Volume 05, Issue 06 (November-December 2022), PP 18-25 www.ijmsdr.org
ISSN: 2581-902X

International Journal of Medical Science and Dental Research

Bed Management Strategy for Overcrowding at the Emergency Department

Abdullah Ibrahim Alfozan, Musaad Ibrahim Alfawzan, Saad Abdulrahman Bin Hameed, Fahad Abdullah Alhwemil, Mohammed Saeed Bazayd, Abdulmageed Mohammed Alyabes, Mohammed Saad Almotawa, Abdullah Farhan Alanazi, Asrar Ahmed A Ghamdi, Badraih Salman Alshehri, Afaf Taher Nafe
Corresponding Author: Abdullah Ibrahim Alfozan
Ministry of Health, Saudi Arabia

Abstract
ED crowding has emerged as a new hazard to patient safety and health-care systems globally. As the problem of ED crowding continues to expand, it is critical to identify the elements that contribute to ED overcrowding. Hospital beds are a limited resource that is continually in demand. When a patient is admitted to the emergency department, there may not be a bed available that matches the specified speciality. As a result, the scarcity of available hospital beds has become a serious issue, and modifying bed-management policies could enhance patient flow. A PRISMA flowchart-based systematic review was undertaken utilizing online databases such as ProQuest and Google Scholar, using keywords such as bed management, emergency department, and overcrowding, and academic publications and articles published between 2003 and 2016. There are some reasons that contribute to ED crowding. Identifying, creating, and implementing solutions to reduce hold time and other barriers would be critical to improving patient flow. Changing hospital bed management policies is worth investigating in order to improve hospital patient flow and LOS (Length of stay). With this knowledge, hospital administration will be better able to create methods to prevent bed overflow and so improve patient care.

Keywords: bed management, emergency department, overcrowding

I. Introduction

Emergency rooms serve a vital role in providing continuous access to healthcare 24 hours a day, seven days a week; nevertheless, controlling patient flow in emergency rooms is difficult due to a scarcity of available hospital beds (ERs). The ER patient flow competes with the flow of planned hospital admissions for the same beds, and there aren't enough beds.

In a disordered system, a clearly defined policy on either prioritizing ER patient flow over planned admissions or vice versa contributes [1].

Overcrowding has been recognized as the most significant issue and the most preventable cause of harm confronting hospital systems [2]. Overcrowding is defined by the American College of Emergency Physicians

as a condition in which the identified need for emergency services exceeds available resources for patient care in the ED, hospital, or both [3]. Another definition of overcrowding is the circumstance that develops when the demand for emergency department services exceeds the available supply or when patients cannot be moved to the inpatients area [4]. Overcrowding owing to poor patient flow puts more than 500.000 patients in the UK emergency department at risk each year [5] It has been associated to increased mortality [6], as well as reducing ED staff's ability to predict surge pressures from neighbouring emergency facilities.

Because hospital beds are a limited resource, bed planning and allocation are critical components of hospital resource planning. When the emergency department agrees to admit a patient and the assigned bed matches the requirements requested, this is an accepted case.

Because the patient is maintained inside the relevant clinical speciality, the hospital refers to this as a 'contained' case. If there are no available beds that match the desired specialism at the time of demand, bed 'overflow' occurs.

For better nursing care, the overflow specialization is likely to be medically close to the requested expertise [7]. Bed management has been an issue in hospitals on occasion, but with increased demand, it has become more crucial. Furthermore, bed management has emerged as a key requirement for providing high-quality, cost-effective health care [8].

Bed management is the allocation and provision of beds, particularly in hospitals where beds in specialised wards are limited [8]. The hospital's bed occupancy rate (BOR), particularly at the specialty level, varies due to the inherent variance of supply and demand by day of the week and time of day. The decision of allocating an overflow bed or allowing the patient to wait longer at the emergency department can be difficult. Policies, such as the 'no waiting more than 6 hours in the emergency department' rule, may exist as guiding principles. In actuality, however, there are more aspects to consider, such as the level of accident and emergency department crowding, predicted demand and supply (for example, planned discharges) [7].

