Southern California CSU DNP Consortium

California State University, Fullerton
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RAPID MEDICAL EVALUATION & TREATMENT IN THE EMERGENCY DEPARTMENT

A DOCTORAL PROJECT

Submitted in Partial Fulfillment of the Requirements

For the degree of

DOCTOR OF NURSING PRACTICE

By

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ABSTRACT

Background: Overcrowding in the Emergency Department (ED) has been a global concern over the past three decades and has posed a threat to public safety leading to poor quality of care. Overcrowding is caused by an increased number of patients presenting to the ED and patients waiting in the ED for admission or waiting transfer to another facility.

Purpose: The purpose of this Doctor of Nursing Practice project was to implement a Rapid Medical Evaluation and Treatment (RMET) process in the ED. The RMET process will be led by a medical provider who initiates the diagnostic workup, treatment and disposition for emergency patients requiring low-resource utilization (Emergency Severity Index or ESI IV & V).

Design/Methods: A pre-post design was used to evaluate this project. Pre-implementation data was collected over 18 months (January 2017 to August 2018) in a community hospital in California. Primary outcomes were door to provider time (DTPT), length of stay (LOS), left without being seen (LWBS), and patient satisfaction scores based on Press Ganey Satisfaction Survey. Due to delay in construction, the RMET implementation is still pending. Post-implementation data collection will be collected once the construction is completed.

Results: Pre-RMET implementation data showed average ED volume of 4200 patients per month with a spike in January to 4822 patients seen. During pre-

implementation, there was a median DTPT of 26.50 minutes. The spike in volume during January 2018, there was an increase in DTPT of 153 minutes. The median LOS for discharged patients was 139.4 minutes (2.3 hours) and for admitted patients, it was 338.5 minutes (5.6 hours). The median percentage of patients LWBS was 1.5% over 18 months. The median patient satisfaction based on Press Ganey Satisfaction Survey was 87%.

Conclusion: The evidence summarized in this project suggests that having low-resource intensive emergency patients cared for using a RMET process will mitigate ED overcrowding by decreasing DTPT, LOS, LWBS and maintain or increase patient satisfaction. Post-implementation will require ongoing evaluation of project metrics to show whether this is the case.

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INTRODUCTION

Overcrowding in the emergency department (ED) has become a global concern while the problem has been documented in the United States (US) as far back as three decades ago (Dharshi, 2006; Dickinson, 1989; Eitel, Rudkin, "IOM: The future of emergency care in the United States health system," 2006; Malvehy, Killeen, & Pines, 2010; Pines et al., 2011; Pines & Griffey, 2015). Overcrowding is a complex multifactorial problem where demand for emergency services exceeds the available resources causing a dysfunction in hospital operation (Gordon, Billings, Asplin, & Rhodes, 2001; Schneider, Gallery, Schafermeyer, & Zwemer, 2003). Another cause of ED overcrowding is the increased number of elderly patients and patients with complex chronic diseases requiring care (Aboagye-Sarfo et al., 2015; Bond et al., 2007). The Institute of Medicine (IOM) and the American College of Emergency Physicians (ACEP) have stated that overcrowding is a critical problem which is a threat to patient safety and leads to poor quality of care and increased inpatient mortality (Bernstein et al., 2009; Farley & Kwun, 2016; Guttmann, Schull, Vermeulen, & Stukel, 2011; Imperato et al., 2012; "IOM: The future of emergency care in the United States health system," 2006; Jo et al., 2015; McCusker, Vadeboncoeur, Lévesque, Ciampi, & Belzile, 2014; Pines et al., 2011; Singer, Thode, Viccellio, & Pines, 2011; B. C. Sun et al., 2013).

Emergency Department overcrowding is driven by three factors: input- an increased volume of patients waiting to be evaluated, throughput- patients who are being treated or waiting for disposition and output- patients who have been discharged from the ED but are waiting for admission or transfer to another facility (Asplin et al., 2003; Crilly et al., 2011; Guttmann et al., 2011; White et al., 2013). Throughput reflects the

efficiency of the organization but it is affected by the input and output components of ED flow. Improving ED throughput will improve quality of care and help decrease ED overcrowding. Throughput is defined as the time and experience of arrival to discharge from the ED (Asplin et al., 2003).

Significance of the Problem

The emergency department provides care to all individuals that presents to the ED seeking medical attention regardless of the ability to pay under the Emergency Medical Treatment and Active Labor Act (EMTALA). Approximately 130 million visits occur in US EDs each year (Rui, P., Kang, K., (2015). Unfortunately, the numbers of EDs in the US have decreased while the number of ED visits have increased (Wiler, Bolandifar, Griffey, Poirier, & Olsen, 2013). This contributes to ED overcrowding, which occurs when the need for emergency services cannot be met by existing resources in the ED, hospital, or both (ACEP, 2006). In 2015, the Centers for Medicare and Medicaid Services (CMS) mandated reimbursement for ED care based on outcomes (Baker, Shupe, & Smith, 2013). ED overcrowding raises significant concerns about patient safety (Hoot & Aronsky, 2008; Moskop, Sklar, Geiderman, Schears, & Bookman, 2009; Pines et al., 2011).

A recent systematic review showed that ED overcrowding was associated with delayed medical treatment, decreased patient satisfaction, and patients leaving without being evaluated by a provider (George & Evridiki, 2015; Tekwani, Karem, Mistry, Sayger, & Kulstad, 2013). A study showed a reduction in the percentage of patients left without being seen (LWBS) was indicative of quality of care, patient satisfaction, and likelihood of treatment adherence in the ED (Clarey & Cooke, 2012). O'Connor et al.

(2014) examined the relationship between ED overcrowding on placement post triage and found that with overcrowding, there was an increased door to provider time (DTPT), and that higher acuity patients requiring monitored beds were placed in non-monitored beds (O'Connor, Gatien, Weir, & Calder, 2014). The ED overcrowding is also associated with increased stress among nurses and doctors (Bond et al., 2007). A retrospective study found an association between ED overcrowding and physical violence among the staff, (Medley et al., 2012).

Patient flow is related directly to the quality of care, safety initiatives, and resultant patient satisfaction (Kane et al., 2015). The IOM's six measures of quality ED care are safety, effectiveness, patient-centeredness, efficiency, timeliness, and equality. Quality of care is compromised when patients do not get evaluated by a medical provider in a timely manner, patients are boarded (patients waiting in the ED for unit bed availability) and ambulances are diverted from the closest hospital (Carter, Pouch, & Larson, 2014; Sills, Fairclough, Ranade, & Kahn, 2011; Stang, Crotts, Johnson, Hartling, & Guttmann, 2015; B. C. Sun et al., 2013).

A recent study found that 60% of all ED interventions were focused on front end solutions to manage overcrowding in order to improve patient flow (Morley, Unwin, Peterson, Stankovich, & Kinsman, 2018). Front end solutions mainly focused on early physician assessment and treatment including provider led triage (Burström, Engström, Castrén, Wiklund, & Enlund, 2016; Han et al., 2010; Imperato et al., 2012; Jarvis, Davies, Mitchell, Taylor, & Baker, 2014; Lauks et al., 2016; Shetty, Gunja, Byth, & Vukasovic, 2012; Benjamin A. White et al., 2012).

Despite a decade of research on ED overcrowding, an effective systematic strategy has yet to be developed and implemented to resolve the problem (Pines & McCarthy 2011; Sun et al., 2013). One potential solution for managing throughput and decreasing ED overcrowding may be using the front-end solution generically called rapid medical evaluation programs, which means allocating a medical provider in the triage area to initiate early assessment, diagnosis, and treatment (Tsai, Sharieff, Kanegaye, Carlson, & Harley, 2012).

Operational Definitions and Concepts

The paper will include many terms and concepts which may require operationalization for consistency of understanding. The following are operational definitions for commonly used terms. The definitions are based on the project hospital.

- Triage: The process by which patients are assessed for the degree of their illness upon first arrival to the ED.
- Emergency Severity Index (ESI): Five-level scoring system that stratifies patients into five different groups based on their severity. ESI level I-V (I being emergent; See Appendix A).
- Provider/Clinician: Refers to a Medical Doctor (MD), Doctor of Osteopathic Medicine (DO), Nurse Practitioner (NP), Physician Assistant, or Resident Physician (MDs in training).
- Door to Provider Time (DTPT): Time from walk-in to initial provider evaluation.
- Length of Stay (LOS-D): Total time spent in the ED for patients that are evaluated and discharged home.

- Length of Stay (LOS-A): Total time spent in the ED for admitted patients.
- Left Without Being Seen (LWBS): Patients who leave before being evaluated by a medical provider (MD, NP, PA).
- Time on Diversion (TOD): Total time ambulances are diverted to other hospitals
- Rapid Medical Evaluation (RME): Quick assessment in triage by a provider other than an RN.
- Fast track: Refers to an area of Emergency Department where non-urgent patients get evaluated.
- Boarding time: Refers to time spent in the ED once admission to the hospital has been ordered.

Local Context

This project took place in a hospital ED located in Southern California. The 265-bed hospital provides health care services from pre-natal and neonatal to geriatric care. It is also an ST Elevation Myocardial Infarction (STEMI) receiving facility and serves as an American Heart Association first hour facility; it also has a rape treatment center and most recently, a primary stroke center. The ethnic makeup of the population presenting to the ED consists of 60% Caucasian, 11% African American, 6% Asian, and 20% other ethnicities. The majority of patients have medical insurance with only 7% being un-insured. The insured patient population consists of 36% commercial, 16% Medicare, 18% medical-assigned, 9% UCLA managed care, 8% out of pocket, and 2% worker's compensation. The ED has 1.6% patients who are deemed homeless.

The 24-bed ED provides diagnostic and therapeutic services for emergency, urgent, and non-emergent patients, both adults and children, and treats over 50,000 patients annually. The ED patients fall into the following age groups: 0.3% neonate, 2.6% infant, 14.7% pediatric, 60.9% adults, and 21.6% geriatrics (project facility, 2017). Approximately 21% of patients seen in the ED are admitted to in-patient beds with 2% transferred for admission to other facilities. One ED physician is on staff at all times; during peak hours from 10:00 to 01:00, two physicians are on duty.

In 2017, ED services were provided to an average of 4283 patients per month, which was approximately 141 patients per day. On average, the total number of patients admitted to the hospital per month was 690, approximately 21% of patients seen. As well, 28 patients per month, on average, were transferred to a psychiatric facility and 49 patients to other facilities. Psychiatric patients and those requiring out of facility transfer tend to utilize more ED time and resources.

Since the ED cannot be physically expanded, there is a need to allow for the efficient evaluation of such a high number of patients in the relatively small physical space. In efforts to help with overcrowding, eight hall gurneys are in place along with the 24 main ED beds; this use of space compromises patient privacy and quality of care. Patients and providers feel constrained compacted in the current space. On many occasions, psychiatric patients get placed in the hall due to lack of space; this takes away from the equanimity of ED and can create stress for patients who are already suffering. Patients brought in by ambulance wait for extended periods of time before getting placement. Recent data shows that 1.5% (January 2017 – August 2018) of patients leave without being evaluated by a provider.

At the project hospital, administration, department chairs and representative from other departments evaluate the ED flow on a monthly basis during performance improvement (PI) meetings. To understand the ED flow and overcrowding, interdisciplinary teams have introduced measures to reduce ED crowding. In recent years, the ED leadership team has taken several initiatives to improve throughput of patients: a fast track area was developed to treat minor injuries and illnesses; an acute admission holding unit was developed to help with outflow; an advanced triage protocol was written allowing staff nurses to order appropriate tests at triage; patients without primary care physicians were connected to providers.

During the 2017-18 flu season, ED executives and leadership team contemplated putting a tent in the side yard to relieve ED crowding but could not due to physical layout of the ED and difficulty staffing. They noted that in response to the increasing volumes of patients seeking care in ED, changes were needed to improve the overall ED metrics and utilize staff most efficiently. It was during one of these meetings the idea of performing input, throughput, and output assessment was originated to identify the gaps in the system that contribute to overcrowding.

Currently, the ED fast track area processes an average of 1598 patient monthly, 37.3% of patients seen each month. The fast track area was initially developed to speed up ED flow by allowing rapid evaluation of lower acuity patients (e.g., those with minor injuries). The goal was to evaluate and discharge patients within 90 minutes from admission (walk-in time). Unfortunately, in 2018, this area has overrun its capacity; fast-track patients are being evaluated in main ED beds and in hallways, which is a patient and staff dissatisfier. In order to free up beds in the main ED area, a new area called

Rapid Medical Evaluation and Treatment or RMET is under construction within the existing ED triage area. This area will house all fast-track patients without utilizing monitored beds. The estimated construction completion is currently spring 2019.

Care in the RMET area should allow quick efficient patient evaluation, treatment, and discharge and subsequently, decrease ED overcrowding. Use of a RMET process to guide care delivery should help improve flow or throughput within the ED. The RMET is a process used in many ED settings (Raven et al., 2016; Rogg et al., 2013; Rowe et al., 2011; Soremekun et al., 2014; Traub et al., 2016; Weston et al., 2017) to reduce patient wait time, total length of stay, and patients leaving before being seen by a provider, and hopefully, increase overall patient satisfaction. With such a program, patients presenting in the ED would be triaged by the RN and if non-urgent, sent to RMET team. Care in the RMET will include a quick medical evaluation and treatment by an ED medical provider such a MD, DO or NP, and a Registered Nurse (RN) followed by appropriate immediate treatment and discharge. Emergent and urgent patients will be sent to the main ED for further workup and evaluation.

Purpose Statement

The purpose of this Doctor of Nursing Practice project was to develop and implement a RMET process that will utilize the space that is currently under construction within the ED at the project hospital. The RMET process will alleviate a portion of ED overcrowding and render timely care. As part of the project, baseline data was collected from January 2017 to August 2018. An implementation and evaluation plan for the RMET process has been developed.

