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# Increased Emergency Department Boarding Times

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Increased Emergency Department Boarding Times

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### **Abstract**

Prolonged boarding times (increased wait times for admitted patients) in the emergency department result in an increase in morbidity and mortality in critically ill adult patients admitted to the ICU. Overcrowding in the emergency department (ED), medication errors, and a delay in transfer to the ICU are the leading reasons for an increase in morbidity and mortality. This project focuses on a comprehensive assessment of a Las Vegas emergency department. The assessment will determine if the issues cited in the literature of: 1) overcrowding, 2) medication errors, and 3) delay in transfer are a current problem in the Las Vegas emergency department and based on the assessment data and evidence-based plan will be developed.

*Keywords:* emergency department, critical patients, morbidity, mortality, boarding, overcrowding, delay of transfer, ICU, medication errors

### **Problem Identification**

The literature supports that the following are the leading causes of morbidity and mortality in critical patients boarding in the ED for a prolonged period of time: overcrowding, medication errors, and delays of transfer to the ICU. Prolonged boarding (increased wait times for admitted patients in the emergency department) times in the emergency department (ED) affects patients, families, and staff members alike. Based on current literature there is an increase in morbidity and mortality in critically ill patients boarding in the ED for a prolonged period of time (Chalfin, Trzeciak, Likourezos, Baumann, & Dellinger, 2007; Knapman & Bonner, 2010). Bernstein, Aronsky, Duseja, Epstein, Handel, Hwang, McCarthy, McConnell, Pines, Rathlev, Schafermeyer, Zwemer, Schull, & Asplin, (2009), report that overcrowding in the ED leads to an increase in mortality in critically ill patients (patients who require 1:1 nurse care and continuous monitoring requiring documentation in the range between every 5 minutes to every hour). Patients admitted to the ICU from the ED are at a particularly increased risk for a prolonged hospital stay, deterioration in condition, and death. Prolonged ED boarding times can be caused by overcrowding, lead to medication errors, and can be caused by delay of transfer to the ICU. Medication errors can occur due to high nurse-patient ratios and the inability of the nurse to properly check the medicine being administered and fatigue of the nurse secondary to high patient volume and therefore the possibility of forgetting to administer medication at all.

Medication errors can cause deterioration in patient status due to inappropriate administration or lack of it. The focus of this project is to complete a comprehensive assessment of the Desert Springs Hospital Emergency Department and to identify if overcrowding, medication errors, and delay of transfer to the ICU are current issues. Each area will be assessed with their own respective documentation. All information (triage logs, transfer logs, and

medication errors for the ED) will be obtained from the ED director and pharmacist.

Overcrowding in the ED will be assessed through triage logs, specifically sign in times (the time the patient signed into triage, the time they were triaged, and the time they were taken to an ED exam room) and admission logs that may indicate reasons of overcrowding (not enough ED beds due to admitted patients, hallway beds being utilized, prolonged blood and radiology tests leading to prolonged ED stays). Medication errors will be assessed in the ED specifically and they will be tracked according to specific types of errors; wrong dose and missed dose. Delay of transfer to the ICU will be assessed through ED transfer logs and the documentation associated in regard to the times of admission (time patient was admitted to the hospital), length of stay (how long the admitted patient has been in the ED), and reasons documented behind the delay (no ICU beds available, not enough staff to take the patient in the ICU).

### ***Background***

The risk of medical errors (specifically medication errors) in critically ill patients can occur in the ED during patient admission and can lead to poor patient outcomes such as a decrease in blood pressure and oxygenation, heart arrhythmias, and multi-organ dysfunction (Richardson & Mountain, 2009). Richardson and Mountain, (2009), report that overcrowding occurs when emergency department function is impeded, primarily by overwhelming of ED staff resources and physical capacity by excessive numbers of patients needing or receiving care. Richardson and Mountain (2009), reports that overcrowding is most strongly associated with excessive numbers of admitted patients being kept in the ED and increases the risk of medication errors due to that overcrowding.

### ***Problem Statement***

Using Issels's (2008) model for problem definition, the problem is stated as, prolonged boarding times in the ED increase the risk of morbidity and mortality among critically ill patients and are caused by several factors including overcrowding, a delay in transfer to the ICU, and medication errors. According to Gonnah, Hegazi, Hmdy, and Shenoda (2008), an increase in ED boarding times is often related to lack of staff, overcrowding, delay of transfer to the appropriate area of admission and their lack of physical beds, and un-timely discharges.

### ***Aims of the project***

The aim of this project is to complete a comprehensive assessment of Desert Springs Hospital Emergency Department, in regard to overcrowding, delay of transfer of critical patients, and medical errors, by identifying if these issues exist at Desert Springs Hospital ED. An assessment will be conducted and based on the findings an evidence-based plan to address the issues will be put together. When a patient is deteriorating due to a lack of appropriate care (lack of monitoring, medication errors) a proper assessment of the ED is a necessary tool in order to provide solutions based on current literature.

