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ORIGINAL RESEARCH

The effect of provider level triage in a military treatment facility emergency department

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Abstract

Introduction

Studies show that patients who spend more than 2 hours in the emergency department (ED) report more dissatisfaction with their visits. To remedy this situation, several EDs have implemented programs that insert a medical provider into triage. The objective of this study was to determine whether a Physician Assistant (PA) and Combat Medic performing triage care during peak hours could increase patient throughput.

Methods

This study is a comparative analysis. We implemented an Emergency Department Provider Level Triage Team (PLTT) that consisted of 1 Emergency Medicine Physician Assistant and 1 Combat Medic to intervene in patient care in the ED at Womack Army Medical Center (WAMC), Fort Bragg, North Carolina, USA. Three days of 12 hours shifts were selected during the peak hours of the ED and compared to the same period on days that did not have the intervention. Only patients categorized with an Emergency Severity Index of 2 or 3 were selected and compared. No additional medical, nursing and medic staff were used. This study was approved by the WAMC Institutional Review Board.

Results

In total, there were 241 cases during the trial period and 231 controls. Median times were significantly reduced ($p < 0.001$) during the intervention period. Times to analgesia (97.4 min v 171.1 min, $p = 0.03$), time to laboratory results (103.8 min v 143.9 min, $p = 0.01$), radiology (136.3 min v 181.6 min, $p < 0.001$), and to disposition (317.4 min v 334.6 min, $p = 0.05$) were all decreased. Nearly 90% of patients in the intervention group said that their experience with the intervention was very good or outstanding.

Conclusion

The implementation of the PLTT model in our ED was associated with reduced time to healthcare provider assessment, decreased overall ED length of stay, and improved patient satisfaction.

Keywords: *emergency medical service; emergency medical technician; health services research; military population; patient care; radiography; team administration; team organization; time factors; triage; waiting lists; wounds and injuries/therapy*

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Introduction

Most emergency Departments (EDs) throughout the United States experience problems of long wait times and overcrowding.¹ According to a report by the US Government Accountability Office, wait times in EDs across the USA are at worrying lengths.² Health care providers generally associate overcrowding and long waiting times to the misuse of the ED.³⁻⁵ Furthermore, the number of patients visiting hospital EDs continues to rise steadily. This contributes to longer waiting times and decreased patient satisfaction as well as frustration with a system viewed unresponsive in a patient's time of greatest need.⁶

In 2003, ED visits in the USA reached nearly 114 million, a 26% increase over the previous decade. The typical patient spent 4 hours and 3 minutes in the ED in 2008, up from 3.7 hours in 2005. Comparisons with earlier time periods suggest even longer waiting times; for example, between 1997 and 2004 the median wait time for ED patients presenting with acute myocardial infarction increased by 150%.⁷ The longer patients wait, the more likely they are to leave without treatment and the less satisfied they are with the ED.⁸

Patients who spend more than 2 hours in the emergency department report less overall satisfaction with their visits than those who are there less than 2 hours.⁸⁻⁹ In an attempt to remedy this situation, several EDs have implemented programs that change the paradigm of the standard ED experience. In Hong Kong, a medical provider was placed into triage instead of a consultation cubicle. All patients were assessed and interventions started at the time of triage. Without additional staffing the waiting time and processing time were greatly reduced.³ Another ED in the United Kingdom combined doctor and nurse triage that significantly reduced time to medical assessment, radiology and discharge.

In the United States, Inova Fairfax Hospital in Virginia¹⁰ and Vanderbilt University Hospital¹¹ EDs adopted a triage team that evaluated, treated and expedited patient care. These systems significantly improved patient care and satisfaction. To date however, no military hospital in the USA has attempted to implement the triage team model.¹²

Womack Army Medical Center (WAMC), the busiest hospital in the Department of Defense, is a 124-bed medical facility located on Fort Bragg, North Carolina, USA that provides medical services to over 197,000 beneficiaries that include soldiers and other military personnel (Active Duty), and spouses, children and some retirees (Dependents). In fiscal year 2007, WAMC's ED saw on average 5,139 per month; in fiscal year 2008, a monthly average of 5,515 patients presented to the ED. In both years, 11.7% of patients left the ED without being seen by a physician or physician assistant (PA).

