

Mitigating emergency department overcrowding

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### Abstract

Emergency department (ED) wait times have long been a contentious subject among providers, nurses, administration, and patients. While the number of emergency visits has increased year over year, many emergency departments are closing and there is a decrease in the number of primary care providers available to patients. After an extensive literature review of multiple methods of mitigation, we discuss several options open to hospitals seeking to decrease long wait times in the ED. Mitigation methods discussed include: increasing both the facility and staff size of EDs, formalizing new roles for senior nurses - focusing on patient flow and treatment, utilizing bed space for flexible purposes, and the complete re-envisioning of ED processes. The results of the research show that while each method can lessen wait times, it will be a combination of several interventions that will really affect ED overcrowding, lessen patient wait and increase staff and patient satisfaction.

*Keywords:* Emergency department, overcrowding, wait times, waiting times, efficiency, hospital systems, patient management, prioritization

### Mitigating emergency department overcrowding

A recent RAND Corporation publication reported that nearly 50% of all inpatient admissions originated in the hospital's emergency department (ED), as seen depicted in figure 1 (Morhanti, et al., 2013). Since inpatient services make up the bulk of most hospitals' revenue this is significant to all stakeholders in the emergency medicine process. Where hospital administrators once saw a money pit of lost revenue, there are now monetary incentives to expand and streamline ED services to evaluate and treat the greatest number of patients possible bringing overcrowding and wait times in EDs to the forefront of administrators' considerations for process improvement. In a recent study published in the *Annals of Emergency Medicine*, it was found that just a one-hour reduction in the average ED length of stay could result in \$9 thousand to \$13 thousand in additional revenue per day (Pines, Batt, Hilton, & Terwiesch, 2011).

Emergency department wait times have long been a contentious subject among providers, nurses, administration, and patients. Patients often perceive long wait time as the result of staff not taking their complaint seriously or simply laziness, especially if they see staff members not directly involved in patient care. In the perspective of providers and nurses, wait times can be seen just as a 'given', there are only so many staff members and rooms to go around. Administrators can view the problem as a loss of revenue from the patients who leave without being seen by a provider. What all of these stakeholders can agree on is that ED wait times are an issue for everyone involved.

The problem of ED overcrowding and excessive wait times is an issue that effects and is affected by all aspects of the 'Iron Triangle' of cost, quality, and access (Kissick, 1994). Administrators can view the issue as a loss of revenue, especially if there are other EDs in the area with whom the hospital competes, as well as accost containment issue when trying to

compensate for non-reimbursed expenses. Patients can see increased wait times as both a loss of access and a decline in quality and, as wait time increases, patient satisfaction decreases (Popovich, Boyd, Dachenhaus, & Kusler, 2012). Providers and staff can be influenced by increasing wait times, contributing to poor decision making or errors in care decreasing quality. This paper will define the problem and then explore several options for mitigation of ED overcrowding and increasing wait times.

### **Methods**

An in-depth literature review was done of recent publications on the effects of ED overcrowding and increased wait times. Recent peer-reviewed articles are the main source of data for this paper; however, recent publications from online journals and websites were used for pertinent up-to-date information and numbers. Google scholar and the Baylor online publication library were used for the majority of searches conducted.

### **Definitions**

Length stay is defined as the total time a patient is in the ED from time of admission to time of discharge or transfer from the department to another facility or another department of the hospital. Wait time is defined, unless otherwise noted, as the wait from time of check-in to time the patient is seen by a provider, this can also be called 'door-to-doctor' time. Emergency department crowding, or overcrowding, is defined as the time at which the number of total patients in the department exceeds the number of beds available (O'Connor, Gatién, & Calder, 2014). Boarding is defined as a patient waiting for a ward bed after being admitted to the hospital, the time is calculated from time that admission orders are completed until transfer of patient care (Pines, Batt, Hilton, & Terwiesch, 2011).