As a result, understanding the source of overflow is critical in order to provide an effective and efficient service to prevent bed overflow and thereby improve patient care in hospitals.

II. Methods

2.1 Data source

This study is a systematic review utilizing the PRISMA flowchart, and the data sources are online databases such as ProQuest and Google Scholar with the keywords bed management, emergency department, overcrowding, and academic publications and articles from 2003 to 2016.

2.2 Search strategy

The authors used ProQuest to search for the phrase 'bed management' with no year restrictions, and they discovered 72 publications. The first constraint is academic publications, which contain scientific articles that present research findings and are authored by researchers for academic readers. Before publication, the publications must have been vetted by specialists in the same subject area. There are 472 items discovered from the first restriction. The writers then apply a period or time constraint, selecting only studies published between 2003 and 2016, and there are 454 articles found. The authors limit the time span of the study to the last 13 years. The author additionally includes a subject and classification constraint, yielding 49 items. We add a second keyword into 'bed management' AND 'overcrowding' to filter all the journals and get closer to the title and study purpose, so the writers receive the final result for 18 articles. Figure 1 depicts the detailed selection process.

III. Results

The flow of patients entering the department was discovered to be the most significant cause of crowding in a study conducted by Morri, Boyle, Beniuk, and Robinson in the United Kingdom (UK). The volume and character

of demand have an impact on this. The time-based 4 h requirement in the United Kingdom has most likely increased flow into EDs by making access more accessible. Crowding is exacerbated by a shortage of nurses, junior medical staff, and specialized doctors [9]. Another reason for ED bed shortages is that admitted patients waiting to be transferred from the ED to inpatient wards limit the ED's capability to accept new arrivals and use Ed's resources [10].

The negative repercussions of overcrowding in the emergency department, such as delays in diagnosis and access, can result in unnecessary death and disability. Crowding can also cause antibiotic and thrombolytic administration delays, as well as errors such as mislabeled radiology and pathology request forms. [9]

Table 1: Results of selection process.

No.	JOURNAL TITLE	AUTHORS	METHODS	VARIABLE	ANALYSIS	RESULTS
1.	Consequences for overcrowding in the emergency room of achange in bed management policy on available in hospital beds, Australia (2016)	Claret, Pierre-Graud Boudemaghe, et all	Computerized simulation & observational descriptive study	Number of patients per day who had to wait for a bed in the ER	1. This computerized simulation Estimate the number of patients waiting for a hospital bed on each day. 2. At the observational study found the correlation between the LOS in the ER and the hospital bed occupancy rate.	1. From 5388 patients were admitted to the ER during the month of January 2013 there are 307patients had to wait in the ER bed waiting area for a hospital bed to become available. 41 were surgical patients and 266 were medical patients. This represented an average approximately 10 patients per day. 2. 10% increase of BOR induces 18 minutes in ER average waiting time and have a longer LOS
2.	Emergency department crowding:towards an agenda forevidence-based intervention, UK (2011)	Morris, Z. S. Boyle, A. Beniuk, K. Robinson, S.	Conceptual synthesis approach (systematic review)	Impact, causes and consequences from EDcrowding	Determine the causes & synthesise existing knowledge around theproblem of emergency department (ED) crowding	The largest cause of crowding is theflow of patients into the department. Other factors are associated with crowding are poor physical design & shortage of physical space equipment and computers, difficulties in accessing medical notes, tests, results and ancillary services and time spent ondischarging or arranging follow up appointments.
3.	A Bed Management Strategy For Overcrowding In the Emergency Department, USA (2012)	Barrett, Lynn Ward-Smith, Peggy	Retrospective review	Patients wait time from ED to transferredto other unit	The average time from ED arrival to discharge is decreased	Decreasing the wait time allows theED to care for another patient, decreased mortality rate from 2,9 in2009 to 2,2 in 2010. Decreasing thewait time for inpatient bed improved 1% of patient satisfactionand increased revenue.