WAMC's ED uses the Emergency Severity Index (ESI) triage system.¹³ The purpose of triage is to prioritize incoming patients and to identify those patients who cannot wait to be seen. The ESI is a five-category triage system that categorizes ED patients by evaluating patient acuity and anticipating resources needed for care (see Table 1).

Table 1. Emergency Severity Index

ESI Level	ESI Category	Definition
1	Emergent	The patient requires immediate life-saving intervention to prevent loss of life, limb, or eyesight
2	Urgent	High-risk situation, or patient confused, lethargic or disoriented, or if the patient is in severe pain or distress, or danger zone vital signs
3	Acute	Many resources* are needed
4	Routine	One resource is needed
5	Non-urgent	No resources are needed

Adapted from: Gilboy N, Tanabe P, Travers DA, Rosenau AM, Eitel DR. The emergency severity index, Version 4: Implementation handbook. Rockville, MD: Agency for Healthcare Research and Quality; 2005.

* Laboratory Tests, ECG, X-rays, CT-MRI-ultrasound-angiography =1 resource
 IV fluids, IV or IM or nebulized medications = 1 resource
 Specialty consultation =1 resource
 Simple procedures =1 resource (e.g. laceration repair, Foley catheter)
 Complex procedures =2 (e.g. conscious sedation)

The overall goal of triage, in this system, is to determine if a patient is appropriate for a given level of care and to ensure that hospital resources are utilised effectively. Within the hospital system, the first stage on arrival at the emergency room is assessment by the hospital triage nurse. This nurse evaluates the patient's condition, as well as any changes, and determines their priority for admission to the ED and also for treatment.

A major factor contributing to the triage decision is available hospital bed space. The triage nurse determines what beds are available for optimal utilization of resources in order to provide safe care to all patients.

Over half the patients triaged at WAMC's ED are categorized as Category 2 (Urgent) or Category 3 (Acute). Following triage and pending resolution, patients continued to wait. In order to decrease wait time this stasis time was made an entry point opportunity to initiate treatment. The objective of this study was to determine whether a Physician Assistant (PA) and Combat Medic performing triage care during peak hours could increase patient throughput.

Methods

This is a comparative analysis of the effect of provider level triage. The study was conducted in the Emergency Department at WAMC, a military treatment facility, with an average daily census of 192 patients. Thirteen weekdays over the course of a month (Monday, Wednesday and Friday from 1000 to 2200) were selected for intervention. The control group consisted of patients seen on Tuesday and Thursday (9 days). Only patients categorized as ESI 2 or 3 were seen.

The Provider Level Triage Team (PLTT) consisted of one Emergency Medicine Physician Assistant (PA) and one Combat Medic. This team conducted a focused history and physical examination; rapidly treated pain; quickly addressed fever; treated nausea and vomiting; ordered appropriate radiographs; drew blood samples; thoroughly inspected minor wounds

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and injuries after nurse triage; inserted intravenous cannula; initiated asthma and chronic obstructive pulmonary disease (COPD) interventions and reviewed ordered electrocardiograms.

Patients were either released back to the waiting room for a bed assignment; expedited to the main ED; or if further treatment was needed with no available ED bed space, they were monitored by the PLTT. Processing time was defined as the duration from registration to leaving the ED. Patients were determined to have left the ED if they were discharged to home, admitted to the hospital, admitted to an observation ward, transferred to another facility or certified as dead.

Equipment, treatment supplies and medications were consolidated into two mobile carts for ready access. Two ED rooms were rearranged with stretchers for patient transport. Both rooms were equipped with telephone and computer workstation with order entry and lookup capabilities.

The project was driven by peak ED hours (1000 – 2200) that required increased patient-care resources. Data collected included times to: registration, PLTT, administration of analgesia, laboratory tests, radiology intervention, physician or PA and final patient disposition; demographic, as well as initial diagnosis, were also recorded. Data from the intervention days were compared with data from the control days.

Patients seen by the PLTT were asked to comment on their ED experience; three questions used a Likert scale and two questions were dichotomous (see Appendix 1).

Data were analyzed using EpiInfo version 3.5.1 (Centers for Disease Control and Prevention, Department of Health and Human Services, USA). Demographic data included gender and age for both Active Duty (soldiers and other military personnel) and Dependents (spouse, children and some retirees). The performances on processing times were compared and analyzed using Student's *t* test. Statistical significance was established at a *p* value less than or equal to 0.05.