## Findings

### The Problem Defined

The cause of ED overcrowding in the United States can be seen as a two-fold issue: 1) the decreasing number of EDs and 2) the increasing number of visits per person. The combination of these two issues has contributed to widespread overcrowding reported as an issue by 90% of hospital directors in the United States. This statistic suggests that nearly every state, if not all states, deal with overcrowding as an issue (Lobachova, et al., 2014).

A study completed in 2011 found that between 1990 and 2009 more than 1,000 EDs closed, while only 374 opened during the same time period. In 34% of the closures, the hospital, itself, remained open. The study found that EDs serving urban areas with primarily uninsured and public insured patients, or serving a disproportionately high level of Medicaid or low-income patients were 40% more likely to close when compared to other EDs and hospitals. Emergency departments were also more likely to close during this time period when run by for-profit hospitals experiencing low profit margins. Even in competitive markets such as New York City, EDs were 30% more likely to shut down when compared to other markets. Paradoxically, during this same time, ED visits increased by 35% (Hsia & Kellerman, 2011).

According to the National Hospital Ambulatory Medical Care Survey conducted by the Center for Disease Control (CDC), there were approximately 129.8 million ED visits in 2010 (CDC, 2010), an 11% increase from the 117 million visits reported in 2007 (Lobachova, et al., 2014). So, what brings patients into the ED? Lobachova, et al conducted a study to find the reason(s) behind patient ED visits. Lobachova, et al surveyed 598 patients and found that in 61% of cases the patient believed that their problem was serious. In 35% of the cases, providers, primary care or specialty care, referred the patient to the ED. Thirteen percent of the

interviewees had family or friends suggest the visit. In 8%, the patient did not have any primary care and 6% stated they could not get an appointment with their primary care provider. Three percent were unsure where else they could seek care and in only 1% of the cases did the patient report not having insurance. Of the patients not referred by a provider, when asked if they had contacted their providers prior to coming to the ED, 26% (of the total patient population) said no, as they considered it an emergency. Another 21% reported that the illness happened after hours. Eight percent of the patients stated they thought it was unnecessary. Seven percent reported a provider outside the local area and the remaining patients did not specify a reason. Further evaluation of the data found that of the 61% who thought their problem was serious, 28% were admitted and of the 35% referred by a provider 37% were admitted (Lobachova, et al., 2014). Figure 2 depicts the different reasons patients gave for ED visits.

This study concludes that only a small number of those patients interviewed visited because they were uninsured (1%) and a greater number of patients came because they either did not have a primary care provider (8%) or that it was convenient (8%). Further analysis shows that there is an access to care issue when it comes to primary care providers, especially since the shortage is well documented. However, there were limitations to the study, including that the hospital used in the study had an overall uninsured population of only 5%. In addition, the study findings of a 1% uninsured rate differs from both the expected 5% and from national averages (Lobachova, et al., 2014).

Overcrowding in EDs is most often blamed on the uninsured seeking care because they cannot be turned away based on insurance status (Emergency Medical Treatment and Labor Act of 1986, 2012). However, based on statistics, of the 129.8 million visits (CDC, 2010), only about 15% of ED were from uninsured patients (LaCalle & Rabin, 2010). This incongruity can

also be seen in Massachusetts, a state with near universal health care, where ED visits have continued to rise (Lobachova, et al., 2014). See figure 3, which illustrates the payers for hospital admissions and figure 4, which illustrates the payers for ED visits.

The Affordable Care Act (ACA) is often mentioned when discussing wait time; it is thought that since the ACA will decrease in the number of uninsured Americans, there will be a reduction in ED visits (Becker & Friedman, 2014). However, this theory is flawed for several reasons. Firstly, even after enactment, the uninsured will still number between an estimated 29.8 million and 31 million (Nardin, Zallman, McCormick, Woolhandler, & Himmelstein, 2013). Secondly, the theory is that the newly insured will shift their care out of the ED to primary care providers; however, concern is emerging that the inadequate number of primary care providers will actually increase the number of ED visits due to decreased access to providers. Thirdly, insurance can actually increase the total amount of health care consumed, an example of moral hazard (Becker & Friedman, 2014). Of course this newly insured group of patients could be a boon for administrators.

