medications or treatments, including over-utilization of medications and treatment; misuse of product or personnel resources; delays in care processes, including core measures" (Cesta, 2013).

By decreasing a patient's LOS in the ED through the development of guidelines and algorithms, the expansion of services and modified and/or instituted processes may help to lessen the backup of patients at triage and in the waiting room that leads to overcrowding. One of the symptoms of overcrowding was boarding, which has been shown to result in poor patient outcomes, patient dissatisfaction, and loss of community confidence in the ED and organization. This project's recommendations have the potential to decrease the overall ED LOS, thus elevating the safety and quality of care.

Strengths and Limitations of the Study

Strength of the project is that the ED has already implemented strategies that could impact patient flow by evaluating staffing and adjusting provider and nursing staff ratios. The department has been broken down into zones, and further into pods, with a physician, nurse, and patient care technician assigned to the pod. Additionally, to expedite patient movement, nurses have set an internal standard to have patients to their assigned IP room within 30 minutes of receiving a room number. When the ED nurse is unable to transport the patient to the unit, a nurse from the floor will transport the patient. Staff within the organization are motivated to work toward solutions for improving patient flow and are eager for implementation of processes that will improve it. This project was limited to one organization. This organization strives to be on the "cutting edge" in all areas and patient flow was no different. This project was designed to look at factors that increase the LOS in the ED and to develop processes that will decrease these times. A second limitation of the project is the researcher is employed by the organization where the project was conducted. However, as all data were collected electronically from reports written and retrieved from the EMR and reviewed by the planning department, I did not have access to the data until it was internally published by the planning department. No prior access to the data should eliminate possible bias, integrity, or rigor of the data used for this project. The study was conducted in one integrated health care system in northeast Kansas.

A major limitation of the project is that recommendations have not been implemented to determine if they will decrease door-to-admission and door-to-discharge times. Radiology and nuclear medicine is another area that warrants close analysis to investigate what processes could be improved to decrease TATs and find out which tests ordered by ERPs could be completed as an OP process.

Analysis of Self

I have found this project to be a humbling experience; hindsight most often proves to be the expert. My ability to execute an organization-wide multidisciplinary project to its fruition was validated and realized. By intertwining the transformational leadership style, Watson's theory of human caring and nursing governance supported by the shared decision-making model, I was able to gain the trust and support of the PFC. At this integrated health care system in northeast Kansas, patient care was supported by interdisciplinary collaboration and leadership, which was committed at all levels to encourage quality outcomes via targeted indicators and improvement processes (Ryan, 2005). I feel that utilizing these principles produced the recommendations that will bring about sustained change in patient LOS in the ED, thus providing elevated safety and quality of care in the ED, decreasing morbidity and mortality, and increasing patient satisfaction. As a professional, I am assured that this organization is doing what is right for the patient by decreasing door-to-admission and door-to-discharge times by implementing guidelines, algorithms, expanded services, and modified processes that meet expected outcomes and goals. As a scholar, I was able to utilize the knowledge and

skills gained through this course of study to develop recommendations that would have an impact on all patients presenting to the ED for care and treatment.

Summary

Patient flow throughout an organization should be a seamless process in which patients flow from one episode of care to another without delays. The ED has noted that a failure in our system exists in terms of door-to-admission and door-to-discharge times. This project was developed to study current processes and review current literature that would support recommendations in developing guidelines, algorithms, expanded services, and modified processes to meet expected outcomes and goals. Existing literature suggests that patients' increased LOSs lead to higher morbidity and mortality rates, increased chances for medical errors, lower patient satisfaction, and a decrease in community trust in the ED proper as well as the organization. The recommendations include developing a bridging order set to cover the patient until seen by the admitting service, developing a business plan, implementing an observation unit run and staffed by ERPs and ED staff, increasing POCT by adding i-STAT equipment in the department, and placing a midlevel at triage.