This study was approved by the Womack Army Medical Center, Institutional Review Board.

Results

There were 472 patients triaged to ESI Category 2 or 3 in the WAMC ED during September 2008. Two hundred forty-one patients (51.1%) were included in the study on the intervention days, 231 patients (48.9%) on the nine non-intervention days. There was no significant difference in the percentage of attendees on each of the study days. The majority of attendees seen were female (n=341, 72.2%).

Nearly 100 different conditions or combinations of conditions were seen. The ten leading conditions seen were: abdominal pain (n=112, 26.9%); chest pain (n=53, 12.7%); vaginal bleeding (n=33, 7.9%); shortness of breath (n=18, 4.3%); headache (n=15, 3.6%); head injury (n=14, 3.4%); gastrointestinal bleeding (n=13, 3.1%); fever (n=9, 2.2%); nausea & vomiting while pregnant (n=9, 2.2%) and renal calculi (n=9, 2.2%). There were no statistical difference between the intervention and the control for the types of conditions seen (*p*=0.01).

Of the 241 patients in the intervention group, there were 160 radiographs ordered at triage, 226 laboratory tests for blood and urine were ordered and 128 patients were administered

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analgesics for symptomatic relief of pain at the time of PLTT. In the control group there were 153 radiographs ordered, 185 laboratory tests were ordered and 143 patients were administered analgesics. Minor interventions undertaken by the triage team included removal of a fishhook, insertion of intravenous cannula, and administration of salbutamol (albuterol) sulphate via nebuliser and insertion of urinary catheters.

The majority of laboratory tests ordered included urinalysis (n=62, 15.0%), Complete Blood Count (CBC)/White Blood Cell Differential Count (DIFF) (n=51, 12.3%), Basic Metabolic Panel (n=38, 9.1%), Pregnancy Tests (HCG QI) (n=33, 8.1%) and Creatine Kinase (n=14, 3.4%).

Treatment times were significantly reduced during the period of the intervention for the administration of analgesia, time to radiology and time to laboratory tests results (see Table 2). In the intervention group the physician was seen near the end of the process after laboratory and radiology results were available. This was in contrast to the control group where the physician was seen early in the process and these tests ordered then. The average waiting time in the intervention group was reduced by 5% (see Table 2).

Table 2. Median times (mins.) intervention compared with control

	Intervention	Control N/A	pValue <0.001
Time to PLTT	89.2		
Time to analgesia	97.4	171.1	0.03
Time to laboratory	103.8	143.9	0.01
Time sent to radiology	136.3	181.6	<0.001
Time seen by physician	200.0	110.8	<0.001
Time to separation	317.4	334.6	0.05

Overall wait time for receiving analgesics were reduced by 43.0%, laboratory results wait time was reduced by 27.8% and radiology wait time was reduced by 24.9%. Waiting time by age (see Table 3) also decreased; the most significant time reduction occurred among children under the age of 18 who were administered an analgesic 50% quicker than the control group; children also had the shortest ED wait time (286.2 mins).

Table 3. Median times (mins.) intervention compared with control by age

	Intervention			Control			pValue
	<18	18-65	>65	<18	18-65	>65	
Time to PLTT	92.10	90.0	82.7	N/A	N/A	N/A	<0.001
Time to analgesia	115.4	103.0	104.1	234.0	170.5	137.3	0.01
Time to laboratory	115.3	96.1	98.6	131.7	149.3	128.9	<0.001
Time sent to radiology	138.5	138.1	129.1	168.5	194.8	149.5	0.01
Time seen by physician	193.0	201.5	194.7	79.6	118.2	91.7	<0.001
Time to separation	286.2	317.2	336.7	296.3	334.5	353.1	0.03

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Patients 65 and over had the longest wait time (353.1 mins. in the intervention compared to 336.7 mins. in the control, $p=0.03$). Males were more likely to have a lower wait time (Table 4) as were soldiers and other military personnel (Table 5).