The process was developed in collaboration with ED medical staff, nursing directors, and the ED nurse educator. Task team was created to train the RMET staff by the author and ED nurse educator. Current plans are for the RMET area to be staffed with one Physician or an NP, an RN, Emergency Room Technician (EMT), and one registration person.

Triage nurses will initially send patients to RMET based upon their level of acuity. If patient conditions change during the wait for diagnostics, the RMET team leader will send those patients straight to the existing non-RMET ED areas to be evaluated by another physician. Patients with Emergency Severity Index (ESI) IV and V (ESI will be explained further later in the paper) will be assessed, evaluated, and treated in the RMET area. These patients present with non-urgent complaints and may require simple procedures (e.g., casting, follow up, medication refill, flu like symptoms, simple upper respiratory infections in healthy individuals, suturing, simple urinary tract infections, wound care intravenous fluids). They will be placed in comfortable reclining chairs in the RMET area. The estimated time patient should spend in RMET is less two hours.

Plans are in process to add a dashboard to the current electronic tracking system to quantify numbers of patients pending medical exam via RMET, numbers of patients boarding in the ED, and time spent on ambulance diversion. This dashboard will be a new tracking system that will be added to EPIC/Care-connect to keep track of RMET patients. EPIC is the electronic health record (EHR) program that is currently in use; it is fully integrated with registration, clinical information, patient scheduling and is accessible to all affiliated clinicians. Also planned for the near future and possibly

concurrent with creation of the dashboard are documentation of LWBS, door to provider (DTPT), and length of ED stay (LOS) for all patients and those who are being transferred to another facility on payor's request or for a higher level of care.

The goals of this project -- all of which reflect less crowding -- include:

1. Decrease door to provider time to 20 mins or less for ESI IV and V patients (average wait was over 4 hours for Dec 2017-Jan 2018).
2. Decrease total length of stay in discharged (LOS-D in minutes) and admitted (LOS-A in minutes) patients in the all ED patients
3. Decrease number of ED patients who LWBS
4. Maintain or improve levels of patient satisfaction as measured by Press Ganey Satisfaction Survey
5. Track numbers of patients discharged from the RMET area post evaluation and treatment.

Supporting Framework

A comprehensive framework can help providers and others to better understand ED overcrowding (Asplin et al., 2003). A conceptual model that assists in understanding ED workflow categorizes factors as input, throughput, and output (ITO) (Asplin et al., 2003). The ITO model provides a framework to study the three factors that impact overcrowding. Queuing theory and compartmental flow models form the basis of the ITO model (Green, Soares, Giglio, & Green, 2006). This model has been utilized in healthcare to comprehend the complexity of ED overcrowding and improve services such as hospital bed assignment, staffing ratios in the operating room, and other medical

operational systems (Murray & Berwick, 2003). Figure 1 shows the components of ED flow and contributing factors of ED overcrowding in an acute care system.

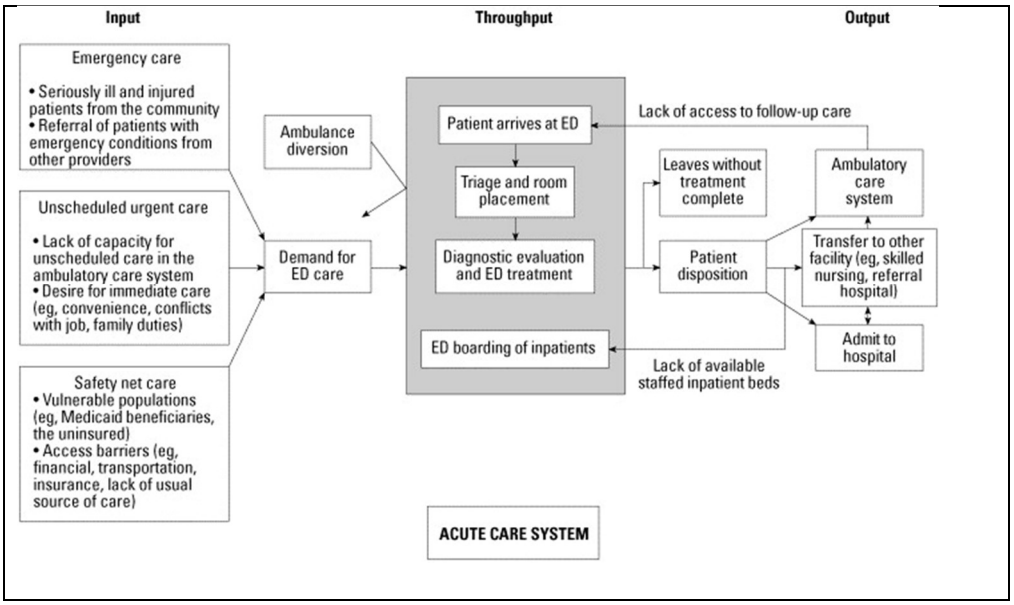

Figure 1. Conceptual framework of Input/Throughput/Output-ED workflow. Adapted from "Conceptual Model of Emergency Crowding" by Asplin et al., 2003, *Annals of Emergency Medicine*, 42, p. 176. Reprinted with permission, (see Appendix A).

Input/Throughput/Output

Input factors are conditions or events that increase the demand for ED services and include patient acuity, number, and type. According to the ITO model, input consists of emergency care, unscheduled urgent care for minor illnesses or injuries, and care for patients who do not have access to primary care. Reasons for increased patient presentations to the ED include serious medical problems, non-urgent visits, ED recidivism, frequent ED visits, seasonal influenza, and an ageing population with chronic medical conditions (Dugas et al., 2015; Durand et al., 2012).

Throughput refers to total time a patient spends in the ED (Asplin et al., 2003). The length of stay in the ED (initial presentation to discharge or admission to an inpatient

unit) is a measure of throughput and is associated with perceived quality of care (Bashkin, Caspi, Haligoa, Mizrahi, & Stalnikowicz, 2015). Throughput can be divided into two parts (Asplin et al., 2003). The first part is time to triage, which includes ED room placement and initial MD evaluation. The second part is diagnostics and ED treatment time before discharge (Asplin et al., 2003). Many factors contribute to ED LOS, such as patient acuity, increased diagnostic testing (radiology, laboratory studies) specialty consultations (Brick et al., 2014; Casalino et al., 2014; Kocher, Meurer, Desmond, & Nallamothu, 2012). These throughput activities become impacted when the ED becomes overcrowded, which impedes patient movement and causes delays. Factors that can affect throughput vary: inadequate staffing of ED nurses and medical staff, long wait times to triage and MD evaluations, long diagnostic testing times, and poor ED design (Moskop et al., 2009).

Factors associated with output play an important part in ED overcrowding (Fatovich, Nagree, & Sprivulis, 2005). Time spent to find an appropriate follow-up, disposition or admission site can prolong the ED LOS. A common output factor associated with ED overcrowding is delayed movement from the ED to an inpatient hospital bed (Crilly et al., 2011; White et al., 2013). Such delays cause the ED to board patients. Boarding has also been identified as a common reason for ambulance diversion. The Joint Commission and CMS have classified decreasing ED boarding time as a priority goal for patient safety and quality of care ("Hospital Outpatient Quality Reporting Program," 2018). The new performance guidelines require that reimbursement be based on timeliness performance metrics to the hospital value-based purchasing program in 2012 and charge penalty to those who did not report the measures: DTPT,

LOS, and LWBS; therefore, there is an urgency to achieve efficiency of patient flow ("Hospital Outpatient Quality Reporting Program," 2018).

Application of the Model to the Local Emergency Department

One of the biggest factors that affects throughput at the project facility is the ED layout. The hospital was built to serve a small community. To address ED overcrowding, the project hospital has begun construction of a RMET area in order to improve throughput and ED flow. At the project hospital, large numbers of patients have resulted in ED overcrowding and led to increasing ambulance diversions, long wait times (over 4 hours during surge time), patients leaving without being seen, long boarding times, and long transfer times to other facilities.

Greater emphasis is being placed on decreasing boarding of admitted patients in the project facility. Median boarding time for admitted patients was 7 hours in February 2017. This boarding appears to be one of the primary causes of the project hospital's ED overcrowding. Patients admitted to the hospital are often left in the ED hallways waiting for beds. Currently, there is no record of how long it takes to transfer patients to inpatient units once admission orders have been written. The lack of inpatient bed availability and the extended time it takes to transfer patients are due to complex issues that require an investigation at the operational level beyond the ED. Boarding of patients is associated with increased patient dissatisfaction, increasing LWBS, and potential safety concerns.

Another factor related to the project hospital's ED is the diversity of patients presenting in the ED (an input issue). As mentioned earlier, significant numbers of elderly patients access the project ED (20%). Elderly patients with acute illness in the ED are a vulnerable population; caring for them is time-consuming and challenging in a fast-

paced ED (Biber et al., 2012). Also, there are a large number of homeless people who present to the ED. These patients may not be adherent to medical treatments prescribed on earlier medical encounters; they may have chronic medical conditions and repeatedly return to the ED for the same problems and diagnoses (e.g., recidivism). About 1.7% of ED patients are thought to be homeless but with the planned dashboard, a head count will be available and the goal will be to connect them to primary care providers. In order to measure and improve ED outcomes, there are mandates from private payers and CMS, which point to a need for standardized ED metrics that include DTPT, ED LOS, and patients leaving without being seen LWBS (Hwang, Lipman, & Kane, 2015). The ITO conceptual framework provides a systematic approach to identify, evaluate and alleviate factors associated with ED crowding.

REVIEW OF LITERATURE

In order to develop a RMET and implement a process change in the ED, a literature review was completed using the following online databases: PubMed, CINAHL, and other governmental, national, and international databases and websites such as National Center for Health Statistics (NCHS), CMS, Agency for HealthCare Research and Quality (AHRQ) and Center for Disease Control and Prevention (CDC). Articles published from 2013 on and written in English were selected. Landmark studies outside this time frame were also included if they contributed to the project objectives. The search consisted of key words such as: "physician triage," "emergency department crowding," "emergency department flow," "emergency department throughput," and "emergency department triage." Tables 1 and 2 shows the keyword searches and corresponding results based on database. The reference lists of identified papers were searched for seminal evidence sources.

Thus, evidence came from the English language publications between 2013 and 2018 with the exception of a few historic studies. Excluded were descriptive studies and those where only the abstract was available. Included were original research studies and systematic reviews. Table 1 summarizes the details about studies retrieved through database search.

Table 1

Database Search Summary

PubMed Database Search					
Terms	Limiters	Articles Retrieved	Articles Excluded	Articles Reviewed	Articles Used
Emergency department crowding	Review, English language, Published 2013-2018	33	17	6	1
Emergency Department Patient Flow	Reviewed, English language, Published 2013-2018	1	0	1	1
Physician in triage	Reviewed, English language, Published 2013-2018	8	1	6	5
Provider in triage		4	1	3	3
CINAHL Search					
Terms	Limiters	Articles Retrieved	Articles Excluded	Articles Reviewed	Articles Used
Emergency department and Rapid medical evaluation	Peer Reviewed, English language, Published 2013-2018	1	0	1	1
Emergency department Overcrowding AND triage	Peer Reviewed, English language, Published2013-2018	30	26	27	1

Note. A total of 77 articles were identified from the electronic database searches.

Emergency Department Overcrowding and Proposed Solutions

Emergency Department overcrowding occurs due to factors associated with input (patient volume), throughput (patients waiting in the ED pending disposition), and output (ED boarding and inpatient capacity limitations). Throughput is the main factor that is directly controlled by the ED. It relates to patient care from ED arrival to disposition. Numerous interventions and programs have been implemented to improve the patient flow through the ED. Therefore, the majority of interventions have focused on optimizing the process of throughput.

The imbalance of ED flow may be caused by a high volume of patients in the waiting area, on-going triage, and patient workup (e.g., for imaging, laboratory tests, and consults) causing an imbalance in the ED work flow (Yoon, Steiner, & Reinhardt, 2003). To alleviate ED overcrowding, several solutions have been proposed such as increasing staff resources, demand management, and hospital operations changes (Hoot & Aronsky, 2008), lean thinking (Holden, 2011), cardiac observation units (Martinez, Reilly, Evans, & Roberts, 2001), RMET (Begaz, Elashoff, Grogan, Talan, & Taira, 2017; Bullard et al., 2012; Burström, Engström, Castrén, Wiklund, & Enlund, 2016; Chartier, Josephson, Bates, & Kuipers, 2015; French, Lindo, Williams Jean, & Williams-Johnson, 2014; Lauks et al., 2016; Liu, Hamedani, Brown, Asplin, & Camargo Jr, 2013; Milsten, Klein, Liu, Vibhakar, & Linder, 2014; Ming, Lai, & Lau, 2016; Raven, Kushel, Ko, Penko, & Bindman, 2016; Rogg, White, Biddinger, Chang, & Brown, 2013; Rowe et al., 2011; Traub et al., 2016; Weston et al., 2017), and clinical decision units (Roberts, Baird, Kerr, & O'Reilly, 2010). Among the interventions that will be discussed here are RMET process, which primarily involve having a provider and/or a team to conduct the initial triage screening. This evidence was used to develop the RMET process based on the ITO model for future implementation.

