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Emergency Department Overcrowding And Its Impact On Patient Outcomes In Saudi Arabia: A Systematic Review At Saudi Arabia 2024

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Abstract

Background: The emergency department (ED) plays a vital role in providing life-saving services in hospitals worldwide. province, Saudi Arabia, the Ministry of Health introduced the "Door to Disposition" key performance indicator (KPI) to enhance ED service quality by addressing overcrowding, limited bed capacity, delays in patient transfer, and complex logistical inefficiencies. Emergency Medical Services (EMS) are undergoing a rapid transformation in Saudi Arabia under the national Vision 2030 framework, which seeks to enhance healthcare quality, accessibility, and responsiveness. Paramedics have emerged as key agents in achieving these goals through the delivery of advanced pre hospital care, technological integration, and patient-centered service models. The review concludes by proposing a strategic framework that aligns workforce development and technological advancement with Vision 2030 objectives for sustainable, high-quality emergency healthcare of teamwork in nursing.

The aim of this systematic review: To assess the effecting between emergency department Overcrowding and Outcomes of teamwork care in Saudi Arabia 2024.

Methods: This systematic review was conducted based on the Preferred Reporting Items for Systematic Reviews (PRISR) 2024 review protocol. We systematically reviewed the emergency department Overcrowding and Outcomes of teamwork care.

Results: particularly due to their constant patient interaction regarding effecting between Emergency Department Overcrowding and Outcomes of nursing care on patient: A Systematic Review at Saudi Arabia 2024. Prolonged Overcrowding and Outcomes of care and consultation time, and physical response to the final decision, and leads to burnout nurses and staff, wrong diagnoses, and management plans. Crowding issues are resolved by awareness, triad systems, and technological and telemedicine services.

Conclusion: ED crowding is becoming a major problem in the delivery of holistic care services in Saudi Arabia. Although significant improvements have been made, workforce shortages and overcrowding in emergency departments continue to be major challenges. Emergency departments in major cities often experience overcrowding, which results in longer wait times and overburdened healthcare professionals.

Introduction:

Background:

The Emergency Department (ED) is one of the most crowded hospital units, where many patients with various medical conditions, including high-risk patients, are admitted [1]. The main purpose of the ED is to treat emergency and urgent cases that need immediate assistance through a rapid diagnosis and the administration of a medical or surgical treatment in a very short time.It has now established that the malfunctioning of health services in the community leads to improper access to the ED, especially in the geriatric and pediatric age groups [1–2]. ED's crowding, sometimes referred to as overcrowding and has identified as a problem for a timely and efficient assistance since the1980s [3].

The quality of the emergency department is critical in supporting life-saving instances in hospitals worldwide. In the context in Saudi Arabia, a Door to Disposition Key Performance Indicator was implemented to improve the quality of services in the emergency department (ED). [4] This initiative addresses the problems of limited emergency beds, slow patient transfer processes, unreliable ambulance transport services, prolonged test results, and complex logistical inefficiencies.[5] Challenges impacting ED services result from rapid population growth and urbanization, which puts pressure on healthcare infrastructure.[6] According to the Ministry of Health, Saudi Arabia .

Overcrowding can defined as a situation in which the performance of the emergency department compromised, mainly due to the excessive number of patients waiting for consultation, diagnosis, treatment, transfer, or discharge [7]; overcrowding is characterized by an imbalance between supply and demand [8]. Although many factors contribute to overcrowding, the latter depends essentially on three factors: the incoming volume of patients (input), the time to process and treat patients (throughput), and the volume of patients leaving the ED (output) [9].

According to the Crowding Resources Task Force of , an ED is considered crowded when the identified need for emergency services is greater than the available resources in the ED [10]

American College of Emergency Physicians amended this definition to be quantifiable by defining ED crowding as any time when "inadequate resources to meet patient care demands lead to a reduction in the quality of care." In, the Institute of Medicine (IOM) released a series of reports stating that emergency medical services in the United States are overwhelmed and underfunded. In response to the Institute of Medicine reports, The Joint Commission has deemed that every hospital must have a plan to address the growing problem of crowding in the ED [11]. However, few hospitals have been able to develop an effective strategy to combat the daily occurrence of ED crowding. Many factors such as increased patient volume, nursing staff shortages, decreased inpatient beds, increased acuity of patients entering the ED, and increased number of patients boarded in the ED have shown consistently contribute to ED crowding [12].