No.	JOURNAL TITLE	AUTHORS	METHODS	VARIABLE	ANALYSIS	RESULTS
4.	The Relationship Between Emergency Department Crowding and Patient Outcomes:A Systematic Review, USA (2014)	Carter, Eileen J Pouch, Stephanie M Larson, Elaine L	Systematic review	Patient health outcomes	•ED crowding is associatedwith higher rates of inpatient mortality amongthose admitted to the hospital from the ED and discharged from ED to home. •ED crowding is associatedwith higher rates of individuals leaving the ED without being seen by careprovider	•Based on 3 international studies, the relationship between ED crowding and patient 30 day mortality was significantly 1,26 greater among paediatric patients with confidence interval 1,02–1,59. •From the five studies that examined the relationship between ED crowding and rates of patients leaving ED without being seen by care provider ranged from 213 to 14.170 and reported a positive correlation between ED crowding measures and patients leaving the ED prior to receiving care.
5.	The probability of patients being admitted from the emergency department is negatively correlated to in-hospital bed occupancy – a registry study, Sweden (2014)	Blom, Mathias C Jonsson, Fredrik Landinolsson, Mona Ivarsson, Kjell	Retrospective descriptive study	Bed occupancy	•On the crude analysis, the admitted fraction as smaller in strata of increasing in hospital occupancy. The admitted fractions were 31.5%, 30.9%, 29.9%, and 28.7% for levels in hospitaloccupancy < 95%, 95–100%, 100–105% and >105%. •The odds ratio after been adjusted for admission was decreased being 0,88 for occupancy level 95–100%, 0,82 for occupancy level 100–105%, and 0,74 for occupancy level > 105% relative to the odds ratio for occupancy level < 95%	•Both crude and the adjusted analysis revealed a negative association between in-hospital occupancy and the odds ratio of patient admission. •High in hospital occupancy is associated with decreased odds ratios For admission of patients presenting in the ED •Physicians admit patients who could be managed safely in the outpatient setting.