These recommendations will improve patient safety, elevate the quality of care provided, and improve patient satisfaction. The measures will also assist in meeting the standards set by external regulators such as the Joint Commission, the CMS, and third-party payers.

Section 5: Scholarly Product for Dissemination

Publication

No plans are currently in place to publish this project. Once the recommendations have been implemented and data gathered to show reductions in wait times, a journal-worthy article could be submitted to the *Emergency Nurses Association's Journal for Emergency Nursing*. EDs of similar size may find the knowledge gained through this project helpful as they continue their journeys to decrease ED LOS.

Presentation

A formal PowerPoint presentation of the project was made at the PFC meeting with the recommendations that best fit the ED and organization. Each year during Nurses Week, the organization sponsors a nursing symposium in which the School of Nursing faculty and other nurses from the organization showcase research and work completed in the past year, usually in the form of podium or poster board presentations. The author is considering a poster board presentation for this venue.

Project Summary

This project was designed to evaluate current processes, develop guidelines and algorithms, expand services, and modify and/or institute processes that best fit the milieu of the ED and have the best chance of adoption with sustained progress. Symptoms of prolonged LOSs in the ED include boarding, overcrowding, poor patient satisfaction scores, loss of community trust in the ED, and poor outcomes for patients that require

time-sensitive treatment. The project focused on proposing recommendations that could reduce the following times:

- ED arrival to ED departure to IP units.
- ED admitting decision to IP unit to ED departure.
- ED arrival to ED departure.
- ED door-to-diagnostic evaluation in an OP setting.
- ED arrival to pain medication administration (long bone fracture only) in an OP setting.

A literature search resulted in the following recommendations:

- Developing bridging order sets for patients that could be used until the hospitalist can see the patient on the floor.
- Opening an ED observation unit.
- Increasing POCT in the ED.
- Scheduling a midlevel at triage during peak periods.

These recommendations have been presented to the PFC and are currently being considered for implementation. The Chief Operations Officer (COO) has requested strengths, weaknesses, opportunities, and threats (SWOT) analysis for the observation unit to include in the 2015 budget calculations for the ED. The outcome of these recommendations could have a great impact on the organization and the ED in providing safe and quality care to our patients.