Rapid Medical Evaluation and Treatment

Rapid Medical Evaluation and Treatment and related process change aim to have assessment, evaluation, and treatment by a provider as soon as patients arrive in the ED. Triage is a strategy used to risk-stratify patients based on their presentation and delegate patients to the appropriate area in the ED. Triage is generally performed upon patients entering the ED. In most settings, an RN conducts a short investigation of the patient's

chief complaint and obtains vital signs (Rowe et al., 2011). Triage performed by an RN is a standard practice internationally (Parenti, Reggiani, Iannone, Percudani, & Dowding, 2014). RMET is an intervention that adds a medical examination along with the nursing triage assessment; its aim is to reduce LOS, decrease patients LWBS, decrease DTPT, and increase patient satisfaction.

The evidence regarding RMET process involving providers in triage along with an RN mainly involves before-and-after studies with few RCTs (Begaz et al., 2017; Bullard et al., 2012; Burström et al., 2016; Chartier et al., 2015; French et al., 2014; Lauks et al., 2016; Liu et al., 2013; Milsten et al., 2014; Ming et al., 2016; Raven et al., 2016; Rogg et al., 2013; Rowe et al., 2011; Soremekun et al., 2014; Traub et al., 2016; Weston et al., 2017). RMET effectiveness is demonstrated by shorter ED LOS (Begaz et al., 2017; Burström et al., 2016; Chartier et al., 2015a; Lauks et al., 2016; Rogg et al., 2013; Rowe et al., 2011; Soremekun et al., 2014; Traub et al., 2015, 2016), decreased numbers of patients LWBS (Begaz et al., 2017; Burström et al., 2016; Milsten et al., 2014; Rogg et al., 2013; Soremekun et al., 2014; Weston et al., 2017), decreased DTPT (Burström et al., 2016; Chartier et al., 2015; Lauks et al., 2016; Milsten et al., 2014; Rogg et al., 2013; Rowe et al., 2011; Weston et al., 2017), and improved overall patient satisfaction (Weston et al., 2017).

Several researchers (French et al., 2014; Rogg et al., 2013; Soremekun et al., 2014; Traub et al., 2015) found evidence that showed the complexity of the association between RMET programs and its effectiveness on throughput outcomes. French et al. (2014) found no difference in wait time whether the patient was triaged by a single nurse or a physician without any treatment or discharged. They also found no patient

satisfaction differences (French et al., 2014).

Traub et al. (2015) and Soremekun et al. (2014) examined the relationship between RMET and ED metrics. Traub et al. (2015), found that implementing RMET teams decreased LOS for patients treated and discharged in triage but increased LOS for admitted patients; they found no significant effect on LWBS. The reason for the LOS being higher for admitted patients was poorly understood (Traub et al., 2015). Soremekun et al. (2014) reported that implementation of a mid-track area, which is essentially a RMET was staffed with one physician and two RNs, led to decreased LWBS and LOS for low to medium acuity patients. This study was conducted at a facility that had a separate area designated for trauma and psychiatric emergency evaluations. This separation of patient types may have influenced the results. There was also a 3.4% increase in nursing staff in order to meet staffing requirements in the mid-track area; additional medical staff was also appointed to the mid-track area. Increasing staff and designated separate areas may have influenced the study findings. All patients were triaged by a triage nurse, there was no standardized criteria for sending patients to the mid track area but rather sending the patients to the mid-track area was at the discretion of physician on duty (Soremekun et al., 2014).

Liu, Hamedani, Brown, Asplin, and Camargo (2013) surveyed academic medical center EDs on use of "vertical patient flow" as a means of improving front-end ED operation and efficiency of throughput. Vertical flow can be used with low acuity stable patients where they are evaluated, treated sitting upright in chairs, and discharged home without utilizing a main ED bed (Liu et al., 2013). In 2010, the researchers sent a short 2-min online survey to all US academic EDs (ED with residency program on site).

Respondents indicated that vertical patient flow was applied in 29% of facilities; 41% reported partial vertical flow utilization. ED initiatives of vertical flow were implemented in most academic hospitals. Most users found it beneficial without requiring much capital investment; however, there was variability in the degree of implementation (Liu et al., 2013).

In a large prospective, randomized controlled trial, Begaz et al. (2017) found that RME with initiating diagnostic testing decreased total wait time in the ED, time in the actual ED bed, and patients LWBS v. RME alone (Begaz et al., 2017). Previous studies have shown that increased number of diagnostic tests specifically laboratory test and increased turn-around testing time increases ED LOS, therefore increasing resources and after hour staffing may help reducing LOS in the ED (Kocher et al., 2012; Li et al., 2015).

All but one study examined the RMET concept with attending physicians or NPs. Weston et al. (2017) conducted a unique study that assigned resident physicians as Triage Liaison Providers (TLPs). Performance outcomes were compared between resident and attending physicians; both residents and attending physicians improved DTPT, patient satisfaction, and LWBS. Thus, utilizing resident physicians as TLPs was cost effective (Weston et al., 2017). Interestingly, DTP times for residents were significantly lower than those for attending physicians. The TLPs led to better return of investment (ROI: 317%) than did attending TLPs (ROI: 86%) (Weston et al., 2017).

In a systematic review, Rowe et al. (2011) evaluated 28 before and after RMET studies and in a meta-analysis, showed a 37-min decrease in average LOS when compared to triage with an RN alone. The authors found decreased DTPT and LOS; in

one RCT, there was no change in LWBS (Rowe et al., 2011). They found no negative effect of provider type. Rowe et al. also evaluated use of providers in triage on intermittent basis, whereas, a provider was not always assigned to the triage but were pulled from the main ED to initiate early assessment; the same decrease in ED metrics was found. In addition, these authors drew conclusions based on some abstract only studies (Rowe et al., 2011). In a more recent systematic review, Ming, Lai and Lau (2016) evaluated evidence from only randomized controlled trials (RCTs); they found that placing a provider vs. RN alone did not lead to differences in LOS or DTP time for all ED patients.

Another systematic review of programs (2003-2014) to determine the effectiveness of ED throughput reduction programs on associated adverse events (Raven et al., 2016) found decreased use of ED for high risk and low-acuity populations secondary to case management efforts. The authors did not show any evidence for increased hospitalization or mortality. While concluding that programs were not definitively effective, there were variations in how the programs were staffed and outcome measured (Raven et al., 2016). However, researchers have studied and identified positive outcomes related to patient safety and ED overcrowding (Carter, Pouch, & Larson, 2014; Cha, Song, Cho, Singer, & Shin, 2015; Kane et al., 2015; Sayah, Rogers, Devarajan, Kingsley-Rocker, & Lobon, 2014). Carter et al. (2014) reported that ED overcrowding is associated with an increased mortality rate for both admitted and discharged patients. Another single site study showed that patient mortality rates decreased from 4.5 to 2.5 when patients spent less than two hours in the ED (Singer et al., 2011).

In the study with the longest duration, Rogg et al. (2013) conducted a retrospective observational study that evaluated physician triage screening by comparing before and after implementation measures over 4 years. The study was conducted at an academic medical center that serves 90,000 patients per year (Rogg et al., 2013). The authors found that using the triage screening model improved ED performance metrics that included DTPT, LOS, and LWBS. This study provides evidence of both effectiveness and sustainability of RMET.

Summary

This literature review provides convincing evidence that having a medical provider along with a staff nurse in triage can make a positive impact on ED patient flow. Findings from most studies support that having a provider in triage decreases DTPT, LOS, and numbers of LWBS patients. Details of studies are presented in table of evidence (see Appendix B). The results of these studies suggest that RMET intervention affects throughput processes in a positive way by allowing early diagnosis and treatment. These types of process change also prevent patients LWBS by a provider. Decreasing numbers of patients LWBS may represent direct effect of immediate assessment, diagnosis, and more rapid treatment of patients.

The studies reviewed had diverse methodologies although most were non-experimental pre-post evaluations. In the evidence reviewed, there were no consistent guidelines or protocols used for the RMET. Several medical provider types were used in RMET: triage liaison physicians (TLP), MDs, NPs, and resident physicians.

Patient satisfaction was not consistent across the studies. There was little evidence as to the cost effectiveness of this intervention and only one study showed

improved overall patient satisfaction (Weston et al., 2017). There have been no studies to date that demonstrated placing a provider in the triage decreased morbidity and mortality but ED overcrowding and long wait times are associated with poor patient outcomes including high risk mortality (Guttmann et al., 2011; B. C. Sun et al., 2013). Conversely, Kocher, Meurer, Desmond, and Nallamothu (2012) found that increased number of diagnostics leads to increased LOS, which is opposite of what the RMET process is trying to accomplish. Data from another study showed that ordering tests from the triage area does not improve patient outcomes and instead may be harmful due to failure to fully examine each patient thoroughly (Hoffman & Cooper, 2012).

It is evident that ED overcrowding is a system-wide problem with no quick fix solution. The throughput component may not be the only factor accounting for this problem; nonetheless the reviewed evidence suggests a positive influence of RMET on the quality of care provided as measured by ED metrics. Having a provider in triage may represent a valuable solution for hospital d ED administration battling ED overcrowding.

METHODS

The purpose of this Doctor of Nursing Practice project was to work with an onsite team in creating and implementing a RMET process to decrease ED throughput time. This entails having a licensed medical provider assigned to the RMET area. The provider will conduct a quick assessment and initiate a diagnostic work up while the patient is waiting to be admitted into the ED. This change should increase efficiency and decrease overcrowding at the project hospital by decreasing the DTPT and decreasing the wait time for diagnostic results. The project includes a pre and post evaluation of outcomes that result from the RMET process. This chapter describes the project setting, RMET process development, RMET process components, ethical considerations, and the evaluation plan.

Ethical Considerations

The project was reviewed and approved by the Institutional Review Boards for both the hospital and the university, all the supporting documents are attached (see Appendix C – E for communications).

Setting

The project took place at a 265-bed hospital in Southern California. The project hospital contains a level 2 trauma center, which has over 50,000 ED visits every year. The ED provides care to prenatal through geriatric patients and provides treatment for a wide range of illnesses and injuries. Its sister hospital is a Level I trauma center which is five miles away from the project hospital. The sister hospital is a base station for ambulances that route designated patients to the project hospital.

The ED has 24-beds, along with 8 patient chairs in the hallway. Pre-project, all patients were treated in the same area with no separation for pediatric and psychiatric patients. The hospital utilizes advanced technology for diagnostic services and an EHR to maintain health information. There is an onsite radiography machine, computed tomography machine, Magnetic Resonance Imaging Scanner, and digital x-ray equipment. These devices minimize patient transport to other units for testing.

The ED is staffed with two board certified emergency medicine physicians who overlap shifts. The nursing and ancillary staff works shifts of 12 hours for three days a week; shift schedules allow for 24-hour coverage. There is a designated pharmacist present in the ED at all times. The ED does not have an emergency medicine residency program onsite; however, residents from other departments rotate through the ED. The fast track area is staffed by RNs and the department has no observation unit. The admission rate from the ED to the hospital is approximately 21% and approximately 6% of patients arrive by ambulance. Patients that are stable or require higher level of care are transferred to another facility which is about 2.7% of the volume annually. The RMET area under construction is located across from the triage area.

RMET Process Development

Since May 2017, a multidisciplinary team consisting of physicians, department educator, analyst, ED nursing director, medical director and administrative/support staff has been meeting once a month to discuss ED flow and the RMET process. The project author has been part of this team. During May 2018, the project author led an introduction to the RMET process for managers of associated departments along with a consultant from the performance excellence office. She presented evidence which

supported implementation of the RMET process. The multidisciplinary meetings will continue for the duration of the RMET implementation. In April 2018, the multidisciplinary team agreed to send members to observe other local facilities that utilize the RMET protocol; during summer 2018, the project author and a member of the performance excellence team visited three different facilities to gather information about the RMET process.

The author and the ED leadership in conjunction with department of performance excellence (PE) worked together to assess and evaluate the front-end work flow processes to identify possible solutions to some of the major throughput challenges. This led to the development of a RMET process that complies with hospital rules and regulations. The RMET process was designed by the project author in collaboration with PE consultant, and ED nursing and medical directors.

In September 2018, the RMET task force was created and consisted of the project author, two administrative RNs, and two charge nurses. Task force members have been participating in workgroups addressing the current state of the workflow dedicating approximately 4 hours per week to the project. A specific task force task is training the ED staff and doing the inventory for all the supplies necessary for the RMET process. Input and involvement of task force staff nurses were critical in this task as they are the experts with the best understanding of department processes. RMET process training was introduced to all staff in December 2018 and the project author gave a presentation on the new RMET and new planned ED flow.

Once the RMET area is constructed and city approval is obtained, the RMET process will be implemented early in 2019. It was anticipated that the RMET area would

be completed by August 2018, with a city inspection and engineering assessment to be done October 2018. However, on-going construction delays have prolonged the process.

The RMET Patient Process

The proposed RMET process begins with patient check-in. Patients initially sign in at the registration desk indicating the reason for their visit. After signing in, patients wait in the triage area until they are called based on time and the reason for their visit. All patients presenting to the ED will be triaged by an RN. During triage, RNs obtain patient chief complaint, complete vital signs, and perform a quick assessment; then, they assign each patient an ESI Level based on patient acuity. Table 2 provides an explanation of ESI levels with examples of presenting chief complaints. The ESI levels are based upon level of illness and projected number and type of possible resources used based upon chief complaint and presenting symptoms. ESI level I and ESI level two are based on severity of illness and ESI levels III, IV & V are based on projected use of ED resources. Patients will be selected based on projected use of resources limited to ESI level IV and ESI level IV that will be sent to the RMET area. ESI levels for this study would be restricted to ESI Level IV and V will be sent to the RMET area. These patients are generally considered non-urgent and require minimal resources. Patients with ESI levels I to III will be sent to the main ED area as they are considered to be acute and require immediate medical assessment and treatment utilizing multiple resources and several staff members. Figure 2 describes the RMET flow from sign in to disposition.

