

Improving emergency department patient flow

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Emergency departments (ED) face significant challenges in delivering high quality and timely patient care on an ever-present background of increasing patient numbers and limited hospital resources. A mismatch between patient demand and the ED's capacity to deliver care often leads to poor patient flow and departmental crowding. These are associated with reduction in the quality of the care delivered and poor patient outcomes. A literature review was performed to identify evidence-based strategies to reduce the amount of time patients spend in the ED in order to improve patient flow and reduce crowding in the ED. The use of doctor triage, rapid assessment, streaming and the co-location of a primary care clinician in the ED have all been shown to improve patient flow. In addition, when used effectively point of care testing has been shown to reduce patient time in the ED. Patient flow and departmental crowding can be improved by implementing new patterns of working and introducing new technologies such as point of care testing in the ED.

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Capsule Summary

What is already known

Published literature on improving patient flow in the emergency department is often contradictory.

What is new in the current study

This study identifies those factors that have been shown to improve patient flow within the emergency department.

INTRODUCTION

Across the world emergency departments (EDs) are facing increasing challenges due to growing patient numbers and an inability to flex capacity to meet demand. This is on a background of decreasing hospital resources. Consequently, ED crowding has become an ubiquitous, international phenomenon. Approximately half of all EDs report operating near or above maximum capacity.¹ Several studies have presented evidence that ED crowding contributes to a reduction in the quality of patient care,²⁻⁸ delays in commencement of treatment^{9,10} and that adherence with recognised guidelines worsens.¹¹ The link between ED crowding and mortality is increasingly being recognised.^{12,13} Another symptom of overcrowding is patients leaving without their care being completed. In the United States this accounts for 2% of all ED visits.¹⁴

Crowding occurs when demands placed on the ED are greater than the entire hospital's capacity to ensure timely care in the ED. The factors that contribute to poor ED performance can be classified as being either intrinsic or extrinsic to the ED.³ Departmental layout and staffing levels are examples of intrinsic factors that influence patient flow, whereas exit block related to the lack of inpatient bed availability and surges in patient demand are factors extrinsic to the ED that influence patient flow. The impact that the wider hospital system has on patient flow in the ED should not be underestimated. Blom et al.¹⁵ showed that the probability of a patient being admitted from the ED is negatively correlated to inpatient bed occupancy.

Improving patient flow within the ED is ultimately achieved by reducing the amount of time patients spend in the ED, thereby reducing departmental crowding. Shorter patient journey times are associated with improved patient satisfaction¹⁶ and reductions in mortality and morbidity.^{17,18}

The aim of this article is to review the evidence relating to strategies to reduce the amount of time patients spend in the ED in order to improve patient throughput in the ED.

DOCTOR TRIAGE

Triage is a brief intervention that should occur ideally within 15 minutes of the patient's arrival in the ED.^{4,19} The aim of triage is to risk stratify patient presentations and prioritise them accordingly as a way of allocating limited resources, such as staff and physical space based on their clinical need.⁵ Nurse-led triage is currently the international standard triage model throughout the world^{20,21} and there is insufficient evidence of any one triage scale being more effective than another.⁶ Utilising the triage nurse to request investigations, such as blood tests and X-rays, has been

shown to be associated with earlier diagnosis, shorter waiting times and faster patient throughput in the ED.²²⁻²⁴ For this system to be effective there has to be a robust training programme, protocols and a standardised approach to investigation.

Doctor-led triage is often cited as a possible solution to poor ED flow.⁵ It is important to differentiate having a doctor embedded in the triage process from other models of ED working such as 'see and treat' (or 'fast-track'). Triage is the initial assessment of undifferentiated patients, whereas see and treat identifies patients without serious illness or injury who are likely to have the potential for prompt discharge.

Rowe et al.⁵ evaluated the impact of having a doctor, of any grade, assisting the triage process. They demonstrated that a physician in triage is an effective intervention to alleviate the effects of ED crowding. Triage performed specifically by a senior doctor has been proposed as a way of accelerating patient flow through the ED, reducing admissions and improving the time to key decision making.² This is done by initiating prompt patient assessment, appropriate diagnostic testing and initiating treatment earlier in the patient's journey. This includes the identification of definite admissions and expediting swifter and safer discharge of patients not requiring further investigation or treatment.

A review confirmed that having a senior doctor in triage impacted positively upon many ED metrics and concluded that it offers a valuable solution to ED crowding.²⁵ Another systematic review found senior doctors, working individually at the front door of the ED or as part of a wider triage team is associated with a reduction in overall ED patient journey time and the length of time from the patient arriving to them being assessed by a doctor.⁵ Although it appears, as a model of working, doctor triage is beneficial to patient flow in the ED, the heterogeneous nature of the role of the doctor in these studies means it is difficult to determine the most efficient and effective model for senior doctor triage.

RAPID ASSESSMENT MODELS

Rapid assessment is the assessment, investigation, and initial treatment of patients as soon as they arrive in the ED. This model utilises the principle of single piece flow more commonly found in the automotive manufacturing industry.²⁶ Essentially early assessment and investigation coupled with prompt initiation of treatment aims to reduce the amount of waiting time that occurs between each of these steps in the traditional model. Typically these are patients that do not require resuscitation room or high dependency unit treatment.²⁷

A review article demonstrated that utilising a rapid assessment

model reduces the overall journey time of patients in the ED. This review article also demonstrated that the length of time it takes for patients to be seen by a doctor is reduced when a rapid assessment model is utilised.²⁷

The costs of implementing such system is often cited as a barrier to its introduction. However there is evidence that altering the existing work pattern within the ED and introducing a rapid assessment model within the confines of existing departmental resources is associated with improved patient flow.²⁸