### ***Review of Literature***

#### **Overcrowding in the Emergency Department**

Overcrowding can be detrimental to the critically ill patient admitted in the emergency department. Overcrowding in the emergency department is not only an issue with critical patients who are boarding but also poses a problem to those that may be emergent in the waiting room. Bullard, Villa, Bond, Vester, Holroyd, & Rowe (2009) report that during time of acute



overcrowding, the most significant delay occurs awaiting placement in the emergency department bed and is primarily a result of access block due to boarding admitted patients, a situation that poses serious risks to the majority of patients who have emergent or urgent conditions that cannot be managed appropriately in the waiting room (Bullard et al., 2009). Steinberg (2006) reports that critically ill patients should be transferred to the ICU immediately after admission, but this is not always feasible. The standard timeframe from ED admission to transfer of ICU patients is generally 2-4 hours. Steinberg (2006) reports that the most common reason for patient diversions was not overcrowding per se, but lack of staffed critical care beds, which led to patients having to board in the emergency department until a bed is available. Reaching the feasibility of timely transfers (2-4 hours after ED admission) is one of many goals that will ultimately reduce morbidity and mortality of the critically ill patient and provide space for other emergent patients. The delay in transfer can result in less than optimal patient outcomes because in general the emergency department does not have the ICU-related resources (such as uninterrupted 1:1 nursing care, focused subspecialty expertise, and invasive hemodynamic monitoring) to provide optimal care for the critical patient (Steinberg, 2006).

According to Olshaker (2009) overcrowding has many other potential detrimental effects including diversion of ambulances, frustration for patients, families, and emergency department personnel, lesser patient satisfaction, and most importantly, greater risk for poor outcomes. Korn & Mansfield (2008) state that because emergency department boarders use emergency department staff resources that are generally “sized” to deliver care only to new emergency department arrivals, care of these boarders endanger new patients by absorbing staff work. This situation can result in inadequate work capacity to address newly arriving ill patients (Korn & Mansfield, 2008). Alternatively, the finite staff might direct their attention to newly arriving

patients, thus being forced to neglect the boarders and providing nowhere near the requisite attention to these deserving inpatients.

Overcrowding in the emergency department can be attributed to a number of circumstances such as waiting longer than 90 minutes to see a provider, patients being placed in the hallway beds, more than 30% of department beds being filled with admitted patients, and having a full waiting room with no place to move new patients (Korn & Mansfield, 2008). In a study conducted by Harris & Sharma (2010) quantified the determinants of the duration of time spent in an emergency department (ED) for patients who need admission to hospital. Reduced time in ED was associated with the number of nurses, the number of beds, and the number of doctors (Harris and Sharma, 2010). Overall an increase in hospital resources, as measured by the number of nurses, doctors and physical beds, is associated with a significant reduction in patient care time in the ED (Harris and Sharma, 2010). Harris and Sharma (2010) concluded that increasing hospital capacity is likely to reduce overcrowding in the average ED, but factors that determine congestion in individual hospitals, such as long holds for admitted patients and lack of movement from triage, are being investigated for improvement.

A third study by Bernstein et al. (2009) provides several reasons why overcrowding occurs in most emergency departments. Some of the main issues presented are an increase in volume and severity of illnesses, the nursing shortage, uninsured patients, difficulty in obtaining timely consultation, and availability of beds. ED crowding is associated with an increased risk of in-hospital mortality, longer times to treatment for patients with pneumonia or acute pain, and a higher probability of leaving the ED against medical advice or without being seen. Results indicated that the inability to transfer in-patients into beds is one of the leading causes of crowding in the emergency department and increases mortality among critically ill patients

(Bernstein et al., 2009). Bernstein et al. (2009) report that mortality among admitted ICU patients when transferred after more than 6 hours was 17.4%, compared to 12.9% when the patient was transferred in less than 6. Bernstein et al. (2009) conclude that a growing body of data suggests that ED crowding is associated both with objective clinical endpoints, such as mortality, as well as clinically important processes of care, such as time to treatment for patients with time-sensitive conditions such as pneumonia.

When overcrowding becomes an issue from the factors listed previously, the quality of care is reduced and patient safety issues increase (Moseley, Dickerson, Kasey, Key, Moore, Vagarali, & Rund, 2010). Moseley et al. (2010) provide data that emergency department overcrowding can harm patients and impair the patient care experience. When a patient has the potential to be harmed due to unforeseen factors it is imperative to re-assess the safety issues at hand such as nurse-to-patient ratios. Nurses become overwhelmed with unsafe patient loads (4-5 patients in the emergency department, including critical patients) and are at risk for making mistakes, including medication errors and inappropriate monitoring (un-timely or lack of) (Moseley et al., 2010).

Overcrowding in the emergency department can lead to department congestion with beds, use of hallway beds, and not enough beds for patients who continue to come to be seen (Moseley et al., 2010). With overcrowding being an issue suggested practice is to move critical patients to the ICU in a timely manner (2-4 hours of ED admission) and provide appropriate care for them in the unit (Moseley et al., 2010). Decreasing overcrowding in the ED and moving critical patients to the ICU can lead to improved patient health status (e.g. increased oxygen levels, decreased documented hypotension) and a possible overall outcome during ED admission (Moseley et al., 2010). The studies discussed regarding overcrowding in the emergency

department all have a common agreement that critical patients can suffer when the ED becomes crowded.