Table 4. Median times (mins.) intervention compared with control by gender

	Intervention		Control		<i>p</i> Value
	Male	Female	Male	Female	
Time to PLTT	074.7	095.2	N/A	N/A	<0.001
Time to analgesia	079.0	104.6	125.2	190.9	0.01
Time to laboratory	089.6	109.5	116.1	154.4	<0.001
Time sent to radiology	106.4	156.9	139.8	199.5	<0.001
Time seen by physician	182.5	207.2	88.1	119.7	<0.001
Time to separation	281.0	332.5	297.6	349.0	0.01

Table 5. Median times (mins.) intervention compared with control by beneficiary category

	Intervention	Dependent	Control	Dependent	<i>p</i> Value
	Active Duty		Active Duty		
Time to PLTT	76.1	96.2	N/A	N/A	<0.001
Time to analgesia	89.2	111.8	138.4	191.2	0.01
Time to laboratory	77.4	107.9	128.6	152.0	<0.001
Time sent to radiology	101.7	159.1	161.5	192.9	0.05
Time seen by physician	184.1	208.4	98.9	117.5	<0.001
Time to separation	283.1	335.7	315.2	345.4	0.02

Nearly 90.0% of patients in the intervention group said that their experience with the provider PLTT model was very good or outstanding. Patient satisfaction decreased when asked about their overall ED experience (66.2%). Surprisingly, 68.9% said that the wait time spent in the ED was appropriate. When asked “would you return to this Emergency Department?” 90.5% answered “yes”.

Discussion

The PLTT model is an effective way of shortening waiting times. Patients are assessed and treated by experienced medical and support staff for ESI Categories 2 and 3.

Long waiting times increase the risks for acute emergencies, increases the period of patient suffering, decreases patient satisfaction and costs patients valuable time. While the cost effectiveness of reducing the waiting time cannot be accurately computed, its importance should not be underestimated. This study found that the average amount of time a patient spent in the WAMC ED is five hours and 34 minutes, considerably above the North Carolina, USA average of four hours and 35 minutes; the intervention group was able to save about 20 minutes off of this time.⁵

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Much of the time spent in the ED is due to patient flow issues: waiting for radiographic or laboratory test results, to see a physician or PA, and for final disposition. Reducing wait time has a direct positive impact on patient satisfaction. The best way to expedite patient treatment and disposition from the ED is to improve throughput. This frees up resources for less-critical patients (ESI Category 4 and 5) to be cared for and discharged from the ED.

Overall patient satisfaction declines for patients who have spent more than two hours in the emergency department,⁵ hospitals that cannot eliminate long waits can give satisfaction a considerable boost by keeping patients informed about delays. Our findings show the negative impact of long wait times can be mitigated by helping to control patient pain, frequently communicating with them, and by improving waiting room comfort.

The PLTT model requires experienced providers and staff to work. The intensity of work in the ED is highly variable. When a surge in demand arrives, the ED must be flexible in allocating and shifting resources that will best serve patients while maintaining linear flow.

One major limitation of this study was that only one Physician Assistant and one Combat Medic were dedicated to the project. Thus, initial patient management was restricted to one patient at a time; this limitation made it difficult to manage multiple patients simultaneously. However, with adequate resources the PLTT model could be more effective. It has the potential to reduce the build-up of waiting times that occurs as the day progresses. Another limitation of the study is that the results are not necessarily generalisable to other hospitals or military treatment facilities as only one month of data were obtained and these results may not be a true representation of what occurs over a longer period of time.

Conclusion

Provider Level Triage Teams are an effective way of shortening waiting times in the ED. Patients are assessed and treated by an experienced Emergency Medicine Physician Assistant and one Combat Medic. While there was small decrease in the overall time to disposition, patients were seen and moved through the ED system quicker; as well as kept informed of all major steps thus giving them increased satisfaction with their encounter. Further studies on the effectiveness of the model over a longer period of time are needed to assess fully its usefulness.

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Appendix 1. WAMC ED Patient Questionnaire

1. How would you rate your overall experience with Team Triage and Treatment?

Outstanding Very Good Good Fair Poor

2. What do you think of seeing a care provider in the triage area?

Outstanding Very Good Good Fair Poor

3. How would you rate your overall Emergency Department Experience?

Outstanding Very Good Good Fair Poor

4. Was your time spent in the Emergency Department?

Appropriate Somewhat too long

5. If given the choice would you return to this Emergency Department?

Yes No