

The Influence of Emergency Department Crowding on Patient Safety and Care Quality: Survey During War

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Abstract:

Background: Emergency crowding is characterized by an excess of patients in the emergency department beyond its capacity to provide timely care. Which had negative effects on patient outcomes, higher risks of adverse events, and diminished patient satisfaction

Aim: To assess the influence of Emergency Department Crowding on Patient Safety and care quality.

Method: a cross-sectional descriptive observational study was conducted within seven days. It involved 40 healthcare professionals working in the emergency department. Total sampling was done. Data were collected by electronic google form questionnaire and analyzed by SPSS version 27.0.

Results: chi square test showed there was a statistically significant association between overcrowding and the patient safety incidents, and no statistically significant association between overcrowding experience and timeliness of care delivery in addition to overcrowding and the rate of overall quality of care provided during crowding.

Conclusion: overcrowding in emergency departments during war has an adverse impact on patient safety and has not affected the quality of medical care provided to patients in an overall manner.

Keywords: emergency; overcrowding; quality of care; hand over; patient safety

Introduction

Emergency (ED) crowding is characterized by an excess of patients in the emergency department beyond its capacity to provide timely care. Which had negative effects on patient outcomes, higher risks of adverse events, and diminished patient satisfaction [1]. The emergency department is among the busiest hospital units. The functionality of this department significantly affects the functionality of other hospital units as well as patient satisfaction. [2]

All ages face complications due to overcrowding, especially geriatric. [3]

Hospitals work to avoid (ED) crowding by triage systems, and studies show that the solution of (ED) approaches can be broadly categorized into the organization or management level and operation level interventions. [4]

The quality and safety of emergency care are very important. Patients depend on emergency services for prompt and effective treatment, along with the essential 'safety net' role they play. As demand rises, it poses challenges for resources across various settings. In areas where emergency medicine is firmly established, quality standards and staff training are typically put in

place to enhance patient safety. Otherwise, in regions where physiotherapy is still growing, the system faces significant pressures, highlighting the need for appropriate graduated standards tailored to the local situation. [5]

Handover defined as 'a patient-centred process that presents adequate and contextually relevant patient-specific information from one medical professional to another. [6] Face-to-Face Communication: Whenever possible, conduct handovers in person for clarity. To clear up any ambiguities, encourage the new team to ask questions. Engage the Patients Make sure the patient is aware of their treatment plan by including them in conversations as needed. The following handover elements were judged necessary: a written handover note, the identities of the doctors, the history of the complaint being presented, the steps taken by the ED, and the ongoing plan. [7]

Crowding, limited resources, and rising patient demand in Emergency Departments (EDs) is a global issue affecting patient safety and care quality. Recent literature identifies the causes, harms, and varying measures of crowding. This review synthesized findings, noting that metrics for crowding are inconsistent and vary geographically. The main causes include patient, staff, and system-level factors, with outpatient boarding being a significant contributor. The review emphasizes the need for standardizing metrics and highlights the impacts of crowding on patients, staff, and healthcare costs to support advocacy and decision-making [8]. Current literature identifying causes and potential harms of crowding in EDs include patient, staff, and system-level factors, with outpatient boarding being a key issue. There is ongoing debate about how to best measure crowding. Many studies found that crowding measures vary significantly, even in nearby areas, and are increasingly using temporal metrics. The review suggests standardizing crowding metrics to improve patient outcomes, healthcare staff experiences, and manage healthcare spending effectively [9]. A number of factors contribute to ED overcrowding, such as: the incoming volume of patients, the time to process and treat patients (throughput), and the volume of patients leaving the ED (output) Patient boarding had been found to be one of the most significant factors among the others. The act of keeping patients in the emergency department (ED) for a longer period when the inpatient wards are not large enough is known as "boarding. Patient care, mortality, morbidity, patient satisfaction, and the standard of treatment are all negatively impacted. Along with increasing medical errors, these also lead to patients being in the ED for longer periods of time and leaving the facility without being seen [10]. Whenever considered as a unit, the literature indicates that ED overcrowding is linked to worse clinical outcomes, such as death, and lower performance [11].

Strategies were reviewed to improve ED performance, focusing on reducing crowding and optimizing resources [12]. Key strategies include advanced triage protocols, dynamic staffing, and the use of telemedicine and diagnostic technology. Findings suggest these approaches can significantly reduce wait times, improve patient flow, and enhance care quality. A comprehensive approach, blending organizational and technological innovations, is essential to meet the evolving needs of emergency healthcare [13].