Patients sent to the RMET area will be evaluated by a licensed medical provider; no standing orders will be initiated. Once arriving in the RMET area, which is a closed-door private area, patients will be placed in a reclining gurney. After examination,

providers will order diagnostic tests; then, based on the provider evaluation, immediate treatment will be initiated. Patients presenting with any possible contagious diseases will be sent to the isolation room in the main ED and those with cough, sneezing or other respiratory complaints will be provided with a mask while waiting for their medical evaluation. Patients requiring oral and intravenous medications and minor procedures such as wound check, foreign body removal, suturing, splinting, casting and simple incision and drainage will be taken care of in the RMET area.

Table 2

Emergency Severity Index Description

Level	Name	Description	Examples
I	Resuscitation	Immediate intervention required to save life, multiple team responders	Cardiac Pulmonary Arrest, Trauma, Bleeding
II	Emergent	Critical, time is essence, hemodynamic instability	Chest pain, STEMI, CVA, Asthma, ALOC, SBP >180mmgh
III	Urgent	Stable patient requiring multiple resources Hemodynamic stability established Such as labs, imaging etc.	Abdominal Pain, Fever of unknown origin, peds 1-28 days fever (100.4◦F) and for 1-3 months, no source or incomplete immunizations
IV	Less Urgent	Stable patient requiring one resource (ex, radiology or sutures or labs	UTI, Simple Laceration
V	Nonurgent	Stable patients requiring no anticipated resources, except oral or topical medications	Follow up, Wound Check, Rash, Prescription Refill

Notes. ALOC= Altered level of consciousness; CVA = Cerebral Vascular Accident;
Peds = Pediatrics; STEMI = ST segment elevated myocardial infarction; UTI = Urinary tract infection

The RMET area will be equipped with the following: sphygmomanometer for blood pressure monitoring, pulse oximetry unit, thermometer, electrocardiogram machine, scale, two computers, printer, 8 to 10 recliner gurneys, supplies for wound care, suturing materials, and infusion pumps. When needed, medications will be obtained from the main ED medication dispensing system cabinet. This locked cabinet requires

secure clinician access. Once patients are seen in the RMET area, they will be either discharged home or returned to the waiting area for diagnostic results. They may also be sent to the main ED for further evaluation and work up if requiring more than one resource.

Table 3 provides a detailed description of resources available to ED patients. Resources are services that are beyond a nursing/medical history, physical examination and simple non-invasive procedures. Examinations performed by the nurse or the doctor, oral administration of medications, immunizations, wound checks, and courtesy calls to primary care providers are not considered resources.

Table 3

Description of Resources in the Emergency Department

Emergency Department Resources	What is Not Consider a Resource
Laboratory blood workup, EKG Radiographs, CT, MRI, Ultrasound	Standard history and physical examination by a physician
IV Medications Intramuscular Injections	PO medications RX refill Immunizations
Intravenous fluids	Saline lock
Specialty Consultation	Courtesy call to Primary Care Provider
Conscious sedation, laceration repair, Foley catheter, and NG tube,	Wound check, simple wound dressing, medical supplies such as crutches, splints, slings

Notes. CT = Computerized Tomography; EKG = Electrocardiogram; IV = Intravenous; MRI = Magnetic Resonance Imaging; NG = Nasogastric PO = by mouth; RX = Prescription

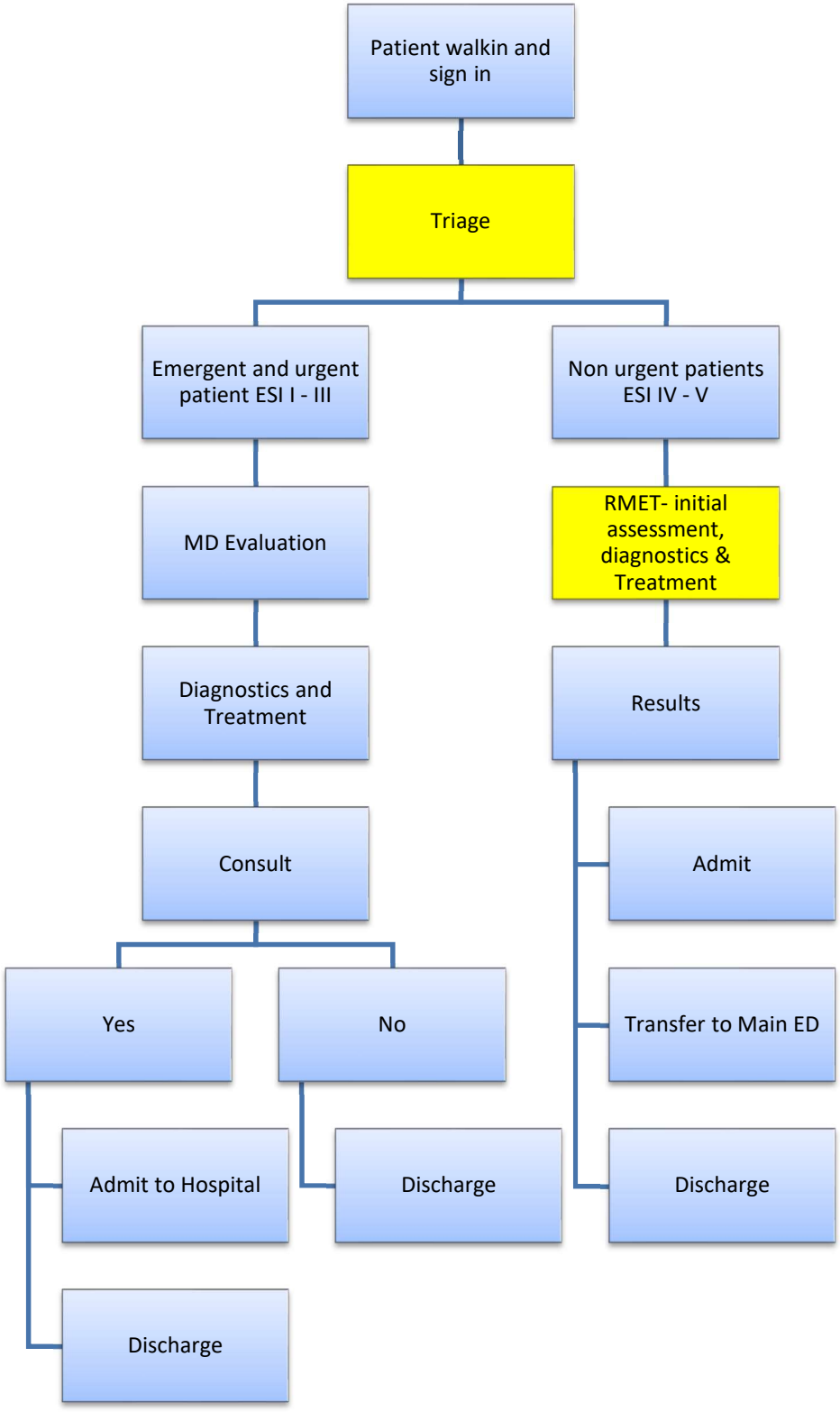

Figure 2. RMET flow chart describing the patient flow from time of emergency department arrival to disposition.

The RMET Staff

To accommodate the new RMET process change, RMET staff will include two additional physicians, two RNs, two EMTs, and two secretaries. There will also be a physician who will back up the RMET area if needed. Figure 3 displays current staffing based on time and shift length. All current physicians and non-per diem nurses will be eligible to be scheduled into the RMET area after training. To accommodate the new RMET process change, six full time RNs and two EMT's have been hired. Only candidates with a baccalaureate degree, two years of ED experience, and holding advanced life, basic life, and pediatric life support certification were hired. Nursing ratios in California mandate a 1 to 4 ratio for non-critical patients. This ratio will be used in the RMET area. Initially, the medical chief was reluctant to hire more than one new physician, but is willing to have two resident physicians that will rotate through the department with a designated attending physician. There is a discussion to hire two NPs for the RMET area for initial evaluation.

Data Collection

The ED performance improvement coordinator used de-identified data to generate baseline reports. Data were collected from the EHR and included patients who presented to the ED. Data were gathered from January 2017 to August 2018. There were 85,713 patient records collected. The variables examined from EHR data were DTPT, LOS-D, LOS-A, and LWBS. Monthly mean ED patient satisfaction scores were collected from Press Ganey Satisfaction Survey. The Press Ganey Satisfaction Survey questionnaire is sent out with a return envelope to patients within 48 hours of discharge from the hospital or emergency department.

Tentative Daily Clinical Staffing Post RMET: Monday – Sunday

Physicians

TIME	PHYSICIANS	SHIFT LENGTH
0700	2	8
1000	3	8
1900	2	12

Nurses

TIME	NURSES	SHIFT LENGTH
0700	10	12
1000	3	12
1200	3	12
1500	2	12
1900	10	12

EMTs

TIME	ETT	SHIFT LENGTH
0700	3	12
1000	1	12
1100	1	12
1300	1	12
1900	3	12

Clerical

TIME	CLERKS	SHIFT LENGTH
0700	1	12
1200	1	12
1900	1	12

Figure 3. Sample of daily schedule based on 24 hours.

Evaluation Plan

Design and Timeline

Baseline data on key variables was gathered from January 2017 to August 2018. This timeframe was selected in order to observe ED seasonal trends. A pre-post design is planned to evaluate this project. The ED throughput variables will be measured for all ED patients before and after RMET intervention implementation. These variables are (a)

DTPT, (b) LOS-D, and LOS-A, and (c) LWBS. Also, once the RMET process begins, numbers of patients discharged post RMET evaluation and treatment will be counted. The post implementation evaluation will begin as soon as the RMET process implementation is in place. Data collected before implementation will be compared to data collected after implementation.

Measures

The ED analyst assisted in obtaining baseline data from the ED for DTPT, LOS, LWBS, numbers of patients seen and discharged from the ED. The patient satisfaction scores are calculated based on Press Ganey Satisfaction Survey. The overall patient satisfaction rating for the ED will be calculated for the purposes of this project. The same variables measured pre-implementation will also be measured post implementation.

Data Analysis

The baseline data has been collected for 18 months. The timeline for post implementation may change based upon the construction timeline and RMET implementation. Baseline data analysis included quality improvement metrics that were analyzed utilizing Intellectus Statistical Software. To understand and monitor variation in performance, control charts were used. A control chart is an effective way to present data over a period of time which can help differentiate causes of variation (Amin, 2001). Since data is continuous, I-charts were created to assess change overtime for baseline months (Tennant, Mohammed, Coleman, & Martin, 2007). The control charts have a central line representing the mean and upper and lower control limits which represent three standard deviations from the mean (Tennant et al., 2007). There are two sources of variation, the control charts distinguish between: intrinsic to the process and extrinsic to

the process (Mohammed, Cheng, Rouse, & Marshall, 2001). The variables measured will assess the effectiveness of changes over time pre and post implementation of RMET process.

RESULTS

The goals of this project are to decrease total length of stay in all ED patients, decrease number of ED patients who LWBS, decrease door to provider time to 20 mins or less for ESI IV and V patients, and track the number of patients that are discharged from the RMET post evaluation and treatment. In implementing the RMET process, an aim is also to maintain or improve patient satisfaction. This chapter presents reports on baseline measures pre-RMET implementation for DTPT, LOS-D, LOS- A, and LWBS. Also presented are baseline patient satisfaction scores based on Press Ganey surveys. During RMET implementation, another set of data will be collected (projected January 2019). These data will be compared to baseline data from these months 2017, 2018 to determine the effect of the RMET processes. Post-RMET implementation, continual monitoring of these metrics will occur along with monitoring of numbers of patients discharged from RMET.

Figure 4 represents the total number of patients evaluated in the ED each month from January 2017 to August 2018 and shows seasonal influences. The total ED census was 85,713 during the pre-implementation period. The center line (CL) is 4285.65, which indicates the average number of monthly patients seen during this time frame. There were no data points above or below the control limits indicating stable volume despite the increase noted in January 2018, which may have put a strain on ED resources.

Figures 5, 6, 7, 8 and 9 indicate baseline data for ED metrics over 18 months from January 2017 to August 2018. Figure 5 displays median monthly DTP time in minutes from January 2017 to August 2018. The lower control limit (LCL) is 16.01 minutes and the upper control limit (UCL) is 36.99 minutes. The center line (CL) is 26.50 minutes,

showing the average over the whole time period. One data point is above the UCL during January 2018. This may reflect special variation reflecting the increased patient volume (see Figure 5).

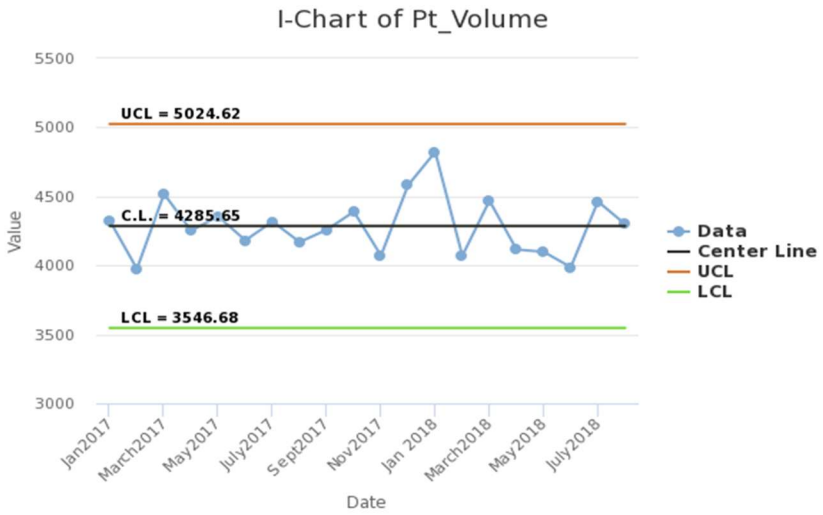

Figure 4. Number of patients seen monthly (total ED volume by month).