The RAND report also highlighted that, although EDs account for 11% of all outpatient visits in the United States, these same departments only represent 2-4% of annual healthcare expenditures (Morhanti, et al., 2013). At this point, hospital administrators should be looking for ways to improve patient through-put in our already overcrowded EDs in order to take advantage of the nearly 28 million newly insured Americans. With the enactment of the ACA, administrators should see an increase in the per-patient profitability, as the newly insured seek care and the visits from the uninsured population diminish. While there will still be uninsured Americans, the odds of providing uninsured or charity care are significantly decreased (Becker & Friedman, 2014).

**Mitigation**

The understanding the causes of overcrowding is just the beginning, the next stage is exploring ways to mitigate. Fortunately, many studies have been conducted in methods to ease the problem of overcrowding and subsequent increased wait times. Many of these studies have also shown that while one change can help relieve the problem substantially, making several changes – or, in the case of one example, boldly re-envisioning ED care - will really solve the problem (Asha & Ajami, 2014). It is important to note that the discussion will only include four mitigation methods due to publication length. Further research should be conducted into the mitigation methods of patient education, key in getting patients knowledgeable on chronic conditions, maintenance and when to seek emergency care, and hospital boarding policies which when effective can free up valuable ED bed space.

One way for hospital administrators to take advantage of the increase in insured Americans is to reinvest revenues into their ED. This reinvestment could be used to increase the footprint of the department itself by adding staff and expanding available space for patient care. However, a retrospective study conducted by Mumma, et al on a single academic ED, found that even after an extensive increase in the departments size, from 33 beds to 53 beds, there was little change in the left without being seen rate or the wait time. During the time periods studied (11 months prior to the expansion and 11 months after the expansion), there was an increase in patient volume to the department and an increase in ED boarding time. No significant staffing changes were made during these time periods; all state guided ratios for care were kept constant (Mumma, McCue, Li, & Holmes, 2014). This means that building a bigger department alone will probably increase patient population, but it will not necessarily relieve the issue of overcrowding.



Another possible solution to the problem of excessive wait times is the use of a coordinator to facilitate effective patient movement. Because a coordinator can be used in several different capacities discussed are two studies conducted using an ED coordinator in different ways.

In a before-and-after study conducted in a Sydney, Australia hospital, it was found that an “Emergency Journey Coordinator” (EJC) increased compliance with the National Emergency Access Target (NEAT) standard of a 4-hour check-in to discharge time from 59.6% to 64.4%, including both discharged and admitted patients, when used just during peak hours of 1430 to 2300. The EJC is defined as a senior nursing role in which the nurse focuses on early identification of delays in patient processing and helping to resolve these issues thus promoting timely disposition of patients in the ED. The role of the EJC included using problem solving, decision making, and negotiating skills to deal with bed managers, inpatient teams, and ward managers. The EJC conducted continuous rounds of the department in order to identify possible delays early on, focusing on patients near the 2 and 3 hour stay marks. The study concluded that the introduction of the EJC impacted NEAT compliance positively and that further study was needed to compare conditions at other hospitals (Asha & Ajami, 2014).

A study conducted at an urban academic center reviewed the effects an ED “flow coordinator” would have on department overcrowding. The role of the flow coordinator focused on “facilitating and improving patient movement both in and out of the department” (Murphy, Barth, Carlton, Gleason, & Cannon, 2014, p. 2). The duties of the flow coordinator included approaching physicians when the patient length of stay exceeded expectations and when admission was decided, but no orders were yet in place. Due to the roles and responsibilities of the flow coordinator, it was imperative that the job was filled by an experienced nurse with an

effective working relationship with both ED staff and inpatient units. The results of the retrospective study, covering the period one year prior to implementation through one year after, demonstrated that, despite an increase in patient encounters, the length of stay decreased an average of 87.6 minutes, the left without being seen rate decreased by 1.5%, and the hospital's monthly diversion time improved 12.7%, dropping from 93 hours to 43.3 hours. Another positive result of implementing the flow coordinator was an increase in the nursing staff satisfaction rate from 50% prior to the implementation to 73% post implementation. Figure 5 depicts the results of the study (Murphy, Barth, Carlton, Gleason, & Cannon, 2014).