Artificial intelligence has revolutionized emergency response coordination. The introduction of A enabled dispatch platforms in Saudi Arabia allows real-time prediction of high-demand zones, optimizing ambulance placement and readiness [13]. Machine learning algorithms analyze previous incident data, road networks, and traffic patterns to determine the fastest routes for paramedic deployment. [14] These systems contribute directly to the Vision 2030 objective of achieving faster, more equitable, and data-driven healthcare delivery.[15]

Telemedicine integration has proven especially valuable for rural and remote regions where specialized medical expertise may not be immediately available. Paramedics can now transmit ECG readings, Ultrasound images and vital signs directly to hospital emergency teams, enabling pre-arrival preparation for critical interventions such as cardiac catheterization or trauma surgery [16] This digital linkage bridges the pre hospital gap and improves patient outcomes through early diagnosis and decision-making.[17]

Method

Aim of the study:

To assess the effecting between emergency department Overcrowding and Outcomes of teamwork care in Saudi Arabia 2024.

Study design:

A literature review study was performed. This design was used to reconceive the presented problem's perspective and facilitate an effective answer. The methodology follows through the included electronic databases: Google Scholar, PubMed, and Saudi Digital Library (SDL). To ensure a comprehensive and

robust analysis, the research methodology employed various strategies, including constant comparison, prolonged engagement, member check, and triangulation. The research team consisted of experts in health policy and management and qualitative and quantitative research methodologies, along with specialists in emergency department management.

Search strategy:
This systematic review was conducted based on the Preferred Reporting Items for Systematic Reviews (PRISR) 2024 review protocol .A comprehensive database search of the Web of Science, Scopus, and PubMed databases was conducted in November 2024, using key terms related ("emergency department", "Overcrowding ", "Outcomes ", "teamwork", and "care"). The keywords were combined using advanced field code searching , phrase searching, truncation, and the Boolean operators "OR" and "AND".A structured search was conducted to identify peer-reviewed articles aimed at assessing the relationship between overcrowding and Overcrowding and Outcomes of care , published between January 2020 and November 2024. Only Studies that were conducted in the ED settings were included

Search methods
A systematic review was conducted using four databases (CINAHL, PubMed, Scopus, Cochrane Library), following the preferred reporting items for systematic reviews and meta-analysis (PRISR). We went through Google Scholar, the National Center for Biotechnology Information, Science Direct, Ovid, Cochrane, the Saudi Journal of Emergency Medicine, Medline, and PubMed as databases. Our criteria were articles done in Saudi Arabia from 2020 to 2024. One hundred and ninety-six (190) research papers were extracted; only 20 articles met our paper inclusion-exclusion criteria.

Inclusion criteria
The studies that were chosen were limited to studies published in English full-text articles from 2020 to 2024. Moreover, there should be strategies or solutions that can be used as a basis for the results of this study.
(1) All primary study designs that evaluate the overcrowding in EDs in Saudi Arabia.
(2) Articles published in the last 4 years (2020-2024).
(3) Peer-reviewed articles originally published in English.

The exclusion criteria
The exclusion criteria were studies that had nursing as respondents. The decision was made to focus on doctors and teamwork inside the health sector as a whole. While doctors are an integral part of the healthcare system, the aim of this study was to explore the experiences of a broader range of healthcare workers.
(1) Any research that is related to Saudi Arabia.
(2) Studies published before 2019.
(3) Articles not relevant to our objectives.

Synthesis of Data
Once the data had been extracted, the results were categorized and organized so they could be analyzed and compared to meet the objectives of the review. The authors chose All reviewers collected the articles to create a literature review and then worked together to include articles that addressed ED crowding, including causes, effects, solutions, or all three in Saudi Arabia. The information obtained on screening tools (structure and characteristics, psychometric properties, and availability of validation studies) was collated throughout this time.

Table 1 Characteristics of reviewed articles about effecting between Emergency Department Overcrowding and Outcomes of care.