### **Medication Errors**

Medical errors such as charting mistakes, medication errors, and inappropriate monitoring can all lead to deterioration in patient status. Medication errors are among the most serious and can lead to bodily harm or death (Hillin & Hicks, 2010). When nurses are caring for patients with multiple levels of acuity, the critical patients are not receiving proper care (such as verifying medication, checking names, DOB, ID number) and medication errors may occur (Kulstad, Sikka, Sweis, Kelley, & Rzechula, 2008). Kulstad et al. (2008) provides data based on the Emergency Department Work Index Number, or EDWIN, score to measure crowding and frequency of medication errors in the emergency department. Some of the main causes of errors included giving medication at incorrect doses, frequencies, durations, or routes, and giving contraindicated medication. There was a positive correlation with the daily EDWIN score and number of medication errors. The average outcome was one medication error per day. The EDWIN score identified an increased frequency of medication errors in the emergency department with increased crowding. Medication errors due to overcrowding can cause severe metabolic disorders or death. This study helped to identify one of the critical adverse outcomes that can result from an overcrowded emergency department. A reduction in medications errors in the emergency department is a critical step in reducing morbidity and mortality in patients admitted to the ICU, by assessing the reasons behind the errors that occur in the ED.

Critical patients boarding in the emergency department can also suffer medical errors due to the care transitions that occur with providers. Hughes & Clancy (2007) suggests that the potential for medical errors in critical patients exists whenever more than one healthcare provider

or site of care (emergency department or ICU) is involved in providing services. The effect of mistakes that occur during the care transitions can result in significant patient harm or death and a change in communication, such as “open communication among providers” helps to alleviate medication errors (Friesen, 2008).

Medication errors represent a failure in the medication use process and can increase morbidity and mortality. According to Hillin & Hicks (2010) the National Coordinating Council for Medication Error Reporting and Prevention maintains a taxonomy that assists in standardized reporting, evaluating, and trending of medication error data. Many emergency departments are overcrowded from the increased responsibility of providing emergency and non-urgent medical care. Nursing staff in emergency departments is inadequate to handle the overload of patient visits. As a result, care is fragmented and methods designed to support patient safety are compromised.

Michaels, Spinler, Leeper, Ohman, Alexander, Newby, Ay, & Gibler (2010) report that substantial patient overcrowding in the emergency department, high provider turnover, and language barriers provided an environment that increased the risk of medication errors. According to Michaels et al. (2010) adhering to the American College of Cardiology/American Heart Association (ACC/AHA) guidelines tend to be less effective among emergency departments where resources are underfunded (shortage of nursing staff). Caring for critically ill and injured patients with limited information regarding their history also creates a high-pressure environment in which errors, in both type and dosage, of medications may be more frequent. These patients are not able to communicate their allergies, past medical history, or desire for treatment (Michaels et al., 2010). Finally, the transition of care from one emergency physician to another emergency physician at changes of shift (or from emergency physician to inpatient

physician at the time of admission) is a particularly vulnerable time in medical communication that may result directly in medication errors (Michaels et al., 2010). Medication errors to which emergency department patients are particularly prone include failure to identify known allergies, failure to identify current outpatient medications that could interact with those provided in the emergency department, inappropriate type or dosing of medications, incorrect route for administration, an incomplete understanding of variability in dosing for patients with renal insufficiency or diabetes mellitus, and excess dosage for a given body weight, particularly in older women (Michaels et al., 2010).

Patanwala, Warholak, Sanders, & Erstad (2010) report findings that identified 178 medication errors in 192 patients during the data collection period. At least 1 error occurred in 59.4% of patients, and 37% of patients overall had an error that reached them. No errors in the study resulted in permanent harm to the patient or contributed to initial or prolonged hospitalization; however, interventions were performed to prevent patient harm that likely influenced the severity of error. Errors categorized according to stage were prescribing (53.9%), transcribing (10.7%), dispensing (0.6%), and administering (34.8%). Nationally 36% of medication errors occur in the administration phase (Blank, Tobin, Macomber, Jaouen, Dinoia, & Visintainer, 2011). Variables predictive of medication errors were boarded patient status, number of medication orders, number of medications administered, and nursing employment status (less error if full time). Most of the errors occurred during the prescribing and administering phases and boarded patient status was one of the contributory factors in increasing errors (Patanwala et al., 2010).

Medical errors have become a part of overcrowded and understaffed emergency departments throughout the country. According to Choo, Hutchinson, & Bucknail, (2010)

medical errors can lead to serious injury or death with patients if drugs are used and safety for patients is the priority in the ED and nurses must double-check their medication administration and charting when distributing medicine in order to avoid errors. Choo et al. (2010) stated that nurses' roles in medication management couldn't be over-emphasized especially when utilizing a computerized medication system. Suggested practice for the reduction of medication errors is to create an educational protocol for the nurses that can facilitate safety checks prior to administering medication (Dennison, 2007). An educational program regarding medication errors, if administered properly, can help to reduce and prevent harm caused by those errors (Dennison, 2007). Dennison (2007) reports that recommended training with an emphasis on problem solving for possible errors and how to prevent them as one strategy for the prevention of medication errors. Advocated clinician education focusing on medication administration technology, high-alert medications, and medication risk-reduction strategies should also be provided. Dennison (2007) reports that an educational computerized program was used to inform nurses about medication errors and how to prevent them. The results showed that nurse responses indicate an increase in safety when administering medication and along with education and continuing follow-up will help to increase medication safety and lead to better patient outcomes (Dennison, 2007).

The studies regarding medication errors contributed helpful evidence as to the number of medication errors and their effects. When errors are not reported it is difficult to have a sufficient amount of quality data to improve outcomes in the ED.