STREAMING

Streaming is the process of allocating similar patients (with regards to disease severity or nature of complaint) to a particular work stream. Typically, patients in each work stream are assessed by dedicated staff in a specific geographical area within the ED. For example, 'see and treat' is a form of streaming where patients with less severe illnesses are allocated to a dedicated clinical area and receive assessment and treatment from a clinical team only seeing 'see and treat' patients. By its nature, triage leads to a build up of relatively well patients in the ED as critically ill patients are seen preferentially. However, streaming ensures less urgent patients continue to be seen in a timely manner. The individual patient work streams in the ED can be staffed by senior doctors, nurse practitioners, physician's assistants or a combination of all of these.²²

There is little evidence to support the use of streaming patients according to their triage categories as a means of redirecting patients from hospital EDs to other clinical settings outside of the hospital, such as primary care.³

There is evidence that dividing ED patients into work streams results in reduced waiting times and shorter ED journey times when compared with a non-streamed ED model.²² The effectiveness of this strategy is likely to be dependent upon how patients are signposted towards the different streams within the ED and whether there is appropriate staffing and physical space to meet the patient demand of each individual work stream.²⁹

There is limited evidence that dividing patients entirely based upon whether they are likely to be admitted or not has any benefit on ED patient flow.²²

PRIMARY CARE CO-LOCATED IN THE ED

Two reviews have evaluated the effectiveness of utilising primary care clinicians within the ED setting for patients with less urgent clinical problems.^{30,31} There was insufficient evidence comparing the safety of care provided by general practitioners in the ED com-

pared with emergency physicians. However, there is some evidence to suggest there is a potential for cost savings as general practitioners tend to order fewer tests and fewer admissions^{31,32} whilst patient satisfaction was increased.³² The waiting time for ED patients in hospitals with a colocated general practitioner service was on average 19% less than patients attending EDs without a primary care service.³³

POINT-OF-CARE TESTING

Point-of-care testing (POCT) provides clinicians with rapid results for commonly ordered investigations. Moving laboratory standard testing into the ED could increase the speed of diagnosis. Numerous reports have highlighted a reduction in turnaround times for investigation results utilising POCT in an emergency setting.^{22,34-37} A systematic review performed in 2011 showed that the introduction of POCT in the ED may reduce the total patient journey time in the ED.²² More recent studies have demonstrated a similar modest reduction in the amount of time a patient spends in the ED before a disposition decision is reached when POCT is utilised.^{36,37}

Norgaard and Mogensen³⁸ compared laboratory turnaround times when utilising POCT in the ED with centralised laboratory testing with an air-tube transport system for the rapid transport of blood samples. They showed that in this setting POCT yielded results on average 46 minutes earlier than from the central laboratory.

A multicentre randomised controlled study performed in the United Kingdom evaluated the performance of POCT in the ED examining cardiac biomarkers in patients with suspected myocardial infarction.³⁹ This study demonstrated a discharge rate which was 20% greater in patients who had blood analysed by POCT. Interestingly, this study demonstrated a greater effect in district general hospitals rather when compared with large university-affiliated teaching hospitals. This phenomenon has been demonstrated by other authors.⁴⁰ Interestingly, recent evidence suggests that POCT can add value when used in the prehospital setting and may reduce the number of patients brought to the ED.⁴¹⁻⁴³

Blood sample POCT is most commonly performed by nursing staff in the ED.⁴⁴ To ensure quality assurance there needs to be a robust training programme in place reinforced with regular recertification. This places an additional burden on members of staff who already have heavy workloads. However, improvements in patient flow seen within the ED as a result of the introduction of POCT are likely to reduce staff workload.⁴⁴

The cost of a single test performed utilising POCT is higher than the cost of a similar test performed in a centralised laboratory.³⁶

However, Rooney and Schilling⁴⁴ state that the time saved eliminating steps when POCT is introduced, such as the sample transportation, registration of the sample in the laboratory and time spent retrieving results, means the cost of utilising POCT seldom exceeds those of analysis in a centralised laboratory. An Australian study performed in 2014 concluded that each hour of patient time saved by utilising POCT costs approximately 120 Australian dollars (84.69 US dollars).³⁶

Jarvis et al.⁴⁵ combined POCT with consultant-led rapid assessment in the ED and demonstrated a 40% reduction in disposition decision time. This would support the idea that the overall effectiveness is dependent upon the processes within the ED.

The actual impact of implementing POCT in a specific ED varies greatly. Presumably, the overall effect POCT has on patient journey times is dependent on the effectiveness and productivity in the rest of the ED. Consequently, ED working patterns may require substantial modification to maximise the benefits of POCT. When used effectively, POCT has been shown to reduce delays to the initiation of treatment, increase patient discharge rates and decrease total ED journey time.⁴⁵

CONCLUSION

Poor patient flow, and the resulting crowding, represents a significant restriction on the ED's ability to deliver high quality emergency and urgent care. Excessive patient waiting, slow investigation turnaround times and delays in making disposition decisions are key factors intrinsic to the ED which affect patient flow.

The association between increased ED mortality rates and departmental crowding^{12,13} suggest that crowding should be treated as a significant public health concern. It is influenced by factors in the pre-hospital, wider hospital setting, community and social care and should not be considered as a problem based entirely in the ED. Nevertheless, the significance of these extrinsic factors should not disempower EDs from improving their processes and work patterns to assist patient flow.

The use of doctor triage, rapid assessment, streaming and the co-location of a primary care clinician in the ED have all been shown to improve patient flow. In addition, when used effectively POCT has been shown to reduce delays in disposition decisions being made and increase timely patient discharge rates with an associated reduction in the overall total patient journey time. There is an elevated cost when compared with laboratory testing on a test for test basis.³⁶ However, these increased costs may be outweighed by improvements in patient flow.⁴⁴

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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