Author, Date,	Country Region	Study design	Study aim	Results
Drennan et al.	Multi in hospital, center Study	A systematic review	To relatively limited evidence of this	The majority of the studies reviewed did not comment on or measure the structure of the

(2024) [18]	Internationally		relationship in emergency departments. Those that have been published identified that lower nurse staffing levels in emergency departments are generally associated with worse outcomes with the conclusion that the evidence in emergency settings was, at best, weak.	team in terms of experience, specialist qualifications in emergency nursing or length of service and patient outcomes, with the exception who found no association between years of staffing experience in ED and time to analgesia. Other studies that have explored the structure of the team have reported variability in the association between years of RN experience and mortality, failure to rescue, and adverse patient events in acute care hospitals with the majority of studies reporting no association. This paper confirms that lower levels of nurse staffing are associated with an increase in patients leaving without being seen, time patients spend in the department and patient satisfaction. Outcomes not reported in a previous review are identified, including that lower levels of nurse staffing are associated with an increase in time to therapeutic interventions and unexpected cardiac arrest and mortality within the ED. Conclusions The heterogeneity and low overall quality of the studies within this Review makes it difficult to draw definitive conclusions. The heterogeneity stems from a number of compounding variables, which include the variability in health systems in which the research is conducted, the differences in hospital size and infrastructure, presence/absence of support staff, variability in nursing roles and associated scope of practice. It was identified, however, that there is evidence of adverse effects on patient care from low staffing including unexpected cardiac arrest, delayed time to treatments and, in particular, leaving without being seen. There is also a need for

				longitudinal studies coupled with economic evaluations that take account of patient dependency, acuity, and staffing levels where interventions are clearly defined and build upon the existing body of knowledge outlined in this review
Alotaibi, et al (2024) [19]	Kingdom of Saudi Arabia	A narrative synthesis of peer-reviewed literature	emergency nursing roles, competencies, and barriers to evidence-based practice (EBP) adoption, addressing gaps in linking interventions to mortality, throughput, and system efficiency	Emergency departments (EDs) function as high-acuity, high-throughput environments within health systems, managing a diverse array of acute presentations from trauma and cardiac events to infectious diseases and mental health crises, often serving as the primary entry point for unscheduled care and handling up to 50 million visits annually in major countries like the United States. These units operate under constant pressure from fluctuating patient volumes, resource constraints, and the need for rapid diagnostics and interventions, positioning EDs as critical safety nets that prevent system-wide bottlenecks by stabilizing patients for inpatient admission or discharge. Reviews highlight that ED crowding stems from input factors like increased arrivals, throughput delays from diagnostics and staffing shortages, and output barriers including bed unavailability, creating a vicious cycle where nurses face moral distress and burnout amid deteriorating care quality Conclusions: Strengthening EBP through training, leadership, and technology can mitigate barriers, enhancing patient safety and ED performance; future research should prioritize scalable strategies for diverse contexts.
Alhabib et al (2024) [20]	Saudi Arabi	Applied the qualitative framework analysis method	To assess the effectiveness of patient-centered care models in improving	Was reported that the availability of primary health care (PHC) helped a lot in decreasing the flow of patients towards ED, which decreased

			patient outcomes in hospital settings, and to investigate the impact of prolonged waiting time on healthcare utilization in the ED.	crowdedness in ED and hence decreased the waiting time as well. In line with these results, a recent study reported that placing primary care staff in the ED to triage patients significantly reduced waiting time in the ED or time to return home. In Saudi Arabia, primary healthcare (PHC) was neglected, leading to overcrowding in ED. To address this, the KSA government introduced the 2030 vision, which aims to promote the use of PHC as a first point of contact by expanding family medicine residency programs across the country. Conclusions Patient-centered care is a holistic approach to forming a trusting relationship between patients and care providers; this is achieved via providing care that includes patient involvement, communication, well-trained staff, and meeting all patients' psychosocial, physical, emotional, medical, social, cognitive, and cultural needs. To reach a well-organized and successful PCC many axes should be targeted at the same time, like improvements to healthcare providers and increasing their qualifications along with dealing with patient needs to shorten the process rather than application of one thing alone.
Al-Qahtani et al (2021) [21]	Saudi Arabi	Retrospective, medical record-based study	To examining the characteristics of pediatrics ER visits, the rate of hospital admissions and its associated predictors at King Fahd Hospital .	This study supports the evidence that pediatric ERs are very much being used by patients as the first point of contact with the healthcare system, rather than visiting their local primary health care physician. This is a problem which should have eased with the current governmental initiative in promoting the use of primary healthcare. Furthermore, Triage I was associated with the highest odds