### **Delay of Transfer to the ICU**

Delays in transfer to the ICU can impact patient care due to requirement of intense monitoring the patient requires and the ED nurse may not be able to provide, which leads to

increased morbidity and mortality for the patient (Huang, Thind, Dreyer, & Zaric, 2010). Gillman, Leslie, Williams, Fawcett, Bell, & McGibbon (2006) found that the two main factors in delayed transfer were lack of ICU beds and inadequate ICU staff, accounting for 45% of the delays. In two instances where the transfer was delayed by more than 6 hours, the patients became hypotensive and emergency department staff had to start vasopressor or inotrope therapy. The results indicate that equipment problems were the most common adverse event occurring in 9% of patient transfers (n = 290). Hypothermia events occurred in 7% of transfers, cardiovascular events in 6% of patient transfers, delays to transfer >20 min occurred in 38% of the prospectively audited cases, with 14% waiting >1 h. One patient was found to have an incorrect patient identification band during a preoperative check. In all cases there were no ICU beds available. Gillman et al. (2006) also report that 27% of the patients ready to leave the ICU, because of a downgrade to a lower level of care or discharge, did not do so within an 8-hour period (p. 861). Gillman et al. (2006) report that there was a significant increase in 30 day mortality in patients who had a delayed admission (24 hrs.) to the ICU (32%) compared with patients who were transferred directly to the ICU (11%). This was also associated with decreased survival during the entire hospital stay. In addition to the delayed physical transfer of the patient to the ICU, a second major issue is the possible adverse outcomes due to lack of monitoring, timely medication administration, and longer hospital stays, which increase mortality. In conclusion Gillman et al. (2006) report that this study generally reported lower rates of adverse events than noted in previous studies involving critically ill transfers. The emergency nurses have an increase in responsibility with various patients that can cause a delay in care for critical patients while they board in the emergency department.

Although the period in the emergency department is brief compared with the total length



of hospitalization, physiologic determinants of outcome may be established before ICU admission. Blot, Rodriguez, Violan, Blanquer, Almirall, & Rello (2007) report that the lack of appropriate oxygen saturation monitoring of critical patients in the emergency department increases mortality during hospital stay. The critical patients were diagnosed with community-acquired pneumonia (CAP) and suggested that patients who did not have their oxygen saturation monitored for more than 1 hour had a longer delay in receiving antibiotics (6 hours) and had an increase in mortality by 35.7% during hospital stay. Patients who had their oxygen saturation monitoring delayed by >3 hours had an increase in mortality by 44.2%. “Prompt oxygen saturation assessment in the emergency department led to decreased time to initiation of antibiotic therapy and better survival” (Blot et al., 2007, p. 2511). Blot et al. (2007) concluded that in this population of patients with severe community-acquired pneumonia, early oxygenation assessment was associated with more rapid antibiotic delivery and better intensive care unit survival. These data suggest the potential value of an early care bundle focusing on implementation of oxygenation assessment immediately after arrival to the emergency department.

Emergency department nurses and physicians may not be able to provide the one on one care that a critical patient needs especially at times of overcrowding and high acuity. The emergency department in most cases is neither designed nor staffed to provide extended care for the critically ill patient. Hall, Schenkel, Hirshon, Xiao, & Noskin (2010) report that 32% of patient visits had at least one non-ideal care event. Process-related delays were the most frequently reported events within the categories of medication delivery (53%), laboratory testing (88%) and radiology testing (79%). Fourteen (7%) of the reported events were associated with patient harm. Hall et al. (2010) concluded that non-ideal care events can occur during emergency

department boarding and involve failures in medication delivery, radiology testing, and laboratory testing processes, and can result in delays and patient harm.

Renaud, Santin, Coma, Camus, Van Pelt, Hayon, Gurgui, Roupie, Herve, Fine, Brun-Buisson, & Labarere (2009) report that delayed-transfer patients had a higher 28-day mortality rate (23.4% vs. 11.7%) and a longer median hospital length of stay (13 days vs. 7 days) than direct-transfer patients. Patients who were directly transferred to the ICU from the ED had a mortality rate of 13.6% and patients who had a delayed transfer of at least 3 days had a mortality rate of 19.6% (Renaud et al., 2009). “This study supports the 2007 Infectious Disease Society of America guideline recommendations advocating direct transfer to the ICU from the emergency department for adults patients with CAP and at least one major criterion for severe CAP” (Mandell, Wundernik, & Anzueto, 2007). A second major study by Restrepo, Mortensen, Rello, Brody, & Anzueto (2010) report that late ICU admission (LICUA) patients (47.4%) had a higher 30-day mortality compared with early ICU admission (EICUA) (23.2%) patients.

Huang, Thind, Dreyer, & Zaric (2010) report that approximately 11.6% of patients experienced admission delay and that admission delay was associated with 12.4% longer length of stay in the hospital (Huang et al., 2010). The delays of transfer to the appropriate care area are associated with increased length of hospital stay and improving patient flow through the emergency department may reduce hospital costs and improve quality of care (Huang et al., 2010).

Yancer, Foshee, Cole, Beauchamp, de la Pena, Keefe, Smith, Zimmerman, Lavine, & Toops (2006) implemented a series of initiatives to decrease ambulance diversions, decrease wait times in the emergency department (ED), improve poor patient satisfaction, and decrease risks to patient safety. Process improvement teams addressed areas affecting overcrowding and inpatient

bed availability. Teams met to identify, test, and implement process changes. The ED's ability to evaluate, treat, and transfer patients requiring inpatient admission was identified as the most critical factor in reducing ED crowding and ambulance diversions.