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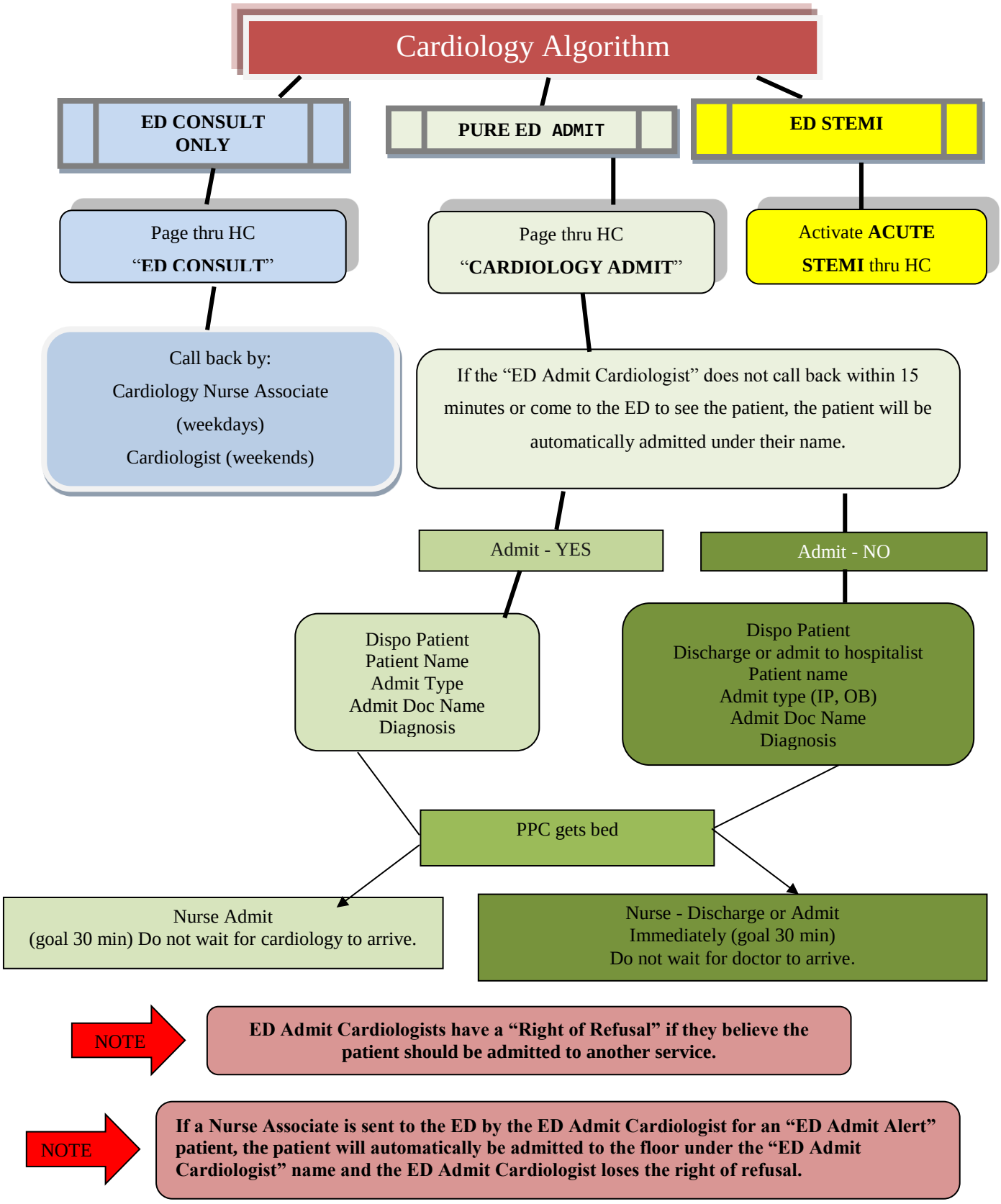
Appendix A: Cardiology Algorithm