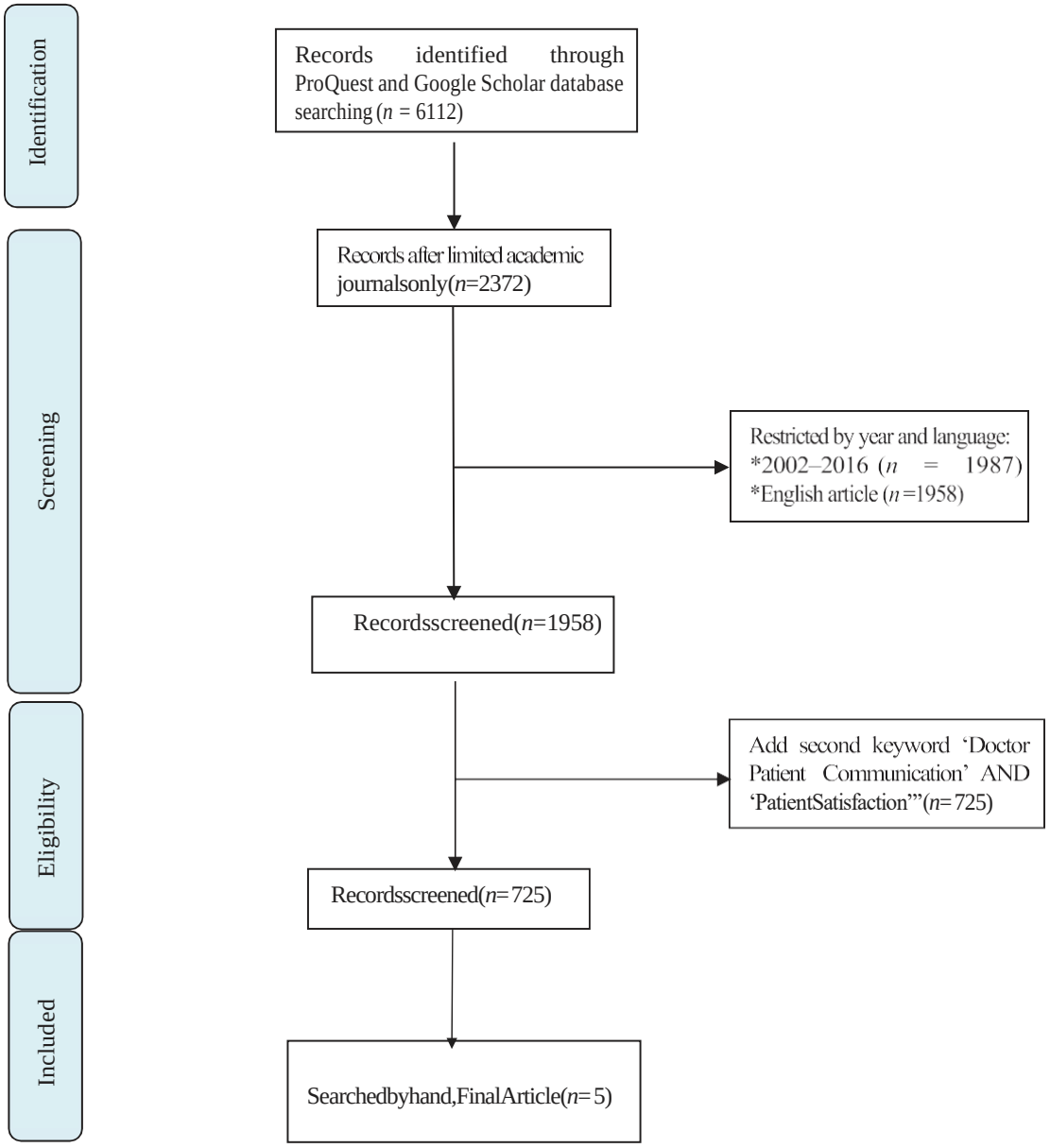

Figure 1: Flow chart of study selection.

According to a comprehensive review of the literature conducted by Barret, Ford, and Ward-Smith in the United States of America (USA), 30 - day mortality was considerably higher among paediatric patients exposed to ED - crowding. Another retrospective stratified cohort analysis found that patients admitted to the hospital via the ED during crowding periods had a 34% higher risk of 10-day inpatient mortality than those admitted during non-crowding periods. [11].

Improving rules for better hospital bed management is a crucial need, particularly in order to decrease ER overcrowding. An observational study published in 2003 discovered a substantial relationship between ER LOS and hospital bed occupancy rate (Forster et al., 2003). Indeed, a 10% increase in bed occupancy causes an 18-minute increase in ER average waiting time (12–24 min) [1].

The study, which included 2347 patients, consisted of a computerized bed management simulation based on day-by-day data collected from 1 to 31 January 2013 in a teaching hospital. The least efficient was the one that prioritized emergency patients presenting with a medical condition. The scenario with the most efficiency was the one that prioritized planned admissions and surgery. [1].

According to the study by Barret, Ford, and Ward-Smith, the need to address overcrowding in the ED is hypothesized timelessness of care provided, patient happiness, and ED staff productivity. Based on data from 10.967 patients in Kansas City over a 12-month period in 2010, a bed management method revealed that the majority of the 113-minute time reduction happened in the wait for an inpatient bed, once the choice to admit was made. The total risk-adjusted mortality rate at this hospital reduced from 2,9 in 2009 to 2,2 in 2010, which was associated to the wait time to be transferred from EDn inpatient. Between 2009 and 2010, the overall composite score of patient satisfaction improved by 1%. Reduced wait time also allows the ED to care for another patient, bringing the total to 2.936. Increased patient volume by 2936 in 2010 had the potential to improve hospital revenue. At the same period, overall hospital mortality fell by 0.07%, and patient satisfaction increased by 1% [11].

Another study, conducted by Blom, Jonsson, Landin-Olsson, and Ivarsson, found a link between emergency department (ED) overcrowding and poor patient outcomes, with in-hospital occupancy related to the likelihood of patients being admitted from the ED. According to the data obtained from Helsingborg General Hospital in southern Sweden, in-hospital occupancy was significantly associated with a lower odds ratio for admission in the study population. The admission fractions from 118.668 visits were 31.5%, 30.9%, 29.9%, and 28.7% for hospital occupancy levels of 95%, 95-100%, 100-105%, and > 105%.