				of admission in these patients. Similar patterns were found in a US study, although the Emergency Severity Index level was used rather than CTAS . Triage V was associated with lower odds of admission, which again highlights that the ER may suffer from overcrowding due to the presentation of non-urgent cases. Neither the shift nor the season of the pediatric patients visiting the ER had any association with the rates of admission. It may be of notice that Spring, Autumn and Summer, despite their non-statistical significance, did show lower odds of admission when compared to Winter. Conclusions This study examined pediatric ER visits at a large teaching hospital in the Eastern Province of Saudi Arabia. It showed that the admission rate of ER visits is extremely low. It also showed that neonates, patients with hematological conditions and patients classified as triage I had the highest odds of admission. However, patients classified as triage V had lower odds of admission. Clear guidance should be used to inform patients and parents of the proper process for seeking medical assistance, as well as ensuring more accessibility to primary health care centres. Moreover, further analysis focused on the predictors identified in this research is highly recommended to inform hospital administrators of potential minor changes that could lead to significant reduction in the over utilization of the ER.
Guerrero et al (2024) [22]	Saudi Arabia A Multicenter Study	Descriptive cross-sectional design.	To assess nurses' perceived causes and effects of overcrowding in the EDs of five	The results imply a strong relationship between the overall identified causes and effects of ED overcrowding in the questionnaires as perceived by the nurses. Nurses perceived

			tertiary hospitals in Saudi Arabia	that ED overcrowding may be due to a lack of standard procedures or poor adherence to protocols related to ED visitation, shortage of inpatient beds at the hospitals due to infrastructure challenges and a growing population, and prolonged patient length of stay in the ED due to the incapacity of the hospital to transfer patients from ED to the ward . These factors cause nurses to be unable to manage incoming patients to the ED, inevitably creating pressure from worried family members. These daily encounters affect nurses' mental health, leading to stress, burnout, and staff resignations. Conclusions Patients seeking immediate medical attention in EDs should receive necessary emergency care in a timely manner to avoid the worsening of their conditions. However, factors such as an increasing number of patients in EDs being accompanied by their family members and a shortage of inpatient hospital beds affect ED patient capacity. This leads to a prolonged patient length of stay in the ED due to inability to transfer patients to other wards. This situation leads to overcrowding and may prolong patient waiting time in the ED, causing the patient's health to deteriorate
Tohary et al (2024) [23]	Saudi Arabia	Descriptive study	To optimize ED operations strategies for Managing Overcrowding in Emergency Departments	Telemedicine has emerged as a critical tool, particularly in rural or resource-limited areas. Virtual consultations allow patients to connect with healthcare providers without the need to visit overcrowded ED. This approach has significantly decreased non-urgent ED visits, as evidenced by a reduction of 30% in urban centers employing telehealth platforms. Additionally, telemedicine supports continuity of care by

				connecting patients to specialists, expediting treatment decisions, and reducing unnecessary admissions. Automated triage systems represent another innovative application. These systems leverage artificial intelligence to assess patients' conditions upon arrival and prioritize care based on severity. An evaluation of such systems showed a 40% improvement in triage efficiency, as well as a decline in errors associated with manual evaluations. Conclusions In addressing emergency department overcrowding, a multifaceted approach combining innovative triage systems, resource optimization strategies, and technology-driven solutions is essential. These interventions not only improve patient flow and outcomes but also alleviate systemic inefficiencies. Investments in staff training and infrastructure are crucial to maximize these advancements. By fostering collaboration and leveraging technology, healthcare systems can create sustainable, patient-centered emergency care environments.
Alanazi (2024) [24]	Saudi Arabia Northern Borders region	A qualitative case study was employed to achieve the aim , Semi-structured interviews were conducted, Direct observations,	To explore teamwork practices from the perspectives and experiences of staff (physicians, nurses, allied health professionals, and administration staff) when interacting in the ED admission area in a public hospital.	The first key contribution extends the framework to include individual factors such as the emotions of individuals, experience and support, multitasking skills, stress management, and the ability to perform effectively in fast-paced situations. These skills are essential for effective team dynamics and better patient outcomes in the ED. These findings suggest the need for professional training programmer that help develop these personal abilities, which would improve patient care and teamwork. In addition, this case study made a second theoretical