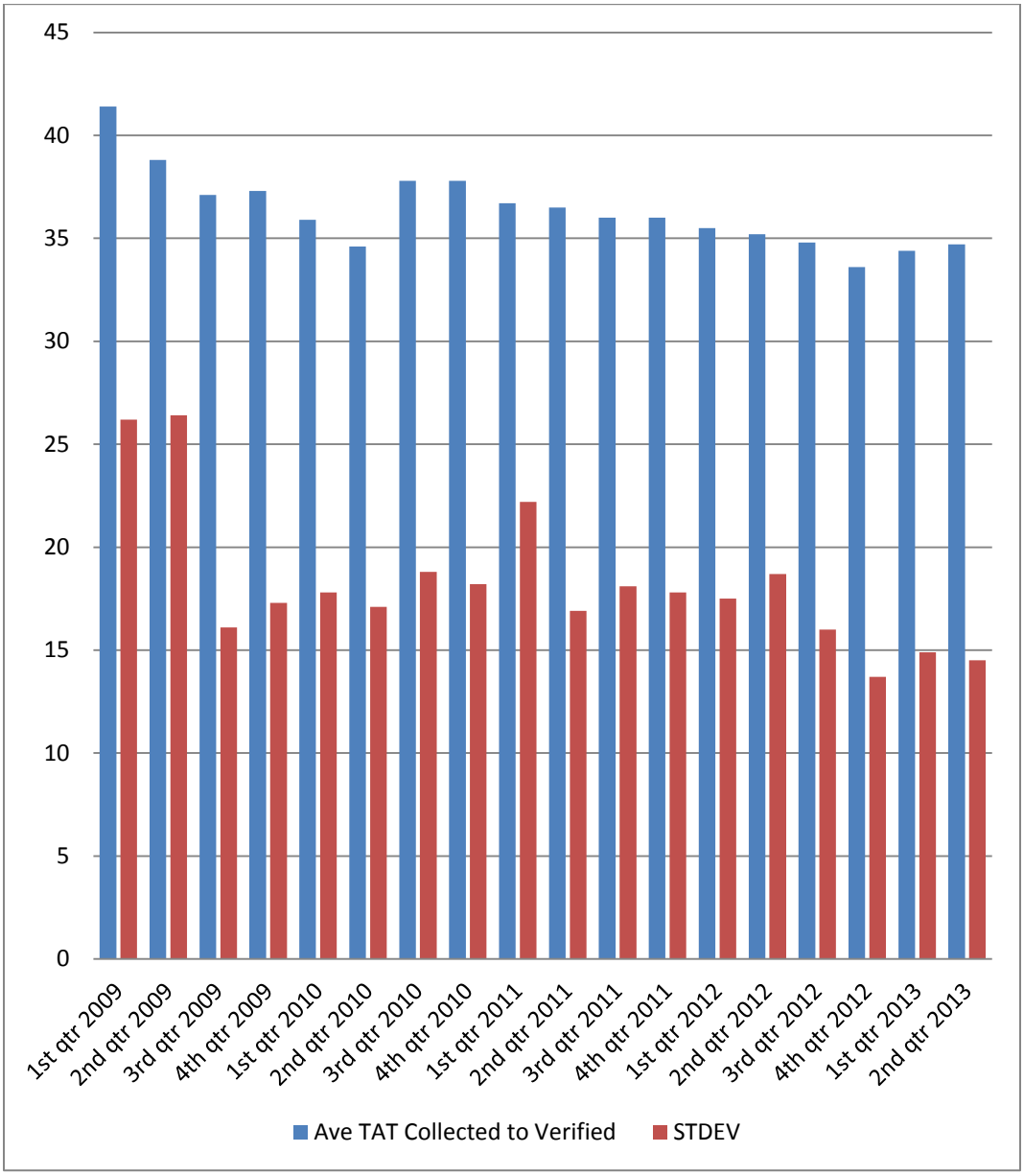
Appendix B: Comprehensive Profile

	Collected-Received	Received-Verified	Collected-Verified
Standard deviation	10.5	9.8	14.5
Minimum TAT	1	14	19
Median TAT	7	23	31
Average TAT	9.9	24.8	34.7
Maximum TAT	243	222	268
Number of samples	7533	7533	7533
<30 minutes	7348	6620	3517
31–40 minutes	82	695	2733
41–60 minutes	49	137	993
>60 minutes	54	81	290
Number of samples	7533	7533	7533
% <30 minutes	97.5%	87.9%	46.7%
% 31–40 minutes	1.1%	9.2%	36.3%
% 41–60 minutes	0.7%	1.8%	13.2%
% >60 minutes	0.7%	1.1%	3.8%
	100.0%	100.0%	100.0%
% <40 minutes	98.6%	97.1%	83.0%

Benchmark is >90%

(SVHC PFC Meeting Minutes, Dec 2013).

Appendix C: Comprehensive Profile Graph



(SVHC PFC Meeting Minutes, Dec 2013).

Appendix D: Complete Blood Count

	Collected-Received	Received-Verified	Collected-Verified
Standard deviation	26.2	13.2	29.4
Minimum TAT	1	2	4
Median TAT	7	5	14
Average TAT	10.3	7.4	17.8
Maximum TAT	1445	856	1449
Number of samples	7858	7858	7858
<30 minutes	7664	7767	7276
31–45 minutes	95	53	376
46–60 minutes	39	15	99
>60 minutes	60	23	107
Number of samples	7858	7858	7858
% <30 minutes	97.5%	98.8%	92.6%
% 31–45 minutes	1.2%	0.7%	4.8%
% 46–60 minutes	0.5%	0.2%	1.3%
% >60 minutes	0.8%	0.3%	1.4%
	100.0%	100.0%	100.0%

Benchmark is >90%

(SVHC PFC Meeting Minutes, Dec 2013).