These two studies illustrate positive effects with the implementation of either a flow coordinator or an emergency journey coordinator to monitor the patients for overall length of stay and help to facilitate the progress of the patients through the system, whether leading to admission or discharge.

The use of a flexible treatment area has also been studied as a means of deterring overcrowding and bringing down wait times. The addition of facility space belonging to the ED is sometimes seen as the solution, but from our previous example this is not always the best answer as more space often correlates to more patients. However, studies indicate possible advantage through the use of 'flex' beds or an area of the ED that can be rapidly shifted from a fast track (low acuity setting) to a high-acuity area on an as needed basis.

At the Nationwide Children's Hospital in Columbus, Ohio, staff developed an evidence-based project to employ a volume-driven protocol for employing an area outside the normal ED area that could be staffed to intervene early and ensure rapid treatment of stable patients. The satellite was an eight-bed area located on the second floor of the hospital easily accessible from the normal emergency department. The area was used for stable patients in the lower triage

categories and staffed by regular ED employees already on duty. The protocol for employing the satellite area was included in the late afternoon staff meeting. Staff used a flow chart of simple data sets to determine if the area should be opened. Utilization factors included: total census of patients in rooms and in the waiting area, the number of lower acuity triaged patients, the number of patients waiting to be triage, the wait time, and whether or not the urgent care area was full. After answering these questions, the staff decided to either to open the satellite area or not (Popovich, Boyd, Dachenhaus, & Kusler, 2012).

A four-month period was used to evaluate the protocol. During this time period, the protocol was met 15 times. A limitation identified by the study was the actual availability of staff for the area, in 3 out of 15 instances which met opening protocols there was insufficient staff on hand to open the additional area. Over the four-month period the left without being seen rate decreased from 62 to 49 and the total length of stay decreased 29%. Results indicate that there were positive effects of both the protocol and the staff meeting (Popovich, Boyd, Dachenhaus, & Kusler, 2012).

Emergency departments are often separated into areas for treatment of high-acuity and low-acuity patient complaints in a fixed capacity. A retrospective study conducted on data collected from a 50-bed, urban teaching ED that historically designated ten beds to a fast track, low-acuity, area. The study authors designed a model for estimating the change in length of wait (in this study the wait time began after triage and ended when given a bed) and total length of stay. Using this method the authors ran several simulations to estimate the changes in times when taking up to five of the low-acuity beds to flex into high-acuity beds. The authors compared results of the simulation to two other models, a fully flexible ED (any bed can be used for any patient, no segregation by acuity level) and a segregated ED (separate areas for high- and

low-acuity). The results demonstrated that a flex track of two to four beds produced the lowest overall averages for both wait time and total length of stay, depending on the overall concentration of high- and low-acuity patients (Laker, Froehle, Lindsell, & Ward, 2014). However, the authors assume that all providers in the ED can see all patients, though often lower acuity areas not staffed that way. Limitations of this study include: 1) the exclusion of all patients that left without being seen and 2) data is retrospective and includes only the data from one hospital (Laker, Froehle, Lindsell, & Ward, 2014).

Demonstrated by these two studies, an area of flex can be a true asset to an ED, although further studies need to be conducted. A true benefit of the ability to be flexible is that patient populations are not at a consistent concentration of high- and low-acuity patients and the ability to vary ED resources to meet demand is an asset. The ability to flex with demand will lead to fewer instances of mismatch between available beds and the patients currently waiting to be seen (Laker, Froehle, Lindsell, & Ward, 2014).