Delay of transfer to the ICU can increase poor patient outcomes due to un-timely monitoring, medication administration, and decreased 1:1 nursing care (Chalfin et al., 2007). Suggested practice for patients boarding in the ED with a delay of transfer to the ICU is that the patient receives ICU level care while waiting for an ICU bed (Blot et al., 2007). A delay of transfer to the ICU can lead to poor patient outcomes including deterioration in health status (low oxygen levels, hypotension, decreased LOC), acquisition of new health problems while boarding (e.g. pneumonia), and possibly death (Blot et al., 2007). The evidence points to an increase in morbidity and mortality when patients do not receive appropriate care and including transfer to the correct unit.

### ***Theoretical Framework***

It is difficult to care for a critically ill patient in the ED when a nurse has several other patients with various acuity levels. Orlando's nursing process theory (1961) provides basic concepts for the nurse to utilize in order to meet the patient's immediate needs. The issues of overcrowding and delays of transfer to the ICU make it more difficult to assess critical patients appropriately and provide them with their basic and immediate needs. Utilization of Orlando's theory would help the nurse focus on any immediate signs of distress or need presented by the patient until they are transferred to the ICU. Orlando's theory provides an ethical understanding of the patient because good nursing, according to the theory, is recognizing and meeting the patient's needs.

*Project Description, Implementation, and Monitoring*

**Description of the group, population, community, results of needs assessment**

The population is critically ill patients who are admitted to the ICU but remain as boarders in the ED because of lack of space or staff in the ICU. A lack of effective care by the ED nurse can become an issue because care is being provided to other patients with various levels of acuity at the same time. The ED nurses must provide emergent care to various patients and they must maintain the care that a critical patient needs. Richardson et al. (2009), report that excessive numbers of admitted patients in the ED are associated with diminished quality of care and poor patient outcomes. These include, but are not limited to, adverse events, medication errors, delayed time-critical care, increased morbidity, and increased number of deaths. Many of the critical patients that remain in the ED for a prolonged period (>8 hours) are at risk for respiratory infections, ulcer formation, worsening of symptoms, and may have a delay in receiving the medication they need.

Prospective enrollment in this project will include all critical patients admitted to the ICU with prolonged wait times (> 4 hours of admission time in the ED) over a three-week period. Critical patients can present to the ED with various diagnoses, which may include ST-elevation MI, sepsis, community-acquired pneumonia (CAP), or CVA. Phua et al. (2010), report that delayed ICU admission from the ED was an independent predictor of hospital mortality and that prompt recognition of severe CAP followed by aggressive management at the ED and direct ICU admission are all important in improving outcomes. It is crucial to recognize the severity of the mentioned diagnoses and promote efficient care that will lead to a speedier recovery. Some patients may present alert and oriented and others may be on a mechanical ventilator with sedation, which can make care more difficult. Duke et al. (2004), report that ICU admission

delay is associated with a greater mortality-risk in critically ill medical patients requiring mechanical ventilation (MV). The sample will consist of all patients admitted to the ICU regardless of the admitting diagnosis and mental status because ED nurses care for all diagnoses. The number of participants will vary based on the assessment of the ED and how many patients were cared for in a three-week period.

### **Organizational analysis of project site**

The site where the research will be conducted is Desert Springs Hospital Medical Center (DSHMC) in Las Vegas, Nevada. The data will be collected from the emergency department and pharmacy over a three-week period. The data will consist of patients admitted to the ICU. The project site is a 200-bed acute care hospital with 41 of the beds belonging to the ED. The organizational plan of the hospital will include information resources (pharmacy) and managerial resources (ED director). I will obtain data from the ED manager with respects to triage logs, transfer logs, and any other transfer information that would provide insight as to whether or not overcrowding, delay of transfer, and medication errors are a problem. Data will also be obtained from the pharmacy in regards to the types of medication errors (if any) that occur in the ED. Mr. Lethi (ED director) will be there to assist with the project by allowing access to patient data. At any time during the data collection process, Mr. Lethi and the pharmacist will notify me in regards to new data that can be utilized for the project. I will continuously report to Mr. Lethi regarding progress of the project and obtain approval for data use from the pharmacy and ED.

### **Evidence of Stakeholder Support and Letter of Agreement**

The primary stakeholders of this project are the Director of the Emergency Department, Scott Lethi, RN, the Pharmacist, Evelyn Chu, and the Risk Management Department. The

affiliate hospital where the project was carried out is Desert Springs Hospital Medical Center in Las Vegas, Nevada.

The letter of agreement is on file with the ED director and Desert Springs Hospital Medical Center and at UMASS, Amherst with the doctoral nursing faculty. The stakeholders were invaluable to this project and without them it would not have been possible.

### **Resources, constraints, and barriers, to implementation at the project site**

The project site (DSHMC) has many resources for utilization but there will be some barriers to collecting data. Some of the resources that are available include assistance from the ED director, Mr. Lethi, with project facilitation, cooperation from pharmacy to provide the appropriate data, computer charting that will assist with documentation of patient status, and availability to obtain all documents (nurses notes, physician notes, orders) in an online program. Another crucial resource is the core measures guidelines available for patients admitted to the ICU, which may consist of CAP, heart failure, AMI, and sepsis. Core measures guidelines are an important part of the ED and they exist to promote quick and efficient delivery of care.

Some of the barriers may include the inability to obtain patient data because of delayed scanning from medical records, incomplete charting by nurse or physician about patient condition, medication administration, medication errors, or the lack of charting completely. A second barrier would be the lack of scanning triage and transfer logs in a timely manner, which would not be available for use.