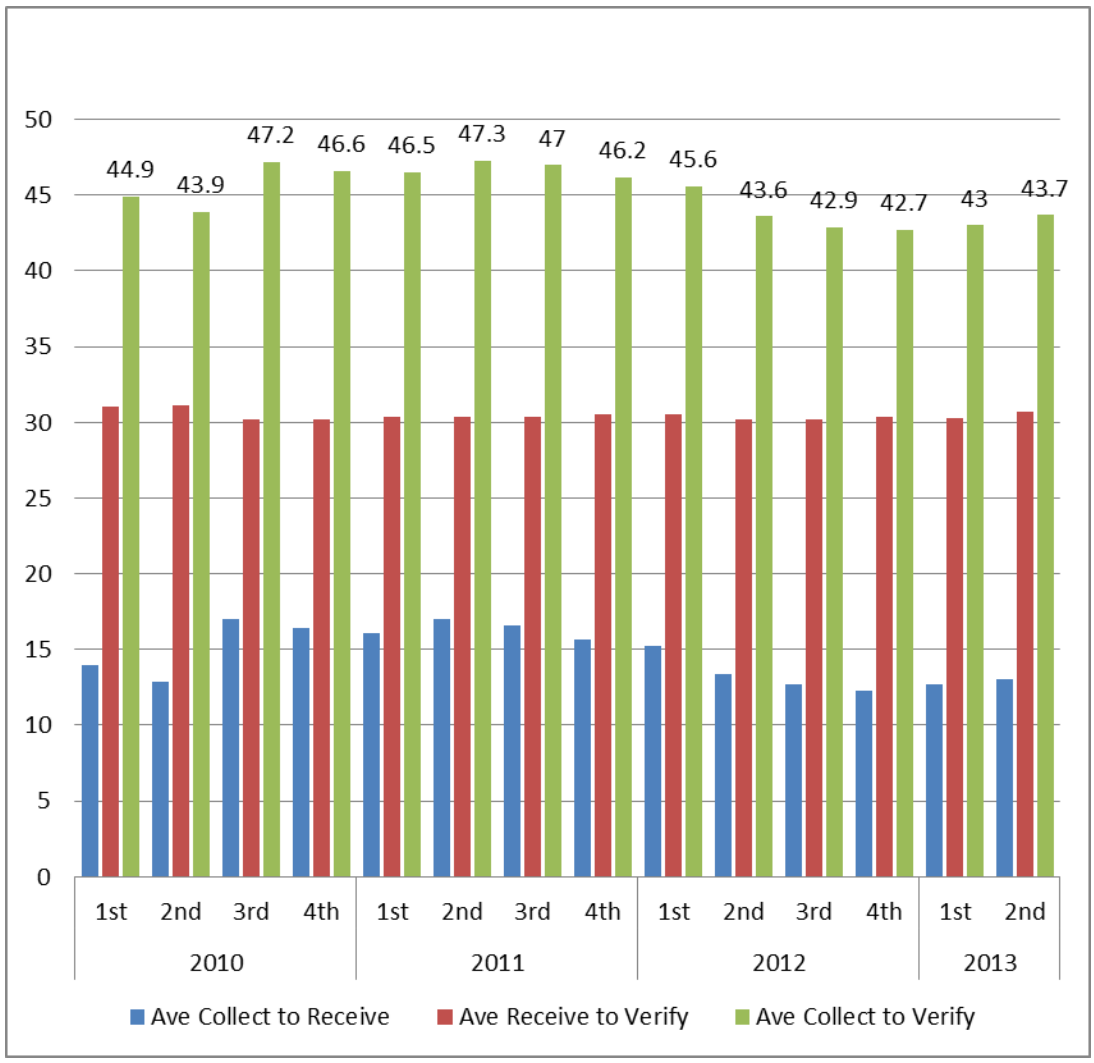
Appendix E: Troponin

	Collected-Received	Received-Verified	Collected-Verified
Standard deviation	42.8	8.0	43.1
Minimum TAT	1	22	27
Median TAT	8	29	38
Average TAT	13.7	30.7	44.4
Maximum TAT	2038	169	2061
Number of samples	2847	2847	2847
<30 minutes	2682	1779	67
31–40 minutes	42	994	1675
41–60 minutes	40	42	886
>60 minutes	83	32	219
Number of samples	2847	2847	2847
% <30 minutes	94.2%	62.5%	2.4%
% 31–40 minutes	1.5%	34.9%	58.8%
% 41–60 minutes	1.4%	1.5%	31.1%
% >60 minutes	2.9%	1.1%	7.7%
	100.0%	100.0%	100.0%
% <40 minutes	95.7%	97.4%	61.2%

Benchmark is >90%

(SVHC PFC Meeting Minutes, Dec 2013).

Appendix F: Troponin Graph



(SVHC PFC Meeting Minutes, Dec 2013)

Appendix G: ED Second Quarter Scorecard

EMERGENCY DEPARTMENT 2013

Off path and not on target for year-end goal (Requires Management Attention)
On Path - Performance on path for year-end goal (90-99.9% of target)
Goal Met - Performance meets or exceeds end-of-year goal
Not applicable - project not started/Data not available

	GOALS / Emergency Services Performance Metric Evaluation	2013 Goals	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVE
Safest Hospitals	AMA, Elopements, LWOT, LWBS	<2%	3.6%	2.4%	1.6%	2.5%	1.8%	2.0%	2.4%	2.5%	2.6%	2.5%			2.4%
	ER Diversion %	<1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			0.0%
	Full Trauma Diversion %	<1%	0.0%	0.06%	0.06%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			0.0%