To deal with ED overcrowding and increased wait times there is another approach that can be taken – that of a complete redesign of the entire department. The University of Colorado Hospital ED in Aurora used to have door-to-doctor time in excess of 80-minutes. The department was overcrowded and inefficient for the patient load that the staff handled on a daily basis. The department, opened in 2012, was designed to handle 25,000 patient visits a year, approximately 69 patients a day, while the department was actually handling 60,000 patients a year, or 165 patients a day. The staff was constantly stretched on resources, patients experienced long wait times, and satisfaction for both parties plummeted (Kutscher, 2013).

Led by the chair of the ED, Dr. Rich Zane, a completely re-envisioned ED opened in April of 2013. Since the opening, the patient population has actually increased to approximately

230 patient visits a day, but the staff has been able to keep the average door-to-doctor time to an average of 10 minutes. A combination of both doubling the space allocated to the department itself and also completely refining the ED's methods of handling patients (Booth, 2013).

The staff at University Hospital eliminated traditional triage done on a patient prior to being sorted for care in the main ED. Instead, a nurse is set-up at a station, called the pivot area, where she receives the initial complaint and the patient is registered. Based on the complaint and appearance the patient is sent to one of three areas in the back: rapid intake rooms, a full ED room, or a trauma room. Each of these areas has different protocols in place for the treatment of the ED patient. Trauma is relatively unchanged from the traditional quick assessment and disposition, except that the hospital has embedded an active imaging and radiological unit within the department making the process more streamlined. The same is true for the full treatment beds, while the process is more streamlined the overall care is more traditional except that the patient is seen and assessed by both a nurse and a provider, usually simultaneously, and care begins more rapidly. Once a patient is treated, the patient is discharged, admitted, or transferred into another area of the ED, the observation unit where the patient is monitored for a period of time depending on condition, without taking up a valuable ED bed (Booth, 2013).

The largest change came in the rapid intake area. In this area, the patient's vital signs are taken and quickly assessed, before a provider comes, usually in under 10 minutes. The patient is seen, assessed, and dispositioned from this area, either discharge or sent to a rapid treatment area for testing and treatment. If the patient has to wait for results, he or she is transferred to an internal waiting area, which again frees up a bed in the ED. Other improvements that the newly designed ED incorporated are: 1) a commercial pharmacy to save patients time after discharge, 2) nursing and technician staff communicates via a closed network of earpieces and microphones

to facilitate the movement and treatment of patients, 3) a computer program is used to track patient time in the ED and highlights patients at the two-hour mark so that staff can assess treatment and goals, and 4) processes in the ED are constantly being monitored and assessed for possible improvement (Booth, 2013). University Hospital is not the only ED implementing these new strategies. Rochester General in New York, implemented similar strategies in 2009 and have seen wait times decrease from 90 minutes to 19 minutes on a patient population topping 119,837 patient visits a year, an average of 328 patients a day (Kutscher, 2013). Although, research has not been fully completed on the ramifications of the changes to ED processes, the informally published results are promising.

### **Discussion and Conclusion**

Emergency departments are a significant part of the hospital and its processes – producing 50% of all inpatient admissions, significantly contributing to revenue. However, overcrowding and excessive wait times inhibit an ED's ability to effectively and efficiently manage patient flow. To mitigate the increase in patients seeking care in the ED, the hospital's administrators and ED staff need to work together to find appropriate solutions to the unique challenges found at each facility. The only common element among successful approaches appears to be a requirement to implement multifaceted approaches and perform continuous reassessment. Each method can bring positives to the table, such as more space, more flexibility, or more efficiency, but, each is only a small method for change. It will take more study and more evidence based practice to truly cure the problem of overcrowding. In addition, the causes behind the problem: lack of insurance, lack of primary care providers, and a decreasing number of EDs, will need to be addressed on a national basis.