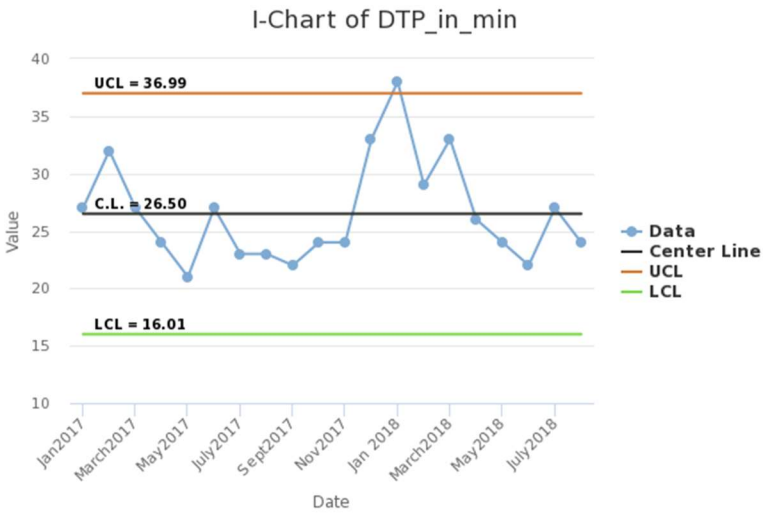

Figure 5. Median door to provider time in minutes.

Figure 6 displays monthly median LOS-D time in minutes for patients that were discharged home from January 2017 to August 2018. The lower control limit (LCL) is 125.32 minutes with the upper control limit (UCL) being 153.58 minutes. The center line

(CL) is 139.45 minutes, which indicates the average LOS for patients that were discharged home post ED evaluation during this time frame. There were no data points above or below the control limits indicating stable processes.

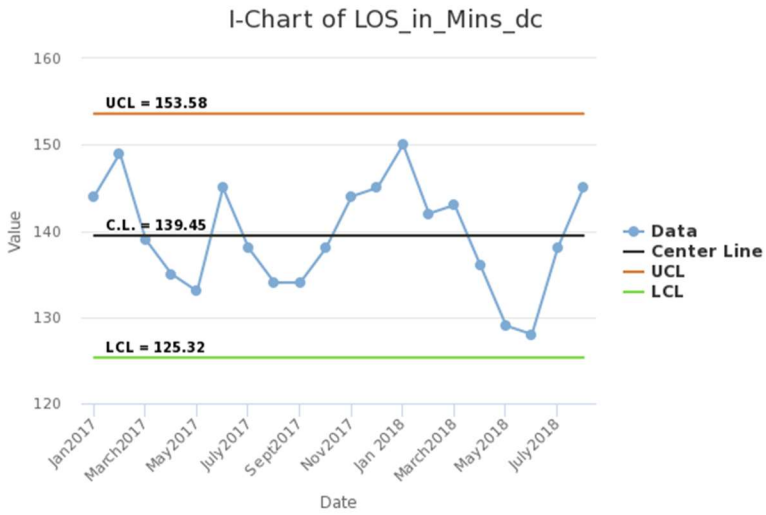

Figure 6. Median length of stay (LOS-D) in minutes for discharged patients.

Figure 7 displays monthly median LOS-A time in minutes for patients that were admitted to the hospital from January 2017 to August 2018 for all ED patients. The lower control limit (LCL) is 244.28 minutes and the upper control limit (UCL) is 432.62 minutes. The center line (CL) is 338.45 minutes, which indicates the average DTP time during this time frame. There was one data point below the control limit indicating a special variance in February 2018, which is currently unexplained.

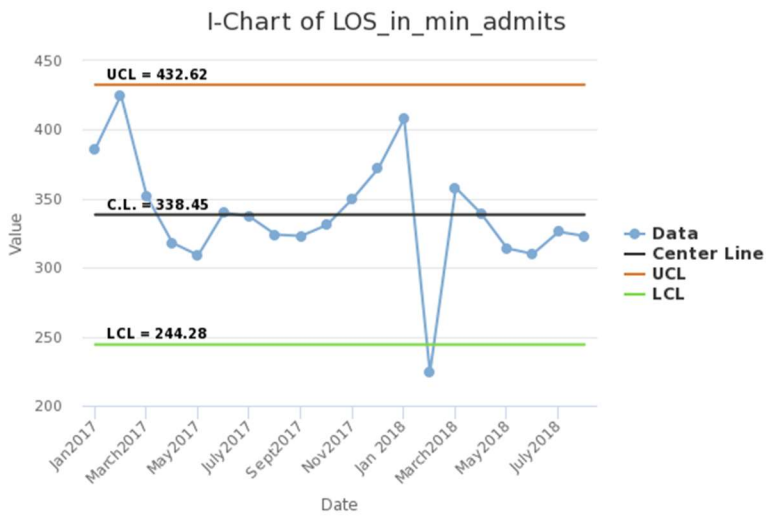

Figure 7. Median length of stay (LOA-A) in minutes for admitted patients.

Figure 8 displays overall patient satisfaction scores each month from January 2017 to August 2018. The lower control limit (LCL) is 81% and the upper control limit (UCL) is 94%. The center line (CL) is 87%, which indicates the overall average of patient satisfaction during this time frame. There were no data points above or below the control limits indicating stable patient satisfaction.

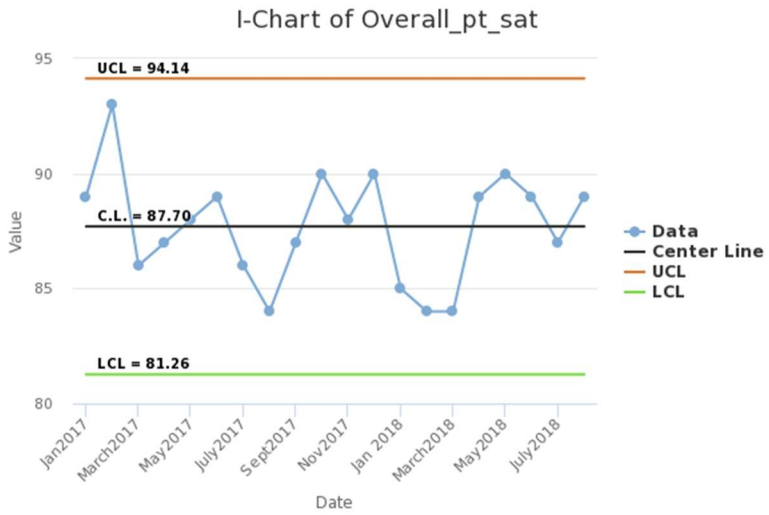

Figure 8. Overall patient satisfaction in percentages.

Figure 9 displays percentages of patients that left without being seen (LWBS) after being triaged during each month from January 2017 to August 2018. The lower control limit (LCL) is 0.22% in May 2017 and an upper control limit (UCL) of 2.93% in June 2018. The center line (CL) is 1.57%, which indicates the average number of patient's LWBS during this time frame. The data shows one data point above the UCL. This may reflect a special cause of variation and could be due to increased ED volume.

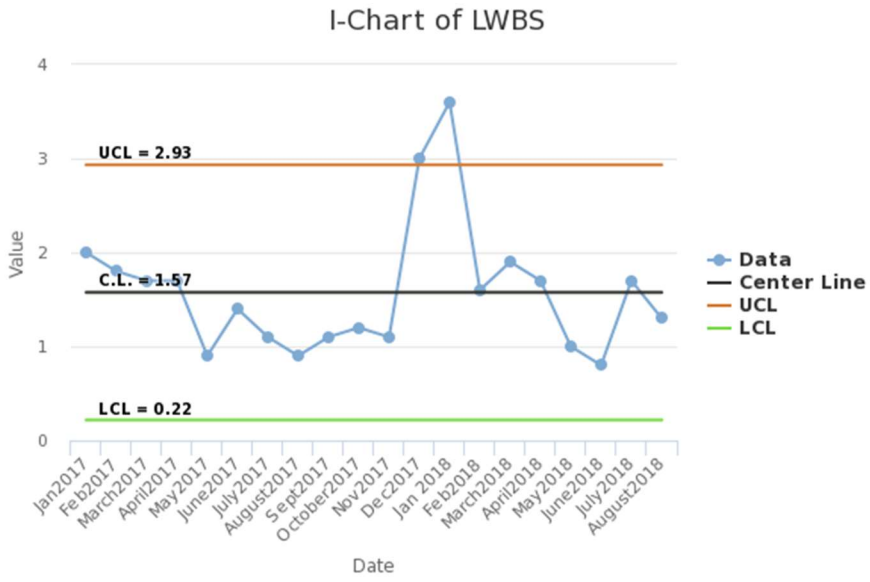

Figure 9. Left without being seen (LWBS) presented in percentage.

DISCUSSION

As of January 2019, the RMET process has not been implemented at the project facility since construction has not been completed. The projected start time for the RMET process is early 2019. However, in anticipation of the flu season and the potential increased patient volume during the winter months, plans are underway to review the current state, update staffing and resource needs, and identify how best to utilize existing space in order to provide quality, efficient, and safe patient until full RMET process can be implemented. In December, working with the office of disaster preparedness, ED leadership assessed the ED lobby/waiting area and evaluated its ability to accommodate and manage the expected flu patient volume surge.

To improve ED throughput during the final construction phase of the RMET area and during the potential flu season, the east side of the ED will be opened for 24 hours, seven days a week. This space was not being consistently used to house patients and the extra space may absorb the additional patients presenting during the flu season. However, in order to open the east side around the clock, staffing needs will have to be addressed. The project author contributed to a new staffing module that considers the entire ED including the east side. Since the east side of the ED holds six beds, four additional nurses are needed. In December, six traveling RNs were hired.

These changes in space created new needs for ED physicians. Based upon recommendations from the RMET task team, at least two per diem MDs need to be hired to provide coverage for the RMET area. However, this is still under negotiation with medical administration. Meanwhile, two attending physicians will rotate from the sister

hospital to the ED; these physicians will be assigned to one of the triage areas and a modified RMET process will be initiated until construction is completed.

Reflection on Baseline Metrics

The purpose of this project was to decrease DTPT, LOS-D, LOS-A, and LWBS and to increase or maintain patient satisfaction. The ED census is generally affected by seasons with the numbers of patients seeking emergency care increasing during flu season and winter holidays. Therefore, it was important to look at ED trends during an entire year to capture surge timings. Figures 4, 5, 6, 7, 8 and 9 indicate baseline data over the period of January 2017 to August 2018, and include fluctuations of hospital census.

The project goal was to decrease the DTPT for patients by 20 minutes or less. DTPT reflects the time needed to provide efficient patient assessment to rule out any immediate life-threatening emergency. The median DTPT in minutes from January 2017 to August 2018 was 26.50 minutes. DTPT is a significant predictor of patient satisfaction ("Lean-driven solutions slash ED wait times, LOS." 2012). Increased wait times to see the physicians leads to patients leaving before medical evaluation is completed (Kennedy, MacBean, Brand, Sundararajan, & McD Taylor, 2008). A study demonstrated that increasing resources can lead to increased hospital flow and decrease LOS, which includes DTPT (Haq, Stewart-Corral, Hamrock, Perin, & Khaliq, 2018). Based on the evidence reviewed for this project, it may be realistic to expect DTPT to approach < 10 minutes. The change will be driven by the new process and extra staff and resources. In January 2018, the ED had the highest number of patients evaluated with 4822 patients being seen, which lead to increased DTPT. It should be noted that even with RMET, these fluctuations may still occur but that RMET may allow the ED to absorb increases in

volume better due to more efficiency with ESI IV and V patients. DTPT is largely dependent on the volume changes in the ED (Guttmann et al., 2011); longer wait times are also associated with increased LOS for discharge (a throughput variable) and patients admitted with a greater risk of increased mortality (an output variable) (Guttmann et al., 2011).

The median LOS for discharged patients was 139.35 minutes (2.3 hours) and for admitted patients was 338.45 minutes (5.6 hours). It is expected that post RMET, the LOS would be decreased for discharged patients which ultimately should decrease LOS for admitted patients to less than 5½ hours. Having ED beds being unavailable for five and half hours leads to department overcrowding (a throughput issue) and an increased use of resources that get consumed by the boarding patients, causing overcrowding (Crilly et al., 2011; White et al., 2013). In previous studies, boarding of patients in the ED was also associated with increased LOS for those who were discharged home (White et al., 2011; White et al., 2013).

At baseline, the median percentage of patients LWBS was 1.5% over 18 months. The national benchmark utilized by hospital across the country is 2% (Sun & Kang, 2017) with a median percentage of 2.6% in all acute, nonfederal hospitals in California (Hsia et al., 2011). It is projected that RMET process may further decrease the percentage of LWBS with the increased in-patient care capacity along with hospital financial gain (Milsten et al., 2014; Soremekun et al., 2012, 2014; Tropea et al., 2012)

The median patient satisfaction score was 87% which can be compared with the national benchmark of 73% (Center of Medicare & Medicaid Services, 2017). The Press Gainey survey measures the patient experience during their ED visit. The survey consists

of 32 questions broken down into several categories: communication, responsiveness of hospital staff, pain management, overall hospital rating, discharge instructions, cleanliness, quietness and likelihood of referral (see appendix F). It is expected that with RMET process change it may increase in median patient satisfaction as ED throughput improves.

Baseline data was gathered with no rotating RN students or residents in the department. Starting summer 2018, physician and social worker residents started rotating through the department three times a week leading to longer LOS and delaying treatment time which may dampen RMET impact.