IV. Discussion

There are five variables that contribute to ED crowding: diversion, boarding, a spike in the number of patients departing without treatment, and longer than typical wait times [12]. These criteria can be used to assess when an emergency department is full and to differentiate between periods of crowding and periods of excess patient volume, which results in congestion.

Changing hospital bed management policies is worth investigating in order to improve hospital patient flow and LOS. Downstream bed management is merely one of the elements that could improve overall organization function. Other issues include the necessity to rearrange upstream channels and reinforce ER"s' internal organization.

Understanding what is doable and acceptable in the context of ED congestion is crucial to developing practice, and using this to change practice in a careful and studied manner.

Improving the hold time required for transfer to an inpatient bed is one strategy to improve ED care. It is necessary to identify, develop, and implement methods to overcome additional barriers.

Crowding in the emergency department is associated with increased rates of inpatient mortality among those admitted to the hospital from the ED and released from the ED to home. Crowding in the ED is also linked to greater percentages of people leaving without being seen.

The findings of physicians in lowering admissions when in-hospital beds are few support the link between in-hospital occupancy level and decreased chance of admission.

V. Conclusion

In today's health-care system, ED crowding is a major concern. Because the need for health-care services is likely to rise as the population ages, the issue of ED crowding will become even more pressing.

Crowding in the emergency department also contributes to an increase in mortality and medical errors. The author of this review hopes that by thoroughly understanding the bed management system, we can reduce ED crowding and avert major incidents.

Collaboration between physicians and managers maximized patient flow to reduce hospital admissions, facilitate earlier discharges, and limit needless transit of patients from home to hospital to avoid ED overcrowding.

With this knowledge, hospital administration will be better able to create methods to prevent bed overflow and so improve patient care.

References

[1] Claret, P. G., et al. (2015). Consequences for overcrowding in the emergency roomof a change in bed management policy on available in-hospital beds. Journal of theAustralian Healthcare & Hospitals Association, vol. 40, no. 4, p. 466.

[2] Richardson, D. B. and Mountain, D. (2009). Myths versus facts in emergency department overcrowding and hospital access block. The Medical Journal ofAustralia, vol. 190, no. 7, pp. 369–374.

[3] American College of Emergency Physicians. (2006). Public training in cardiopul- monary resuscitation and public access defibrillation PlumX Metrics. Annals of Emergency Medicine.

[4] Bernstein, S. L., et al. (2009). The effect of emergency department crowding on clinically oriented outcomes. Academic Emergency Medicine: Official Journal of theSociety for Academic Emergency Medicine, vol. 16, no. 1, pp. 1–10.

[5] College of Emergency Medicine. (2014). Crowding in Emergency Departments. The College of Emergency Medicine.

[6] Geelhoed, G. C. and de Klerk, N. H. (2012). Emergency department overcrowding,mortality and the 4-hour rule in Western Australia. The Medical Journal of Australia,vol. 196, no. 2, pp. 122–126.

[7] Teow, K. L., El-Darzi, E., Foo, C., et al. (2012). Intelligent analysis of acute bed overflow in a tertiary hospital in Singapore. Journal of Medical Systems, vol. 36, no. 3, pp. 1873–1882.

[8] Baru, R. A., Cudney, E. A., Guardiola, I. G., et al. (2015). Systematic review of operations research and simulation methods for bed management, in Proceedingsof the IIE Annual Conference and Expo, pp. 298–306. Nashville, TN.

[9] Morri, Z. S., Boyle, A., Beniuk, K., et al. (2012). Emergency department crowding:Towards an agenda for evidence-based intervention. Emergency Medicine Journal,vol. 29, no. 6, pp. 460–466.

[10] Johnson, K. D. and Winkelman, C. (2011). The effect of emergency department crowding on patient outcomes: A literature review. Advanced Emergency NursingJournal, vol. 33, no. 1, pp. 39–54.

[11] Barrett, L., Ford, S., and Ward-Smith, P. (2012). A bed management strategy for overcrowding in the emergency department. Nursing Economic$, vol. 30, no. 2, pp.82–86.

[12] Bellow, A. A., Jr. and Gillespie, G. L. (2013). The evolution of ED Crowding. Journal ofEmergency Nursing, vol. 40, no. 2, pp. 153–161