A patient-centered process known as "handover" provides sufficient and contextually relevant patient-specific information from one medical Professional to another. Some standardized tools are used as Structured Format (like SBAR: Situation, Background, Assessment, and

Recommendation) [14]. Face-to-Face Communication: For clarity, complete handovers in person whenever at all practicable. Encourage Questions: Give the new team the opportunity to ask questions in order to get any doubts answered. Engage Patients: Make sure the patient is aware of their treatment plan and participates in talks as needed.

Documented handover notes, doctor names, complaint history, ED actions, and an ongoing plan were considered crucial handover components. By the time the final patient recovery was completed, there had been a noticeable improvement in the frequency of these components [15]

In this research, we aim to assess the influence of Emergency Department Crowding on Patient Safety and care quality.

Method

The study was hospital-based observational descriptive cross-sectional study. It was done in Port Sudan teaching hospital in Port Sudan city that contain estimated number of trained and qualified medical staff, as well as its strategic location, where this hospital was adopted because it covers large population area with high number of medical care providers, and the quality of the medical service provided, covering all specialties as well as providing patients with diagnostic capabilities. The target population consists of all healthcare professionals working in the Emergency Department (ED) of Port Sudan Teaching Hospital. Medical officers, ER Residents, and ER Specialists were included. While house officers, ER nurses, and laboratory technicians were excluded. The sampling technique used was purposive sampling. The sample size of this study was 40 participants. The data collectors were well trained and approached all subjects (n=40) using structured electronic Google form questionnaire. The questionnaire consisted of sections on demographic information (age, gender, years of experience), perception of ED crowding (frequency, impact on patient care), suggestions for improving ED efficiency and patient safety, and hand over assessment. All data that led to the identification of participants have been treated confidentially. The study purpose was explained clearly to each participant before filling the questionnaire.

The data were analyzed by Statistical Package for Social Science (SPSS) software version 27.0. Categorical variables were described statistically by frequency and percentage. Chi square test was used to assess relations. The ethical approval was held from Port Sudan teaching hospital and verbal consent was taken from each participant. Each participant was informed that the data collected for this study would be used for strictly scientific purposes, and no names would appear in any stage.

Results

The majority of the doctors were medical officer (26,65%) with experience less than one year (18,45%). (24,60%) of them strongly agree with the fact that war increase the overcrowding in emergency department. (15,37.5%) of the doctors have never experienced overcrowding. Compared to normal times, (37,92.5%) of them stated that the emergency department is much more crowded, and the highest level of overcrowding was observed in the morning (19,47.5%). (27,67.5%) of the working staff think that high patient influx is the major cause for overcrowding, and most of them strongly agree with the fact that overcrowding increases patient morbidity and mortality (19,47.5%). [table-1]

Characteristics	Frequency (n)	Percentage %
Position		
ER specialist	3	7.5
Medical officer	26	65.0
Registrar	11	27.5
Working experience		
1-3 years	16	40.0
4-6 years	5	12.5
Less than 1 year	18	45.0
More than 6 years	1	2.5
Do you think that the war increased the overcrowding in the emergency department?		

Agree	16	40.0
Strongly agree	24	60.0
On a scale of 1 to 5, how often do you experience crowding in the Emergency Department? (1 = Never, 5 = Always)		
1	11	27.5
2	4	10.0
3	6	15.0
4	4	10.0
5	15	37.5
During times of war, how would you rate the level of crowding in your ED compared to normal times ?		
Less crowding	2	5.0
Much less crowding	1	2.5
Much more crowding	37	92.5
What time of day do you typically observe the highest levels of crowding?		
Afternoon	18	45.0
Evening	3	7.5
Morning	19	47.5
What do you think are the commonest causes of crowding in your emergency department?		
High patients' influx	27	67.5
Limited staff	3	7.5
Limited beds	10	25.0
Do you believe that crowding leads to increased patient morbidity and mortality?		
Agree	17	42.5
Disagree	1	2.5
Neither agree nor disagree	3	7.5
Strongly agree	19	47.5

Table-1: Demographic and overcrowding characteristics of the participants (n = 40)

A chi-square test was conducted between overcrowding and patient safety incidents, and there was a statistically significant association between overcrowding and the patient safety incidents, $p = 0.003$. [table-2]

Safety incidents				P value
	No	Yes	Total	0.003
Witnessed overcrowding	No	4	4	
	Yes	1	31	
Total	5	35	40	

Table-2: Chi-square test showing the relation between overcrowding and patient safety incidents (n = 40)

Also, it is conducted between overcrowding experience and timeliness of care delivery, and there was no statistically significant association between them, $p = 0.405$. [table-3]