Recommendations

The project will continue until the post implementation data is collected and analyzed. The ED educator will take the lead on discussing the findings of post implementation results, obtain staff feedback and identify any barriers to the RMET process. Ongoing evaluations will be needed for measuring efficiency of the new process change and its effectiveness. My recommendation would be to track time through RMET and compare it to the previous fast track because the resident physicians will not be rotating rough RMET and we will be able to evaluate the time difference through there. It is assumed that the RMET evaluation will show improved DTPT, LOS for both discharged and admitted patients. However, factors beyond RMET may impact LOS for admitted patients.

Patient flow in the ED can be depicted with the conceptual model of intake, throughput and output; this model can be utilized to identify problems and potential solutions to ED crowding (Asplin et al., 2003). In order to further improve input patient

flow and decrease ED overcrowding, an open access to walk-in or same day appointment clinic could be developed (Arain, Campbell, & Nicholl, 2015). The ED directly controls the throughput of patients that are discharged home from the ED. However, for the patients to be admitted to the hospital, throughput of these patients is controlled by the hospital. If there are no hospital beds available, patients will need to wait in the ED despite written orders for admission. Disruption in either throughput (type of discharge) can lead to ED crowding. Therefore, it is essential for the project facility is to identify the contributors to patient boarding causing a bottle neck effect. Examining solutions for output factors, the priority should be to move the admitted patients to inpatient wards or discharging ED patients in timely manner.

Difficulties and Challenges

There were many difficulties during the RMET process development. Delays in construction, engineering inspection and city inspections led to almost 8 months lag time. The performance excellence (PE) team lead for this project left the facility for another job and assigned replacement also left, leaving the department with limited resources in this area.

The author is newly employed by the care coordination department at the project facility. Her job description is to review records of ED patients who are admitted to the hospital and make suggestions to the admitting team regarding appropriate admission destination (outpatient, < 48 hours under observation). It was difficult to obtain data in timely manner because the author is staffed by care coordination department not the ED.

During the process of meeting with the RMET task force, the most impactful factor in terms of understanding the potential change was obtaining data on ED metrics

from the ED analyst and financial counselor (summer 2018). While the delay in accessing reports was a matter of affiliation and unfamiliarity of the author with the ED staff (and vice versa), the executive meetings helped establish connections for gathering information and implementing the project.

Visits to RMET Facilities

In summer 2018, the project author and consultant from the performance excellence office visited three local facilities that utilized the RME process. One of the facilities (Hospital A) was a large county hospital that had started the RME over 10 years ago. The process began at Hospital A with simple medical screening exam by NPs on ESI level IV and V patients. The NPs performed exams on non-urgent patients who required simple treatments such as wound checks and medication refills. The RME process, with the addition of separate day clinic, decreased total LOS and decreased the time patients waited to be evaluated by a provider. The other two facilities shared a similar process where a few beds were designated to the RME. What was learned was that it was not possible to offer treatment to all non-urgent patients when patient volume exceeded resources; therefore, hospital B opened a same day appointment clinic within the ED for these low resource-requiring patients.

We learned that each facility tweaked the RMET process according to their needs. Each hospital described positive effects post RMET that allowed patients to have timely medical evaluations and decrease their ED LOS. At Hospital B, the biggest impact of RMET was the 2% decrease in numbers of patients LWBS and DTPT decreased by 50%. These observations were shared with the RMET task force via power point presentation. An ED physician who works at both the project hospital and one of the observed facilities

also gave feedback about the positive experiences with RMET. In summary, the feedback from these visits was well received by the task force.

Post RMET Evaluation

The post RMET implementation evaluation is pending completion of the construction of the RMET area. Once the construction and city inspections has been completed author will lead the RMET implementation process and the ED metrics of DTPT, LOS, LWBS and satisfaction will be compared to the pre-implementation data. Based on the post RMET evaluation process will be tailored to best fit the facility needs.

Conclusion

Emergency Department overcrowding is a system wide problem that requires more than a simple intervention. Solutions to ED overcrowding depends on the hospital culture, size, demographics, lack of academic affiliation, patient acuity, availability of mental health and homelessness resources, hospital leadership engagement, and other factors (Le & Hsia, 2014; Love et al., 2016; Venkatesh et al., 2015). Although having a provider in a RMET area may not address all factors contributing to overcrowding, numerous studies have showed a positive relationship between improved indicators of quality of care such as DTPT, LOS, LWBS, and overall patient satisfaction. Several studies found that adding a provider in triage makes the ED flow efficiently. It is expected that by implementing the RMET process, DTPT will decrease, LOS for both discharged and admitted patients will decrease, and the number of patients LWBS will decrease. Concurrently, we expect to maintain or increase patient satisfaction as supported by the literature. Implementing a new RMET process in this ED will be challenging as there will be an adjustment of ED staff to a different workflow, but the

process will be introduced as s solution to alleviate overcrowding and patient assessment and treatment in timely manner.

In order to improve quality of care provided in hospitals, new policies are required that demand financial resources. ED crowding is a multifaceted systemwide problem and having a provider in the triage can provide one method to increase the department capacity and a significant throughput solution fighting a battle against ED crowding. This project contributes to knowledge about developing and implementing a RMET process in a specific southern California hospital.

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APPENDIX A

ELSEVIER LICENSE TERMS AND CONDITIONS

March 17, 2018

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Estimated size (number of pages)	100
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APPENDIX B

TABLE OF EVIDENCE

Table 1

Rapid Medical Evaluation and Treatment Programs in Emergency Departments

Purpose	Design/Variables	Sample/Setting	Measures	Results	Conclusions/Notes
Purpose of the study was to study the effect of initiating diagnostics on pt w/ abdominal pain (labs & imaging) from the waiting room and effect on LWBS RME vs RME + WRDT (wt room diagnostic testing) (Begaz et al., 2017)	Prospective, randomized controlled eval DV: -LWBS in pts with abd pain ↓ LOS in ED IV: Clinician triage screening leading to early initiation of diagnostic tests	1659 non-pregnant adults w/ c/o abdominal pain July 2014 - May 2015 Los Angeles county ED. Servers ~55000 visit/yr	Time in ED bed Total ED time LWBS	RME+WRDT ↓ mean time in ED When c/o RME only group (277min - 245min) ↓ total ED time (504min-460min) 9% LWBS in RME + WRDT group 13% in RME group	Starting diagnostic testing in the waiting room ↓ time spent in the ED bed, total ED time, and ↓ LWBS Initiating diagnostics in the ED may improve ED throughput Notes: extremely busy ED w ↑ wait time above the national benchmark may not work in a community hospital
Effectiveness of Resident physician as Triage Liaison Provider (TLP) for screening & tx compared with attending physician (Weston et al., 2017)	Retrospective cohort study DV: LOS, DTP (door to-provider) IV: Resident physician (TLP) vs. attending physician as TLP	Single urban academic ED (Illinois) facility that had a residency program -88,000 annual visits and w/50 residents and 28 attending physicians 20 % inpt & 15 % Obs admission rate	Primary outcome: cost effectiveness -return of investment (ROI) Secondary outcomes: -LOS -DTP -LWBS -Pt satisfaction	ROI: -Resident MD 317 % -Attending MD 86% LOS: not statistically significant DTP: ↓ for resident and attending MD	Resident/Attending MD liaison is effective. Improved DTP, LWBS and pt satisfaction Resident MD & Attending MDs are both cost effective (Resident > Attending) Limitations: -single site

Purpose	Design/Variables	Sample/Setting	Measures	Results	Conclusions/Notes
		-utilizes EMR		LWBS ↓ for resident and attending MD Improved pt satisfaction of "very good" for both	-cannot generalized -retrospective design -bias possible Note: 4-month period only Done at high vol. ED -no peds
The purpose of the study was a comparison of efficiency and quality measure pre and post triage organization model in the ED (Burström et al., 2016).	Retrospective comparison, two study periods w/ 2 different triage models -Nurse triage (2008) -Physician-led Triage (2012) IV: RME unit DV: -PIA -LOS -LWBS -turnaround time -mortality rate	-20,073 pts in 2008) -23,765 pts in 2012. County ED Level II trauma center in Sweden	Measures (TIME) - Registration to MD -MD to Dispo -Length of stay (LOS) -4 hr turnaround time -Left without being seen (LWBS) -24hr unscheduled return -72hr unscheduled return -7day mortality (post ed visit) -30day mortality (post ed visit)	-Registration to MD time ↓□□□□□□ mins ($p < .001$). -LOS ↓ 219-185 min ($p < .001$) -4hr turnaround was 57% for RN-triage 68% for MD-triage -LWBS- 38% lower probability -24/72hr return was lower 64% -7/30 day mortality rate prob was 30% and 20% of the variation -Admission rate ↓ from 37%-32%	Physician-led triage team improved the overall efficiency and quality to care provided in the ED. Limitations: -Triage is only one aspect of ED process -single institution Notes to self: It is the results I am hoping to find.
Investigate effect of implementing MTE in ED (Lauks et al., 2016)	Pre and post intervention study Baseline = 5 months prior; Post = 5 months after MTE initiation	Location: Single center 700 bed hospital in Switzerland. Age, gender, time Pt signed in, initial ED	Data collected from EMR including age, gender, time stamped. After initial triage assessment, level 3-5 pts asked to wait to	↓ wait time by 30 min, ≈ 76% Pre-MTE: 33% pts seen within 30 mins	Conclusion: ↓ DTP time in all pts ED LOS ↓ only in ESI level 5 pts Limitations: Single center study

Purpose	Design/Variables	Sample/Setting	Measures	Results	Conclusions/Notes
	DV: Assess Initial wait time & LOS IV: MTE = Team triage, designated rooms, quick registration, EMR redesign	MD contact, end of Tx time. Inclusion criteria: All pts seen in ED. Exclusion criteria: pts not assessed in the ED, returning to ED within 24hrs,	be seen for diagnostic testing ESI level 4 ↓ 54-11mins LOS calculated based on: Time the pt signed in Initial contact with MD End of Tx Door to doctor time	During MTE: 90% pts. D/C'd Pt time ↓ by 36 min vs. admitted Pts ↓ by 24 min Overall median ED LOS ↑ by 15 min except for ESI 5 pts (ED LOS ↓ from 1.2 to 0.3 hrs). 11% ↑ diagnostic radiology during MTE	Disproportionate reductions in the lower ESI levels MTE operated only 9am-10pm; data based on 24hrs Notes: MTE overall successful; decreased door to doctor time across all patient acuity levels.
The purpose of the study was to compare MD in triage model one yr vs rotational pt assignment following an algorithm the following yr. (Traub et al., 2016)	Retrospective cohort review IV: MD triage model vs rotational assignment DV: - LOS -LWBS -unscheduled visits	~26,000 visits Single facility (Mayo clinic Arizona)	-LOS -LWBS -unscheduled return (with 72hrs) -early return w/ admission	Rotational pt assignment ↓ median LOS 219 vs MD in triage 233) No significant difference btw LWBS, returns within 72hrs or admission rate	Rotational pt assignment showed ↓ in LOS when compared w MD in triage; not significant in a regression model after assessing and including the possible confounders Significant findings- LWBS returned to ED and were admitted Limitations: single-site study Note to self: interesting comparison

Purpose	Design/Variables	Sample/Setting	Measures	Results	Conclusions/Notes
The purpose of the study was to the evaluate the quality of ED visit reduction program (Raven et al., 2016)	Systematic review IV: Programs utilized to ED visits DV: quality of ED reduction programs, effectiveness vs adverse events	ED visit reduction programs from Jan 2003- Dec 31, 2014. Examined 38 studies of ED visit reduction programs, Randomized controlled trials & observational studies, peer reviewed literature Studies done only in the United States	Primary outcome was ED use. Sec. outcome r/t ↑ hospital admission and ↑ mortality due to ED reduction program by discouraging seeking tx in the ED.	13 studies mod-high quality GRADE criteria Only case management reduced ED use No evidence of any increased event of hosp admission or mortality rate was found.	limited evidence No definitive conclusion about effectiveness or programs Future programs should be evaluated in depth. Limitations -program terminology -variations in the definition of high vol, Staffing, and outcome measurements -no standardization -peer reviewed only NOTES: recent Systematic review. Significant findings
Purpose: to evaluate whether there are difference btw team triage vs single-nurse triage on patient flow in the ED (Ming et al., 2016)	Systematic review? & Meta-analysis IV: single nurse triage vs provider team triage DV: LOS -WT	Randomized Control Trials (RCTs) -2164 studies were identified -58 studies were fully assessed (14,777 pts) -27 studies non-RCTs/9 RCTs	-LOS -WT (for all ED pts) -mortality rate	No statistical significance or clinical ↓ in LOS & WT 1 study reported death	-No conclusive evidence found that team triage provides better outcomes Limitation: studies included were small -possible publication bias -heterogeneity Notes: RCT
1. describe effect of RMT on ED LOS and rate of LWBS	Retrospective before and after observational study	Mayo Clinic Arizona 24 bed ED, tertiary care teaching hospital	Data extracted EHR	LOS ↓ from 297-261 (overall ed pts)	Improved LOS but no change for LWBS