	Air Trauma Diversion %	<1%	0.0%	0.0%	0.006%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			0.0%
	Door to Interpret EKG is ≤ 10 min	90%	88%	96%	92%	96%	92%	95%	97%	95%	95%	97%			94.3%
	EKG Criteria Compliance	80%	96.0%	96.0%	95.0%	96.0%	96.0%								95.8%
	Length of stay for Discharged Pts	2 hrs	3.1	2.9	2.8	2.9	2.6	2.7	2.8	2.9	2.88	2.81			2.84
	Length of stay for Admitted Pts	4 hrs	4.6	4.4	4.2	4.2	3.90	4.2	4.3	4.4	4.35	4.37			4.29
	VHA all ED LOS database - 149 CDC all ED LOS average - 198 mins		150.6	155.7	153.8	153.4	144.2	132.3	151.8	147.8	149.9	149.2			148.87
	Door to Provider Times (NHAMCS 56.3 min average)	<40 min	31.7	29.8	31.9	28.4	37.7	32.55	26.0	33.8	32.97	28.47			31.33
	Bed to Provider Times	<20 min	11.8	8.5	8.3	11.6	12.9	13.6	10.0	11.5	9.72	9.63			10.76
	Monthly ED Census	5332	5,879	4,872	5,066	4,928	5,208	5,482	5,642	5,576	5,428	5,240			5332
	Average Daily Census	172.00	189.65	168.00	163.42	164.27	168.00	182.73	182.00	179.87	180.93	169.03	167.00		174.08

YTD	Projected
53,321	63539.9

(SVHC PFC Meeting Minutes, Dec 2013)

Appendix H: Second-Quarter Door Times

Median time	U.S. average	SVHC ED	90th%
IP ED arrival to ED departure	274	239	175
IP ED admitting decision to ED departure	96	31	42
OP ED arrival to ED departure	139	158	92
OP ED door to diagnostic evaluation	29	16	14
OP ED arrival to pain med administration	60	47	37

(SVHC PFC Meeting Minutes, Dec 2013)