Timeline of care delivery						P value
		No change	Significant	Somewhat	Total	0.405
Crowding experience	1	1	6	4	11	
	2	0	1	3	4	
	3	2	1	3	6	
	4	0	1	3	4	
	5	1	8	6	15	
Total		4	17	19	40	

Table-3: Chi-square test showing the relation between overcrowding experience and timeliness of care delivery (n = 40)

In addition, the same test was done for overcrowding and the rate of overall quality of care provided during crowding, and there was no statistically significant association between the two variables, $p = 0.160$. [table-4]

Overall quality of care								P value
		1	2	3	4	5	Total	0.160
Crowding experience	1	2	2	1	3	3	11	
	2	0	1	2	1	0	4	
	3	1	0	1	4	0	6	
	4	0	0	3	1	0	4	
	5	5	2	3	5	0	15	
Total		8	5	10	14	3	40	

Table-4: Chi-square test showing the relation between overcrowding and the rate of overall quality of care provided during crowding (n = 40)

Regarding, the strategies have been implemented to alleviate overcrowding in the emergency department, triage systems, rapid assessment units, and improved communication with inpatient wards were the common ones (26,65%; 5,12.5%; 5,12.5%), respectively. [figure-1] (19,47.5%) of the staff agree with the fact that the hand over between shifts has effect on the emergency department in ensuring patient safety during crowded condition. [figure-2]

Discussion

Similar to several studies conducted earlier, the general aim was to assess the influence of overcrowding in emergency departments on the outcomes of patient care. The unique aspect of our study is to allocate additional space to evaluate the hand over between the shifts on the quality of medical care provided.

The demographic and career characteristics suggested that the majority of the staff was medical officers, with an experience less than one year. Most of them were strongly agree that war increases the overcrowding state in emergency units, and they have not experienced overcrowding never.

Unlike the target population in our study, the target population was patients. Their average age was 56 years, the majority of them were females, with mild disease severity, and the median of hospital length of stay was three days [21].

Regarding crowding description, the majority claimed that it was frequently observed during morning, it is main cause was high patient influx, and it increases patient morbidity and mortality according to doctors' perspectives.

In the same study, the most common crowding measures were the architecture design of the emergency department, and the prolonged time of emergency treatment [21]. However, the overall differences between the target populations and the sample sizes in both studies are behind the variation between their results.

The essence of the findings is the impact of overcrowding on patient safety incidents, the timeline of healthcare delivery, and the quality rate of medical care provided during overcrowding. There is a statistically significant association between overcrowding and patient safety incidents, as well as the timeline and the overall quality rate, were not statistically significant associated with overcrowding in emergency departments. This finding in line with what was found in this study, which acknowledged that overcrowding delays the therapeutic process, which in turn leads to unexpected deaths [22]. Moreover, in this study it was concluded that overcrowding in emergency departments is associated with poor performance of medical personnel, and negative clinical outcomes [23]. This difference in the timeline for medical services delivery and the overall quality of healthcare can be attributed to the fact that overcrowding may be the weakest factor among a group of factors that lead to the impoverishment of therapeutic outcomes in emergency department.

Regarding the strategies used to reduce the impact of overcrowding on emergency departments, triage systems, rapid assessment units, and improved communication with inpatient wards are the most feasible methods from the point of view of the medical staff. This is consistent with the study's statement that improving human resources efficiency and integrating predictive algorithms would reduce the adverse effects of overcrowding [24].

For hand over among medical personnel, nearly half of them believe that the hand over process between shifts affects the safety of patients in overcrowded emergencies. Our study gave a superficial picture of the relationship between hand over among the shifts and patient safety. However, this systematic review deepened the factors leading to poor hand over and its consequences, which were weak and lost effective communication between staff members, scarce training, lack of standard hand over method, and delay in hand over [25].

The study findings represent a clear mirror to reflect the reality of emergency departments during war. Thus, proper planning of anti-machines can reduce

the adverse effects of overcrowding and push away potential threats to patients' safety.

The strengths of this study are that it covered all the medical staff working in the emergency department of Port Sudan Teaching Hospital, which is one of the most important hospitals that receive ovations of settler and displaced patients on a daily basis during the war. It also indicated the hand over between the shifts and that it may be one of the factors negatively affecting patients' safety. In contrast, Cohort retrospective study may be the optimal study design for this research especially with regard to testing associations.

Conclusion

In the conclusion, overcrowding in emergency departments during war has an adverse impact on patient safety and has not affected the quality of medical care provided to patients in an overall manner. The ministry of health and responsible medical departments should strengthen strategies that combat the negative effects of overcrowding.

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