Purpose	Design/Variables	Sample/Setting	Measures	Results	Conclusions/Notes
2. evaluate effect of RMT on other ED pts (Traub et al., 2015)	DV: LOS, LWBS. IV: RMT	Annual census 24,500 w/ 30% admission rate. no observation unit or fast track Resident rotations Data for Mondays and Friday from 10:00 a.m.–10:00 p.m. for November 2010–April 2011 reviewed pre and post RMT.	LOS- registration- d/c home. -%LWBS 1219 visits divided into three main groups and 2nd group had 2 sub groups	LWBS-no sig change Pt evaluated and dispo by RMA ↓ of 117mins Pt evaluated by RMA tx care of main ED ↑ LOS by 25mins	Limitations -single institute -note that additional MD and RN was staffed in the RME area -lack of strict protocols -generalizability Notes: could be utilized to replicate better results for my project. Similar idea but no RMT protocol or guidelines
The purpose of the study was to improve wait time in lower acuity (CATS-4/5) pts utilizing the Rapid Medical Evaluation (RME) unit (Chartier et al., 2015)	Retrospective QI project One nurse and one MD to RME area DV: wait times for pts with lower acuity. IV: RME-unit Plan-Do-Study-Act (PDSA) First 3months after the implementation of RME.	64,000 pts -Academic hospital in Toronto, Canada Pre-determined guidelines for RN to triage pts to RME unit. One MD and One RN assigned to RME-unit (relocation of staff)	-initial MD assessment time (PIA) -total LOS	-PIA ↓ from 98mins-70mins -LOS ↓ from 165min-130mins On avg RME pts wait was < 12 mins to see the MD and stayed in ED < 36min less compared to other	PIA and LOS ↓ significantly through PDA cycles. Limitations: -impact on wait time of sicker pts that was statistically significant Notes: -Utilized same staff into the RME that may have increased wait time for sicker patients. - Done in another country w/ diff healthcare delivery system

Purpose	Design/Variables	Sample/Setting	Measures	Results	Conclusions/Notes
Assess if overcrowding influenced pts placement after triage, intensity of medical workup received and unscheduled returns to the ED (O'Connor et al., 2014)	Retrospective Electronic health record reviews (EHR) IV: triage destination during ED crowding -time to MD -#of investigations ordered -unscheduled returns to ED w/in 2wks. DV: ED crowding (yes/no?) DX: CP vs SOB monitored vs non-monitored beds	EHR review of pts presenting to 2 tertiary care EDs over 1yr. Location: Ottawa, Canada ~75,000 pt visits per/yr 568 charts reviewed	Outcomes measured based on -triage time, -time to MD, -# of investigations ordered, -disposition and ----- return within 14days of dispo. - triage destination during ED crowding and number of investigations orders	> 50% pt presented during ED crowded ↑ # of pts triaged to non-monitored beds w (p= .02) Initial MD contact time ↑ during crowding (p=.0003) No change in return to ED after d/c Pts in cardiac beds ↑ investigations ordered (EG CBC, electrolytes, ABGs); No differences in CXR & CT orders.	ED Crowding influences pt placement after triage, ↑ wait time for high acuity pts ↑ acuity pt delayed due to wrong triage Limitations: Single institute -Small sample -Crowding cut points was not based on literature Notes: Good study to consider when evaluating my project but keep in mind that it was done at another country w/ different healthcare system.
Purpose of the study was to examine the effects of Physician in triage on wait time and pt satisfaction in the ED. (French et al., 2014)	Cross-sectional survey of ambulatory care pts DV: wait time and pt satisfaction IV: PIT	University Hospital of the West Indies (UHWI) in Kingston Jamaica	Wait time Pt satisfaction	No significant decrease in LOS No difference in pt satisfaction Wait time was influenced by pt waiting for diagnostic testing such as x-ray and labs	Overall no reduction in wait time nurse vs physician in triage Delays in the ED are due to other factors and nurse in triage are adequate Notes: study done in a foreign country with a totally different healthcare system.
To evaluate the effect of having physician vs	Retrospective quality analysis	Before and after intervention	Primary outcome -Rate of LWBS	-LWBS ↓ 3.1% - 1.7%	LWBS & DTP time ↓ despite of the increased census

Purpose	Design/Variables	Sample/Setting	Measures	Results	Conclusions/Notes
PAs as first provider contact on pts LWBS in the ED (Milsten et al., 2014)	DV: LWBS, DTP time IV: PIT	-265 bed non-profit community hospitals -70month period (June 2004-April 2010) -MD/PA in triage 16hr/day	Secondary outcome -DTP	-DTP ↓ by 14mins -Vol ↑ 86,000-102,000 pts/yr -monthly ED visit ↑ 5% and ambulance visits ↑ 18%	ED visits via care and ambulance also increased along with admission rates Limitations: single institute Notes: other changes along w/ intervention. Geographic expansion of the ED, EHR instillation, ambulatory pts only
Purpose of the study was to find out the effects of a mid-track area for evaluating medium acuity patients in a tertiary hospital (Soremekun et al., 2014)	Pre/post interventional study over 24months DV: LOS, LWBS IV: Mid-track area in the ED	Mid-track area 91,903 patients -tertiary academic hospital	LWBS and LOS rates before and after intervention	Results were based on statistically high-volume post intervention ↓ LOS ($p < .0001$) ↓ LWBS ($p < .0001$) For high acuity patients there was no significant change time to room but LOS ↑ by 24 minutes ($p < .0001$)	Implementation of mid-track area ↓ overall LOS for medium ↓ LWBS However, ↑ LOS for high acuity patients Limitation: -single site -no randomization -no measurements of return to ED within 72hrs -no standardization Notes: RN staffing increase by 3.4%
Hypothesis was that a physician triage screening program improves care provided in the ED	Retrospective, observational, performance comparison over 4 yrs.	Stable pts triaged to fast track. Dec 2006-Nov 2010.	Primary outcome: All ED LOS for patients evaluated by START	LOS ↓ by 56mins Pts not eligible for START also showed	ED performance based on -LOS -% pts left without completing evaluation -Door to room time

Purpose	Design/Variables	Sample/Setting	Measures	Results	Conclusions/Notes
(Rogg et al., 2013)	IV: START - screening performed by physicians in triage area of ED. comparison group- pts with higher acuity, unstable vital signs DV: LOS, LWCA Door to bed time	Unstable & psychiatric pts excluded. Large level I trauma center Northeast U.S. Screening area of triage staffed with extra triage MD, one NP/PA, one RN	All pts triaged directly to START except fast track or psych complaints Secondary outcome: -left without completing Assessment (LWCA) -Door to room time -Disposition rate from START	decreased LOS by 22 mins 29% pts d/c home without ED monitoring. Door to bed time ↓ 18.4 to 9.9 mins (yr 1- 3) By yr 3, 55% pts screened through START	-Decrease in monitored bed usage MD screening efficient & effective Limitations single hospital. Findings are an association Studies 4 factors not measures of Quality of care Notes: -efficient & sustainable intervention This could by outcome for my project.
Purpose of the study was to evaluate initiative such as vertical pt flow (pt evaluation in a chair w/out bed placement) on ED overcrowding (Liu et al., 2013)	Online survey of IV: vertical patient flow and other initiatives DV: ED overcrowding	152 academic sites w/residency program -academic EDs in 4 states in U. S.	-inpt unit coordinator -inpt full capacity protocol -vertical flow -fast track area -observation unit -surgical schedule smoothing -provider in triage	Response rate -73% response rate -71% completion rate Initiative to dec ED crowding -d/c coordinator 46% -Surgical Schd smoothing 11% -Fast track 41% -vertical pt flow 41% -pending partial implementation	Variability in the extent of ACEP's high-impact ED initiative. -70% some initiative of vertical pt flow. Limitations: Notes: Similar concept to RMET, efficient as ed & hospital approach.
Hypothesis was that a physician triage screening program improves care provided in the ED	Retrospective, observational, performance comparison over 4 yrs.	Stable pts triaged to fast track. Dec 2006-Nov 2010.	Primary outcome: All ED LOS for patients evaluated by START	LOS ↓ by 56mins Pts not eligible for START also showed	ED performance based on -LOS -% pts left without completing evaluation -Door to room time

Purpose	Design/Variables	Sample/Setting	Measures	Results	Conclusions/Notes
(Rogg et al., 2013)	IV: START - screening performed by physicians in triage area of ED. comparison group- pts with higher acuity, unstable vital signs DV: LOS, LWCA Door to bed time	Unstable & psychiatric pts excluded. Large level I trauma center Northeast U.S. Screening area of triage staffed with extra triage MD, one NP/PA, one RN	All pts triaged directly to START except fast track or psych complaints Secondary outcome: -left without completing Assessment (LWCA) -Door to room time -Disposition rate from START	decreased LOS by 22 mins 29% pts d/c home without ED monitoring. Door to bed time ↓ 18.4 to 9.9 mins (yr 1- 3) By yr 3, 55% pts screened through START	-Decrease in monitored bed usage MD screening efficient & effective Limitations single hospital. Findings are an association Studies 4 factors not measures of Quality of care Notes: -efficient & sustainable intervention This could by outcome for my project.
Evidence search for the Effectiveness or TLP in ED overcrowding (Rowe et al., 2011)	Systematic review IV: triage liaison physicians DV: ED overcrowding	14,446 relevant citations -3,615 addressed ED overcrowding -354 manuscripts reviewed --28 studies included -13 journal publications -12 abstracts	Primary outcomes based on -ED LOS -PIA Secondary outcomes -LWBS -LAMA	TLP ↓ LOS 1study significant ↓ in PIA secondary to TLP -LWBS- no difference -LAMA-not conducted	TP is an effective intervention to ↓ ED overcrowding Limitations: -no pooled data from non-RCTs -weak research methods -no multicenter study Notes: older study but every recent systematic or meta-analysis has reviewed this study

Notes. Avg = Average; CP = Chest Pain; Emergency Department; DV = Dependent Variable; Dispo = Disposition; DTP = Door to Provider; ; ESI = Five-level scoring system that stratifies patients into five different groups based on their severity (ESI I-V); Hosp = Hospital; LAMA = Left against medical advice; LWBS = Left without Being Seen; LOS = Length of Stay; Hosp = Hospital; IV = Independent Variable; MTE = Medical Team Evaluation; Obs = Observation; PIA =

Provider Initial Assessment; Provider = Refers to MD, DO, NP or PA; Pts = Patients; RTT = Rapid Triage and Treatment; Schd = Schedule; SOB = Shortness of Breath; START = Supplemented Triage and Rapid Treatment; TIP = Triage Liaison Physician; TOD = Time on diversion; TX = Treatment; Triage = The process in which patients are assessed for the degree of their illness upon first arrival to the ED; Vol = Volume; Yr = Year

APPENDIX C

LETTER FROM THE PROJECT FACILITY IRB OFFICE

Hi,

As the sole intent of the project is to evaluate a new process (RME) to improve patient satisfaction in the ER, the activities as described do NOT constitute “research” as defined by the federal regulations. Therefore, neither IRB approval nor certification of exemption from IRB review of the described activities is required. DEFINITION: “Research” is defined by the federal regulations as "a systematic investigation, including research development, testing and evaluation, designed to develop or contribute to generalizable knowledge." [45 CFR 46.102(d)]

You also mention that the data collected may be used for your dissertation project. After the data is collected, submit an IRB application for the secondary review of existing data at that time.

Please retain this email as formal documentation of this determination. Please contact the UCLA OHRPP if the nature or intent of the activities changes in order that we may update our determination at that time.

Sincerely,
Gloria

.....
Gloria Varghese
SGIRB Administrator
Office of the Human Research Protections Program (OHRPP)

APPENDIX D

CalIFORNIA STATE UNIVERSITY, FULLERTON IRB APPROVAL LETTER

CALIFORNIA STATE UNIVERSITY, FULLERTON

Office of Research and Sponsored Projects
P.O. Box 6850 or 1121 N. State College Blvd., 2nd Fl., Fullerton, CA 92831
T 657-278-7719 / F 657-278-7238

APPROVAL NOTICE

From the Institutional Review Board
California State University, Fullerton

October 6, 2018

From: Dr. Matt Englar-Carlson, Chair
CSUF Institutional Review Board

To: PI: Manpreet Sidhu

Application No. HSR-18-19-191
Study Title: Rapid Medical Evaluation in the Emergency Department

Re: Initial Exempt Review

The forms you submitted to this office regarding the use of human participants in the above-referenced proposal have been reviewed by the Regulatory Compliance Coordinator and the Chair of the California State University, Fullerton, Institutional Review Board. Your proposal is determined to be Category 4. Research involving the collection or study of existing data, documents, records, pathological specimens, or diagnostic specimens, if these sources are publicly available or if the information is recorded by the investigator in such a manner that subjects cannot be identified, directly or through identifiers linked to

the subjects.
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The CSUF IRB has not evaluated your proposal for scientific merit, except to weigh the risk to the human participants and the aspects of the proposal related to potential risk and benefit. This approval notice does not replace any departmental or additional approvals which may be required.

It is of utmost importance that you strictly adhere to the guidelines for human participants and that you follow the plan/methodology/procedures described in your research proposal. Since your proposed was determined to be exempt, there is no further review or annual renewal required by the CSUF IRB. **However, any change in protocol or consent form procedure requires re-submission to the CSUF IRB for approval prior to implementation**. Additionally, the principal investigator must promptly report, in writing, any unanticipated or adverse events causing risks to research participants or others.

Please be advised that if you are seeking external funding for this proposal, the above-reference title should match exactly with the title submitted to the funding sponsor. Any changes in project title should be submitted to the CSUF IRB prior to implementation.

By copy of this notice, the chair of your department (and/or co-investigator) is reminded that their responsibility for being informed concerning research projects involving human participants in the department, and should review all protocols of such investigations as often as needed to ensure that the project is being conducted in compliance with our institutional policies and with DHHS regulations.

The institution has an Assurance on file with the Office of Human Research Protections. The Assurance Number is FWA00015384.