### **Plan for individualized project**

The plan for the project is to design a report for the ED director based on literature in regards to overcrowding, delay of transfer to the ICU, and medication errors. The report will consist of reasons behind the issues, and how based on the literature, we can reduce or solve those problems. The report will be based on a comprehensive assessment of the ED and findings that support it through current literature.

### **Project design and feasibility**

The project will be designed in two phases, collection of data and implementation of the report. In phase 1, data will be collected from the ED and pharmacy records and will be based on the ability to obtain all necessary logs and medication error rates at DSHMC to establish the number of errors, types of medication errors, and when they most occur and why overcrowding is an issue secondary to triage and transfer logs. In phase 2, a report of reasons and solutions based on literature will be put together after the assessment of the ED and pharmacy logs and presented to Mr. Lethi.

The project design may not be 100% feasible due to missing logs and lack of medication error reporting.

### **Goals and objectives of project**

The goal is to focus on the reasons behind overcrowding, delay of transfer to the ICU, and medication errors, which in turn cause morbidity and mortality in admitted ICU patients. In order to reach this goal a comprehensive assessment will be conducted on Desert Springs Hospital Emergency Department to assess the reasons leading to overcrowding, delay of transfer to the ICU, and medication errors, through triage logs (sign in times, wait times), ED transfer logs (time of admission to ICU, reasons for hold in the ED, time of transfer to ICU), and reported

medication errors from pharmacy (type of error, frequency of occurrence, reason for occurrence).

The assessment information will be obtained through the ED director and pharmacist. Solutions will be proposed based on the findings, with evidence-based literature.

### **Costs and plan to obtain resources**

The projected costs for a comprehensive assessment of the ED in ICU admitted patients will need to be evaluated through the hospital's budgets and estimated costs of patient care. Resources such as patient data will be obtained through the ED and pharmacy for use during the project. Copies will be made of the data and disposed of as soon as it is no longer needed for research. Copies are of no cost at DSHMC, although the hospital will be refunded for the use of their paper. Paper cost will amount to \$4-5 per printer pack. The use of the emergency department and pharmacy and their resources is going to be facilitated by Scott Lethi, RN, the ED director at DSHMC, and the pharmacist Evelyn Chu PharmD., who will contribute 40-hour weeks. The time of his contribution will be based on his ability to help and he will not be required to be present at all times. The other component of the budgeting will be during the implementation process when the report is put together for the ED director. All costs are projected numbers until the data is collected in December.

### **Implementation and Evaluation Plan With a Timeline**

Implementation of the project will be conducted over a one to two-month period starting in November 2011 with implementation beginning in January 2012. All patient information will be protected under hospital policies, as indicated by Health Insurance Portability and Accountability Act (HIPPA) (U.S. Department of Health and Human Services, 1996).



- December 2011: The project proposal will be submitted for approval at the University of Massachusetts, Amherst and Scott Lethi, RN the project facilitator at DSHMC. Will meet with key stakeholders during this time period and receive approval for data collection tools.
- January 2012: The project data will be gathered with the tools available from the hospital (triage logs, transfer logs, computer charting, scanned charts form medical records, pharmacy data on medication errors).
- January 2012: The implementation process will begin after all of the data has been analyzed for appropriate indicators of the research. The project to complete a comprehensive assessment of the ED will be in process with Scott Lethi, RN and Evelyn Chu, PharmD.
- January 27, 2012 – February 15, 2012: The implementation process will be conducted at Desert Spring Hospital Emergency Department.
- February 15, 2012 – March 30, 2012: The data will be analyzed, prepared, and written.
- April 2012: The evaluation will be presented to the University of Massachusetts, Amherst and Desert Springs Hospital for review.

### **Results, Findings, Data Analysis**

The comprehensive assessment at Desert Springs Hospital ED took place over a three-week period of January 1, through January 21, 2012. The assessment included review of admission logs as a reference to delay of transfer to the ICU, triage logs as a reference to overcrowding in the ED, and medication errors reported from pharmacy and risk management.

Admission logs were assessed to look at reasons behind delays of transfer to the ICU. Several different factors were assessed including the average number of admitted ICU patients in the ED during each week assessed, the highest and lowest number of ICU admits in a 24-hour period, the longest and shortest ICU admit times in a 24-hour period while waiting in the ED, the main reasons for ICU patient hold in the ED, and the average hold time for ICU patients in the ED. The average number of admitted ICU patients during the 3-week period was 3.8 patients at any given time in the ED. The highest number of admitted ICU patients boarding in the ED over the 3-week period was 7 and the lowest was 1. The longest time a patient waited to be transferred to the ICU over the 3-week period was 26 hours and the shortest time was 15 minutes. The main reason for a delay of transfer to the ICU over the 3-week period was unavailable ICU beds and not enough RN's to care for the patients. The average hold time for ICU patients waiting in the ED over the 3-week period was 36.29 hours. Please see Table 1 and 1a for further breakdown of data.

Triage logs were reviewed over the same time period and assessed for the reasons behind overcrowding in the ED. The factors that were assessed include the longest time from sign-in to triage, the longest time from triage to bed placement, and the main reasons for the long waits. The average wait time between sign-in and triage over the 3-week period was 1.22 hours. From being triaged to being taken to a physical bed in the ED, the average wait time over the 3-week period was 5.83 hours. The main reasons for the long waits in triage were due to no available beds because of a high number of boarding patients. The patients included various levels of admission such as medical-surgical (MS), medical-telemetry (MT), cardiac-telemetry (CPOU), intermediate medical care (IMC), and intensive care (ICU) units. Please see Table 2 and 2a for further breakdown of data.