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## Figures

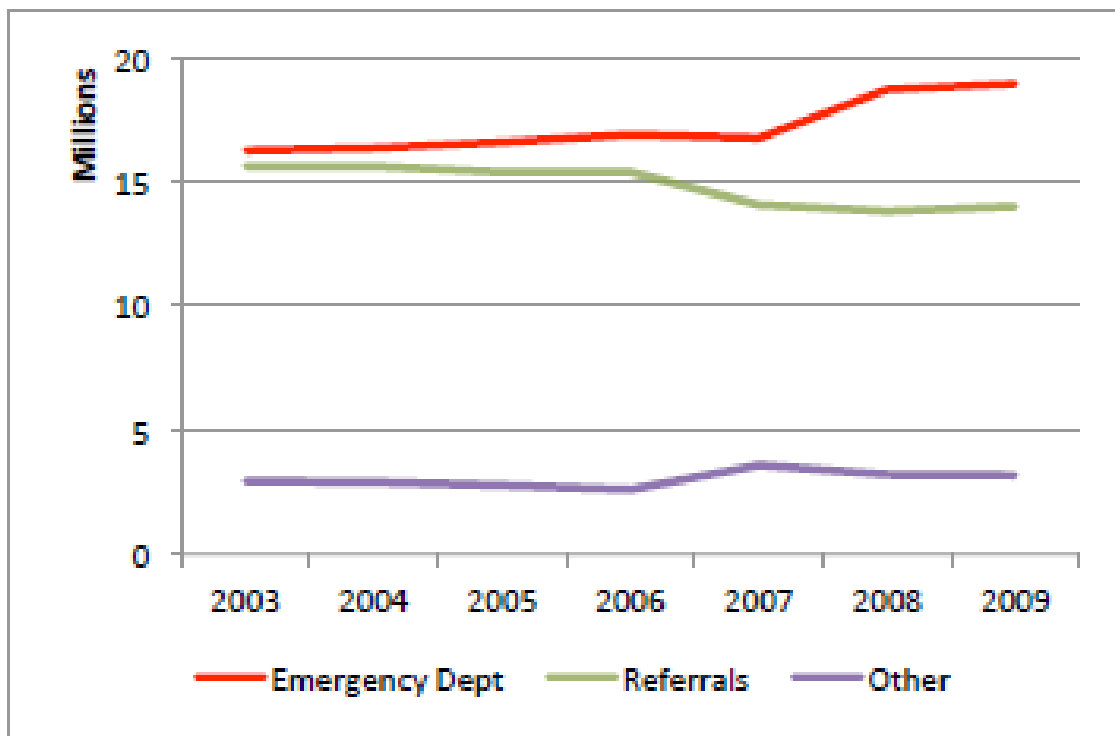
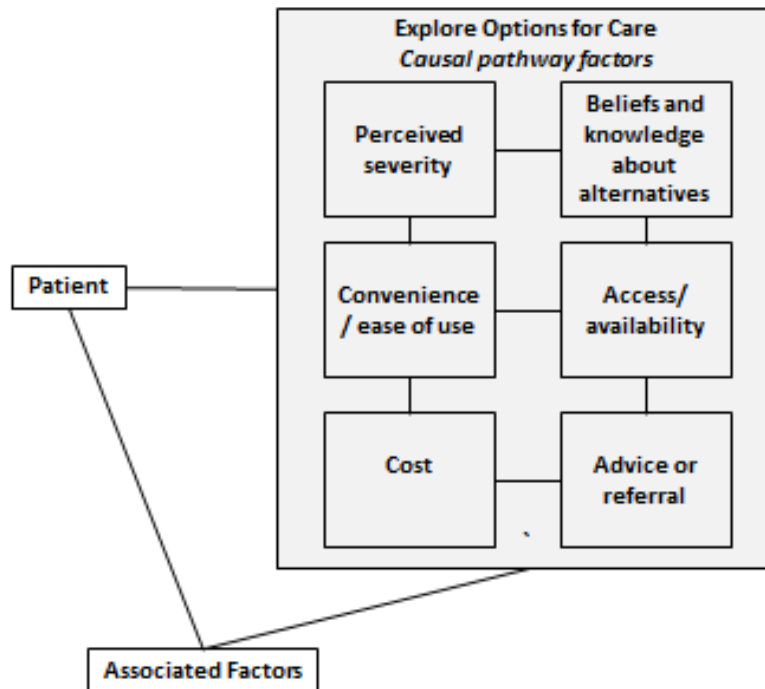