Cc: IRB Office
Dana Rutledge

APPENDIX E

PROJECT FACILITY IRB APPROVAL LETTER

UCLA Office of the Human Research Protection Program (OHRPP)

Administrative Review for Human Research Studies Not Being Conducted by a UCLA Principal Investigator But Accessing UCLA Facilities, Patients or Personnel (Faculty, Staff, or Students)

INSTRUCTIONS FOR USE:

- Non-UCLA investigators involved in human research that seek to access any UCLA facilities, patients or personnel (faculty, staff or students) must complete this form and submit it to the UCLA OHRPP for a determination of whether proposed research involving human subjects falls within the UCLA IRB jurisdiction and/or whether UCLA is engaged in the research. Either case requires UCLA IRB review and approval or certification of exemption from UCLA IRB review.
- **Submit the completed and signed form and requested supplementary materials to the UCLA OHRPP by e-mail to gcirb@research.ucla.edu. You will be notified by e-mail of the results of this review.**
- QUESTIONS? Contact Wendy Brunt (wbrunt@research.ucla.edu) or Paul Lillig (plillig@research.ucla.edu).

Principal Investigator:		
Name and degree **Manpreet Sidhu, DNP**	Institution **Cal State Fullerton**	Department **School of Nursing**
Mailing Address **1527 Centinela Ave, Unit A**	Phone Number **310-600-5194**	E-mail Address **Bsidhu@csu.fullerton.edu**
Contact Person:		
Name and degree **Same as above**	Institution	Department
Mailing Address	Phone Number	E-mail Address

Study Title:		
Rapid Medical Evaluation and Treatment in the Emergency Department		
All Researchers Involved in Study Who Will Be Working With UCLA Facilities, Patients, or Personnel:	**List the UCLA Site(s) and Specific Location(s):**	**End Date of UCLA Involvement:**
Name and Degree/Institution **Manpreet Sidhu, DNP-UCLA** **Dr. Walid Ghurabi UCLA**	**SM-UCLA Medical Center Emergency Department**	**May 15, 2019**

Provide a Brief Description of the Study:	
QI project to create a Rapid Medical Evaluation (RME) program in the ER. It entails a process change in which non-urgent patients are evaluated, treated and discharged by an MD led team in a new triage area. Pre/post measurements of QI metrics will be gathered that is intended to improve patient care/efficiency.	
Describe How UCLA Facilities, Patients, Employees (Faculty, Staff, Students) Will Be Involved in the Study:	
Collaboration with the nursing and medical director along with a personal from the performance excellence department.	
Describe the Subject Population and the Recruitment and Consent of Subjects:	
No subjects will be recruited as the data is an aggregate and contains no personal identifier.	
Include the Following Information About the PI's Institution:	
1. Has this study been reviewed and approved by a duly constituted IRB?	In progress
2. If no, please provide in the space below the justification as to why local IRB approval was not received. *Note: Without appropriate IRB approval it may not be possible to involve UCLA facilities and subjects.*	
3. Please provide the name of the PI's Institution:	UCLA/Cal State Fullerton
a. What is the PI's relationship to the institution?	Employed at Care coordination Dept/ED
b. Please provide the following with this application. Check all that apply.	
☐ Local IRB Approval ☐ Local IRB Protocol, and any questionnaires, surveys, or interview outlines ☐ *Local IRB Approved Consent Form	

Version 6-24-2015

UCLA Office of the Human Research Protection Program (OHRPP)

Administrative Review for Human Research Studies Not Being Conducted by a UCLA Principal Investigator But Accessing UCLA Facilities, Patients or Personnel (Faculty, Staff, or Students)

INSTRUCTIONS FOR USE:

- Non-UCLA investigators involved in human research that seek to access any UCLA facilities, patients or personnel (faculty, staff or students) must complete this form and submit it to the UCLA OHRPP for a determination of whether proposed research involving human subjects falls within the UCLA IRB jurisdiction and/or whether UCLA is engaged in the research. Either case requires UCLA IRB review and approval or certification of exemption from UCLA IRB review.
- **Submit the completed and signed form and requested supplementary materials to the UCLA OHRPP by e-mail to gcirb@research.ucla.edu. You will be notified by e-mail of the results of this review.**
- QUESTIONS? Contact Wendy Brunt (wbrunt@research.ucla.edu) or Paul Lillig (plillig@research.ucla.edu).

Principal Investigator:		
Name and degree **Manpreet Sidhu, DNP**	Institution **Cal State Fullerton**	Department **School of Nursing**
Mailing Address **1527 Centinela Ave, Unit A**	Phone Number **310-600-5194**	E-mail Address **Bsidhu@csu.fullerton.edu**
Contact Person:		
Name and degree **Same as above**	Institution	Department
Mailing Address	Phone Number	E-mail Address

Study Title:		
Rapid Medical Evaluation and Treatment in the Emergency Department		
All Researchers Involved in Study Who Will Be Working With UCLA Facilities, Patients, or Personnel:	**List the UCLA Site(s) and Specific Location(s):**	**End Date of UCLA Involvement:**
Name and Degree/Institution **Manpreet Sidhu, DNP-UCLA** **Dr. Walid Ghurabi UCLA**	**SM-UCLA Medical Center Emergency Department**	**May 15, 2019**

Provide a Brief Description of the Study:
QI project to create a Rapid Medical Evaluation (RME) program in the ER. It entails a process change in which non-urgent patients are evaluated, treated and discharged by an MD led team in a new triage area. Pre/post measurements of QI metrics will be gathered that is intended to improve patient care/efficiency.
Describe How UCLA Facilities, Patients, Employees (Faculty, Staff, Students) Will Be Involved in the Study:
Collaboration with the nursing and medical director along with a personal from the performance excellence department.
Describe the Subject Population and the Recruitment and Consent of Subjects:
No subjects will be recruited as the data is an aggregate and contains no personal identifier.

Include the Following Information About the PI's Institution:	
1. Has this study been reviewed and approved by a duly constituted IRB?	In progress
2. If no, please provide in the space below the justification as to why local IRB approval was not received. *Note: Without appropriate IRB approval it may not be possible to involve UCLA facilities and subjects.*	
3. Please provide the name of the PI's Institution:	UCLA/Cal State Fullerton
a. What is the PI's relationship to the institution?	Employed at Care coordination Dept/ED
b. Please provide the following with this application. Check all that apply.	
☐ Local IRB Approval ☐ Local IRB Protocol, and any questionnaires, surveys, or interview outlines ☐ *Local IRB Approved Consent Form	

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☐ * Local IRB Approved recruitment documents (e.g., flyer, letter)
** If not yet approved by Local IRB, attach copies submitted to Local IRB for review.*

Funding Source(s):	**Review Type:**
☐ Federal Government ☐ Other Gov. (e.g., State, local) ☐ Industry ☐ Other Private ☒ PI Departmental Funds ☐ Other: Sponsor Name: _____	☐ Exempt Category: _____ ☐ Expedited Review Category: _____ ☐ Full Committee* ** Will likely require additional approvals.*

Principal Investigator's Certification:

- I certify that the information provided in this application is complete and correct.
- I certify that I will follow my IRB approved protocol.
- I accept ultimate responsibility for the conduct of this study, the ethical performance of the project, and the protection of the rights and welfare of the human subjects who are directly or indirectly involved in this project.
- I will comply with all applicable federal, state and local laws regarding the protection of human subjects in research.
- I will ensure that the personnel performing this study are qualified and adhere to the provisions of my IRB approved protocol.
- I will not modify the involvement of UCLA in this protocol without first submitting an amendment to the previously approved protocol and receiving subsequent IRB approval as well as review at UCLA.

Manpreet Sidhu [signature] 9/25/18
Principal Investigator's Signature Date

UCLA Department or Clinic Head, as appropriate: (Complete below or attach a letter of support)

- I am aware of the proposed research and the level of involvement with the departmental faculty, staff, students, and/or facilities.
- I agree that this researcher can access our clinic, personnel or patients as described in the proposal.

[signature] 10/2/2018
UCLA Department or Clinic Head Signature Date

[signature] 10/2/18

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UCLA OHRPP Administrative Review Determination

UCLA OHRPP Administrative Review Determination	
UCLA IRB review or certification of exemption from UCLA IRB review is required	☐ Yes ☒ No

[signature] 10/10/18
Authorized Signature Date

************************** **STOP** **************************

If full committee review was required at the PI's Institution or if there are any questions or concerns raised during the OHRPP administrative review, the UCLA OHRPP Director may also be required to review and approve this research. The OHRPP will arrange this process.

UCLA OHRPP Director Review and Approval:

Authorized Signature Date

APPENDIX F

PRESS-GANEY PATIENT SATISFACTION SURVEY SAMPLE

[redacted]

EMERGENCY DEPARTMENT SURVEY

We thank you in advance for completing this questionnaire. When you have finished, please mail it in the enclosed envelope.

Please rate your visit on

BACKGROUND QUESTIONS

1. Time of day you arrived: **(select one response only)**
   - O 7:01 am - 11:00 am
   - O 11:01 am - 3:00 pm
   - O 3:01 pm - 7:00 pm
   - O 7:01 pm - 11:00 pm
   - O 11:01 pm - 3:00 am
   - O 3:01 am - 7:00 am

2. Time spent in the Emergency Department:
   ☐☐ ☐☐
   hours minutes

3. Patient's sex?
   O Male O Female

4. Patient's age? ..... ☐☐☐

5. Who is filling out this survey?
   - O Patient
   - O Parent
   - O Family
   - O Friend
   - O Other _____ (specify)

INSTRUCTIONS: Please rate the Emergency Department services you received from our facility. Select the response that best describes your experience. If a question does not apply to you, please skip to the next question. Space is provided for you to comment on good or bad things that may have happened to you.

Please use black or blue ink to fill in the circle completely.
Example: ●

ARRIVAL

	very poor 1	poor 2	fair 3	good 4	very good 5
1. Waiting time before staff noticed your arrival	O	O	O	O	O
2. Helpfulness of the person who first asked you about your condition	O	O	O	O	O
3. Comfort of the waiting area	O	O	O	O	O
4. Waiting time before you were brought to the treatment area	O	O	O	O	O
5. Waiting time in the treatment area, before you were seen by a doctor	O	O	O	O	O
6. Courtesy of the reception area/triage nurse	O	O	O	O	O

Comments (describe good or bad experience):_____

NURSES

	very poor 1	poor 2	fair 3	good 4	very good 5
1. Courtesy of the nurses	O	O	O	O	O
2. Degree to which the nurses took the time to listen to you	O	O	O	O	O
3. Nurses' attention to your needs	O	O	O	O	O

this section continued on next page...

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NURSES (...continued)	very poor 1	poor 2	fair 3	good 4	very good 5
4. Nurses' concern to keep you informed about your treatment	O	O	O	O	O
5. Nurses' concern for your privacy	O	O	O	O	O
6. Degree to which the nurses took your problem seriously	O	O	O	O	O
7. Extent to which nurses checked ID bracelets before giving you medications	O	O	O	O	O

Comments (describe good or bad experience):_____

_____

_____

DOCTORS	very poor 1	poor 2	fair 3	good 4	very good 5
1. Courtesy of the doctor	O	O	O	O	O
2. Degree to which the doctor took the time to listen to you	O	O	O	O	O
3. Doctor's concern to keep you informed about your treatment	O	O	O	O	O
4. Doctor's concern for your comfort while treating you	O	O	O	O	O
5. Degree to which the doctor took your problem seriously	O	O	O	O	O

Comments (describe good or bad experience):_____

_____

_____

TESTS	very poor 1	poor 2	fair 3	good 4	very good 5
Radiology refers to any X-ray, Ultrasound, CAT scan, or MRI testing you may have received. (Please answer only those questions that apply to you.)					
1. Courtesy of the person who took your blood	O	O	O	O	O
2. Concern shown for your comfort when your blood was drawn	O	O	O	O	O
3. Waiting time for radiology test	O	O	O	O	O
4. Courtesy of the radiology staff	O	O	O	O	O
5. Concern shown for your comfort during your radiology test	O	O	O	O	O

Comments (describe good or bad experience):_____

_____

_____

FAMILY OR FRIENDS	very poor 1	poor 2	fair 3	good 4	very good 5
(If you came alone, please skip this section.)					
1. Courtesy with which family or friends were treated	O	O	O	O	O
2. Staff concern to keep family or friends informed about your status during your course of treatment	O	O	O	O	O

this section continued on next page...

FAMILY OR FRIENDS (...continued)	very poor 1	poor 2	fair 3	good 4	very good 5
3. Staff concern to let a family member or friend be with you while you were being treated	O	O	O	O	O

Comments (describe good or bad experience):_____

_____

_____

PERSONAL/INSURANCE INFORMATION	very poor 1	poor 2	fair 3	good 4	very good 5
1. Courtesy of the person who took your personal/insurance information	O	O	O	O	O
2. Privacy you felt when asked about your personal/insurance information	O	O	O	O	O
3. Ease of giving your personal/insurance information	O	O	O	O	O

Comments (describe good or bad experience):_____

_____

_____

PERSONAL ISSUES	very poor 1	poor 2	fair 3	good 4	very good 5
1. How well you were kept informed about delays	O	O	O	O	O
2. Degree to which staff cared about you as a person	O	O	O	O	O
3. How well your pain was controlled	O	O	O	O	O
4. Information you were given about caring for yourself at home (e.g., taking medications, getting follow-up medical care)	O	O	O	O	O
5. How well did the staff identify themselves to you	O	O	O	O	O
6. Degree to which staff protected your confidentiality	O	O	O	O	O
7. Safety and security felt in the Emergency Room/Department	O	O	O	O	O

Comments (describe good or bad experience):_____

_____

_____

OVERALL ASSESSMENT	very poor 1	poor 2	fair 3	good 4	very good 5
1. Overall cleanliness of ER/ED	O	O	O	O	O
2. Overall rating of care received during your visit	O	O	O	O	O
3. Likelihood of your recommending our Emergency Department to others	O	O	O	O	O

Comments (describe good or bad experience):_____

_____

_____

Patient's Name: **(optional)**_____

Telephone Number: **(optional)**_____

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