Medication error reports were obtained from risk management and reports were limited. Due to HIPPA and privacy laws, risk management was able to provide general data about hospital wide medication errors and could not break them down into the ED specifically. Over the three-week period of the assessment the hospital wide number of medication errors reported were 12. Risk management could not disclose which area of the hospital these errors came from or the type of error that occurred. With the limited number of errors reported it is imperative to educate the nurses about the importance of reporting errors, even if they are minor.

**Table 1. Admission Logs**

	Week 1: 1-1-12 – 1-7-12	Week 2: 1-8-12 – 1-14-12	Week 3: 1-15-12 – 1-21-12
Average # of admitted ICU patients in ED.	<b>3.5</b>	<b>3</b>	<b>5</b>
Highest # of ICU admits in 24 hour period.	<b>6</b>	<b>4</b>	<b>7</b>
Lowest # of ICU admits in 24 hour period.	<b>1</b>	<b>1</b>	<b>1</b>
Longest admit time to ICU in 24 hours	<b>24 hours</b>	<b>24 hours</b>	<b>26 hours</b>
Shortest admit time to ICU in 24 hours	<b>15 minutes</b>	<b>45 minutes</b>	<b>1.35 hours</b>
Main reasons for ICU patient hold.	<b>No ICU Beds. Not enough ICU RN's.</b>	<b>No ICU Beds. Not enough ICU RN's.</b>	<b>No ICU Beds. Not enough ICU RN's.</b>
Average hold time for ICU patients in the ED.	<b>25.5 hours</b>	<b>22.92 hours</b>	<b>60.45 hours</b>

**Table 1a. Admission Log 3-Week Averages**

	1-1-2012 - 1-22-2012
Average # of admitted ICU patients in the ED over the 3-week period.	<b>3.8</b>
Average hold time for ICU patients in the ED over the 3-week period.	<b>36.29 hours</b>

**Table 2. Triage Logs**

	Week 1: 1-1-12 – 1-7-12	Week 2: 1-8-12 – 1-14-12	Week 3: 1-15-12 – 1-21-12
Sign-in to Triage: Longest Wait	<b>2 hours</b>	<b>55 minutes</b>	<b>45 minutes</b>
Triage to Bed: Longest Wait	<b>7 hours</b>	<b>6 hours</b>	<b>4.5 hours</b>
Main Reasons for Wait	<b>No open beds available due to high level of admissions.</b>	<b>No open beds available due to high level of admissions.</b>	<b>No beds available due to high # of ICU admissions.</b>

**Table 2a. Triage Logs 3-Week Averages**

	1-1-2012 – 1-21-2012
Average time: Sign-in to Triage over the 3-week period.	<b>1.22 hours</b>
Average time: Triage to Bed over the 3-week period.	<b>5.83 hours</b>

**Proposed Solutions**

In order to provide improved healthcare quality, the issues mentioned before must be solved. With healthcare so unpredictable it is important to propose solutions that may help in solving some of the issues in the ED. Although the solutions may not fix the problems right away, it is a step in the right direction and promotes movement in the ED. As stated by Hoot and Aronsky, (2008) the proposed solutions should be long-term approaches and are considered to be

better than the short-term options that have only masked the problems for a short time in the past, delaying the crisis and need for long-term solutions. Short-term and long-term solutions will be provided to support in the ED's movement of patients in regards to overcrowding, delay of transfer to the ICU, and medical errors.

Short-term solutions have been used in the past and continue to be used by several state hospitals. According to the American College of Emergency Physicians (ACEP) (2008), there are short-term high impact solutions that can help movement in the ED. The first high impact solutions includes moving emergency patients who have been admitted to the hospital out of the ED to inpatient areas, such as hallways, conference rooms, and solariums. Moving patients out of the ED beds can open areas for emergencies and alleviate the ED nurses of those patients.

A second high impact solution includes coordinating the discharge of admitted patients in the hospital before noon, or in the case of ICU patients, assessing for downgrades prior to noon. Timely discharges and downgrades of patients can significantly improve the flow of patients through the ED by making more inpatient beds available to emergency patients (ACEP, 2008). In order for this solution to work, there must be leadership from all aspects of the hospital and the process must include physicians, nurses, pharmacy, radiology, lab, and housekeeping.

A third solution is to coordinate the schedule of elective patients and surgical patients and if necessary cancel those appointments at times when the hospital has reached high volume of inpatients and admissions (ACEP, 2008).

Other short-term high impact solutions included bedside registration, fast-track units, and physician triage (ACEP, 2008).

Long-term solutions are highly regarded as the solutions that will have the most impact on an organization (Hoot & Aronsky, 2008). Although the time frame is lengthier than short-

term solutions, they provide long lasting results. According to Hoot & Aronsky (2008) there are two major long-term solutions; increased resources and demand management.

The first long-term solution is to increase resources. According to Hoot & Aronsky (2008) additional personnel, observation units, and hospital bed access are the most common solutions for crowding in the ED. Olshaker and Rathlev (2008) stated that the most frequently cited reason for ED overcrowding is the inability to move admitted patients from the ED to an inpatient bed.