Figure 1. This figure depicts the change in hospital admission sources (Morhanti, et al., 2013).



*Figure 2.* This figure depicts the reasons that patients may seek treatment at an emergency department (Morhanti, et al., 2013).

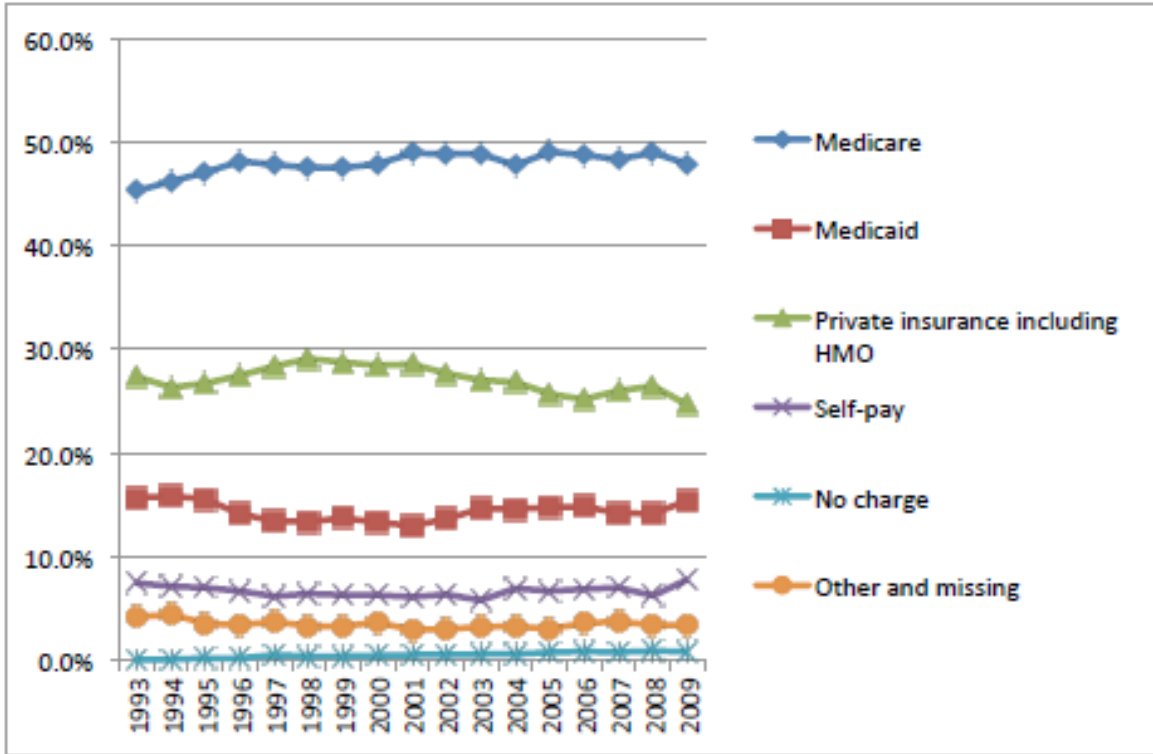


Figure 3. This figure depicts payment type for admitted patients (Morhanti, et al., 2013).

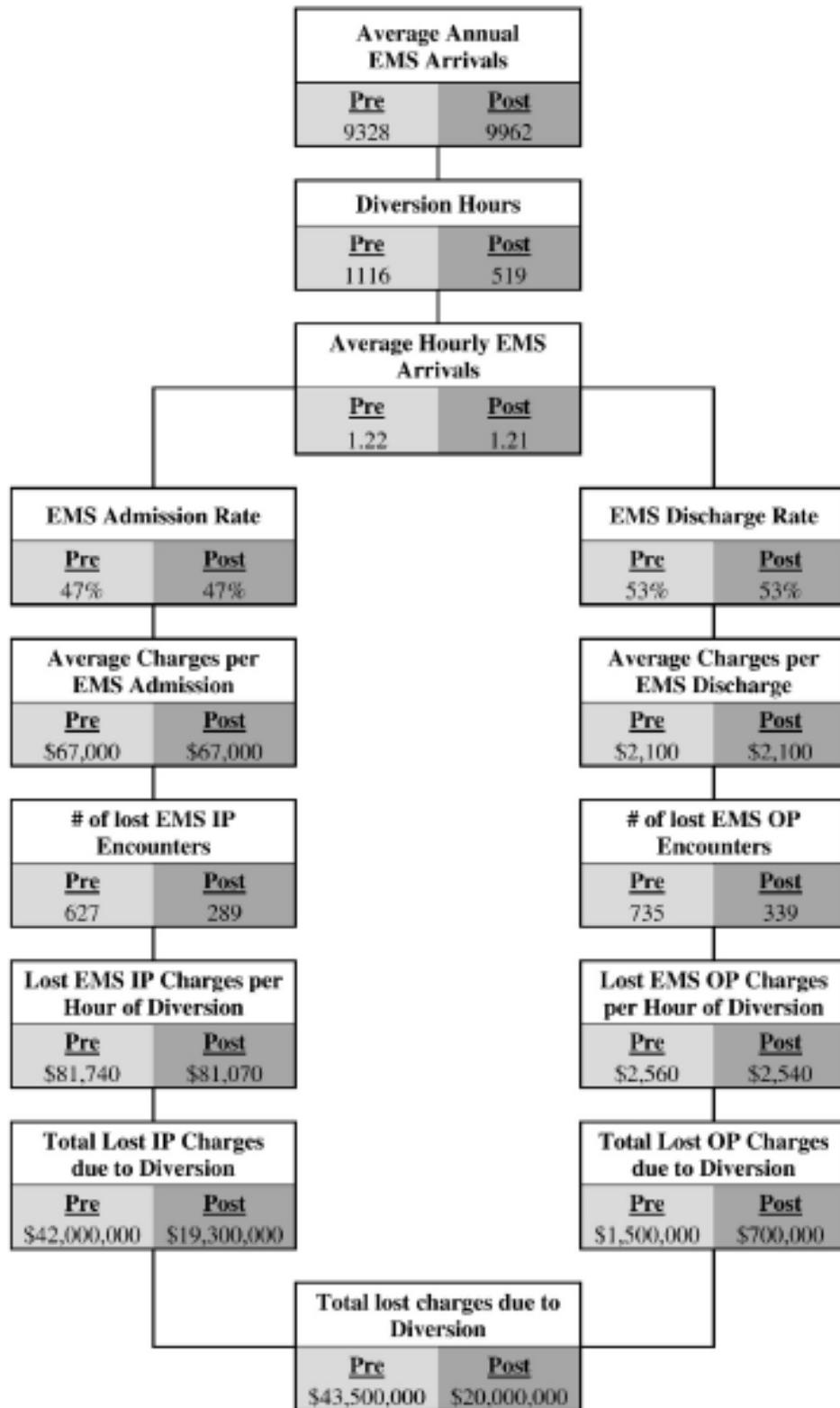


Figure 5. This figure depicts the results of the study completed on ED Coordinator (Murphy, Barth, Carlton, Gleason, & Cannon, 2014).