Additional personnel may include a permanent increase in the number of physicians during a busy shift, which can reduce the outpatient length of stay by 35 minutes (Hoot & Aronsky, 2008). A second option for additional personnel is to reserve employees as needed during the viral season. A rural hospital activated the reserve personnel strategy and reduced waiting times by 15 minutes and the rate of patients leaving without being seen by 37% (Hoot & Aronsky, 2008).

Increasing resources can also mean adding observations units to decrease the number of admitted patients holding in the ED. According to Hoot & Aronsky (2008) the addition of an ED-managed acute care unit decreases ambulance diversion by 40% and halves the rate of patients leaving without being seen. As stated by Moloney, Bennett, & O’Riordan (2006) a hospital reported that the addition of an acute medical unit reduced the median number of boarding patients (including ICU) from 14 to 8 during a 2-year period. In a study conducted by Olshaker and Rathlev (2008) a short-stay, undifferentiated inpatient unit was implemented with the purpose of reducing the time from admission decision to departure from the ED. The unit was successful in reducing the throughput time for both admitted and discharged ED patients. In a second study by Olshaker and Rathlev (2008) the benefits of an acute care medical unit

accepted patients requiring extensive evaluation that was to exceed 4 hours in duration. Admitted patients were also taken to the unit if there were no inpatient beds available. Implementation of the unit decreased overcrowding significantly and decreased ambulance diversion by 40% over a 6-month period (Olshaker and Rathlev, 2008).

A third resource included hospital bed access. After increasing the number of critical care beds from 47 to 67, ambulance diversion decreased by 66% at one hospital. Over a period of time, when more beds were added to hospital units, there were significant decreases in occupancy levels and waiting times in the ED (Hoot & Aronsky, 2008).

The second long-term solution is demand management, which focuses on non-urgent referrals, ambulance diversion, and destination control.

In a survey conducted by Hoot & Aronsky (2008) 38% of ED patients said that they would swap their ED visit for a primary care appointment within 72 hours. When following up non-urgent patients who were triaged to receive care elsewhere it was found that 42% of the patients received the same care and there were no adverse outcomes. In proposing non-urgent referrals, the ED can continue to focus on the patients who need consistent monitoring (ICU patients) and keep the ED beds open for future emergencies.

Ambulance diversion decreased the rate of ambulance arrivals by 30% to 50% (Hoot & Aronsky, 2008). Although ambulance diversion should not be priority, having it available throughout all of the local hospitals can help to reduce overcrowding and allow nurses to care for the critical patients without adding other patients to their assignment load. Destination control in turn is considered an excellent way to reduce ambulance diversions. Hoot & Aronsky (2008) found that internet-accessible operating information to redistribute ambulances reduced the need for diversion from 1,788 hours to 1,138 hours in a single network. By distributing ambulances

through the city, diversions can be avoided and patient care can resume.

The proposed solutions for Desert Springs Hospital ED will help to decrease crowding, delay of transfer to the ICU, and possible medication errors due to those factors. Using evidence-based research can help to solidify the ED and help to decrease these issues in the future.

### **Costs and Financial Benefits**

The costs associated with the implementation process were minimal. Paper cost was reimbursed for the ED at a cost of \$4.75 for a pack. The cost for the ED written report came to \$65 for thirty sets with ring binders placed. The financial benefits include the help of Mr. Lethi and the pharmacist, Mrs. Chu, and cutting down cost on making copies as most of the work was done at the hospital.

### **Plan for Post-Project Continuation and Implications for Future Practice**

The plan for post-project continuation is to follow-up with Mr. Lethi on a monthly basis for four months and find out if the written report given out was successful among hospital directors and other employees and if any of the proposed solutions were implemented or discussed as a possible future endeavor.

### **Discussion**

There has been extensive research in regards to increased boarding time in the ED by ICU patients. According to Gonnah, Hegazi, Hmdy, and Shenoda (2008), the increase in boarding times is often related to lack of staff, overcrowding, delay of transfer to the appropriate area of admission and their lack of physical beds, and un-timely discharges. The major themes among the effect with increased boarding times include overcrowding in the ED, delay of transfer to the ICU, and medication errors. The major themes among the effects of solutions of increased boarding times include short-term and long-term goals to fix the issues. The short-term



solutions include moving admitted patients to other areas of the ED to free up monitored ED beds, coordinating the discharge of admitted patients in the hospital before noon, or in the case of ICU patients, assessing for downgrades prior to noon, and to coordinate the schedule of elective patients and surgical patients and if necessary cancel those appointments at times when the hospital has reached high volume of inpatients and admissions. The long-term solutions include increased resources (additional personnel, observation units, hospital bed access), and demand management (non-urgent referrals, ambulance diversion, and destination control).

The results yielded from the solutions suggest that short-term solutions have been used frequently in the past and have only masked the problems in the ED, delaying the crisis and need for long-term solutions (Hoot & Aronsky, 2008). The long-term solutions tend to take a longer period of time but they make more impact on an organization as a whole by leaving lasting results.

When considered as a whole, the body of literature demonstrates that increased boarding times in the ED are a symptom of a systemic problems. The causes of increased ED boarding times involve a complex network of processes ranging from hospital workflow to viral epidemics. Various targeted solutions to increased boarding times in the ED have been shown to be effective, and further studies may demonstrate new ideas in the future. The overview of the literature in regard to increased boarding times in the ED may bring newer and more innovative ways to help decrease the problem within the healthcare system in the future.

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