				contribution to relational factors. These factors include disputes, harmony and compatibility, and forming relationships, which were not included in the framework. Conclusions The study provided insights into interdisciplinary teamwork practices from the perspectives and experiences of staff when they interacted with each other in the admission areas in the ED of a public hospital in the Northern Borders region of KSA. This study demonstrated that organized, effective teamwork in the ED had considerable benefits for patient safety, quality of care, staff satisfaction, and patient satisfaction.
Almass, et al (2023) [10]	Saudi Arabia	A systematic review of the literature was conducted according to the PRISMA guidelines	To understand the impacts of ED overcrowding on emergency medical healthcare services and patient outcomes.	Our review points out that the demand for emergency care services is strong in Saudi Arabia, and this has led to overcrowding in emergency rooms, which might compromise patient treatment. Time spent waiting for care in the ED may be considerable, and patients who need to be admitted to the hospital typically have to wait much longer. Both the ED's flow and the overcrowding issue has been the subject of several efforts at resolution. Few solutions have been presented despite numerous efforts to do so. This report examines the factors that lead to overcrowding in Saudi Arabia's emergency rooms and discusses how those issues could be resolved. Overcrowding in emergency rooms may be caused by a number of factors, one of which is the shortage of physicians and nurses. The ED personnel are under pressure due to the high patient volume and the limited number of available staff members. Medical procedures take a lot of time.

				Conclusions ED crowding is becoming a major problem in the delivery of holistic care services in Saudi Arabia. High demand for emergency treatment should not be a hindrance to quality treatment. Physical, technological, and strategic measures should be put in place to fight the crowding problem in the ED in Saudi Arabia, as it may cause adverse effects such as transmission of diseases and deaths of patients. This systematic review revealed multiple factors behind the issue of ED crowding, such as a shortage of medical and nursing staff, the large influx of patients, insufficient beds in the ED, and the lack of integration of telemedicine services. As a result, the quality of care is compromised, and the medical staff is unable to deliver holistic care services to the patients. Long working hours also affect the care providers and cause work-related burnout.

Results and discussion

The result of systematic review remain particularly due to their constant patient interaction regarding effecting between Emergency Department Overcrowding and Outcomes of nursing care on patient: A Systematic Review at Saudi Arabia 2024. Prolonged Overcrowding and Outcomes of care and consultation time, and physical response to the final decision, and leads to burnout nurses and staff, wrong diagnoses, and management plans. Crowding issues are resolved by awareness, triad systems, and technological and telemedicine services. High patient expectations, and overcrowding. Respondents emphasized the importance of education, security enhancements, and administrative support to address. Through 7 cross-sectional studies published between 2020 and 2024 present systematic review (Table 1).

The findings of this review highlight the transformational progress made in Saudi Arabia's Emergency Medical Services (EMS) sector under Vision 2030 and underscore the strategic centrality of nurses in achieving the Kingdom's health transformation goals. The synthesis of literature reveals a multidimensional shift—from a reactive, transport-centered model toward a proactive, data-driven, and patient-centered EMS framework.[25] This evolution demonstrates how the Saudi health system is transitioning toward a model that integrates governance, technology, and professional excellence to deliver sustainable emergency care outcomes.[26]

Our review points out that the demand for emergency care services is strong in Saudi Arabia, and this has led to overcrowding in emergency rooms, and poor outcomes of nursing care, which might compromise patient treatment. Time spent waiting for care in the emergency department may be considerable, and patients who need to admit to the hospital typically have to wait much longer.[27] Both the emergency department flow and the overcrowding and poor outcomes of nursing care issue has been the subject of several efforts at resolution. Few solutions have presented despite numerous efforts to do so. This report examines In Saudi Arabia, emergency crowding and Outcomes of nursing

care is an important topic of research. It is a known reason associated with increasing the rate of patients being unseen, delaying treatment for patients who need urgent Care, and expanding the burnout of medical staff [28].

According to Previous research zone at a university hospital in Saudi Arabia, there is a correlation between the degree of emergency department congestion and the average duration of a patient's stay in the emergency room. A study of 350 people in KSA revealed that 63% did not have a regular healthcare provider and 62% wanted to obtain care on the same day and came because of the availability of medical care around the clock [29].

Through the articles that are included in our research, there are common reasons for emergency crowding that can be solved, such as shortage of medical staff, nurses and doctors, shortage of equipment [30] , lack of emergency department process, lack of patient knowledge about telemedicine services, and PHC [31]. which lead to unsatisfactory services and can be associated with higher mortality rates [30] . A large number of patients would come to the emergency department for non-urgent causes. A cross-sectional study was done on 400 patients who visited the emergency department during morning shifts and showed that almost 78.5% of patients who visited the emergency department were non-urgent visits. Less urgent patients might sent to primary care facilities, and the problem could remedied with an urgency transfer strategy [32].

Conclusions

The transformation of Saudi Arabia's Emergency Medical Services (EMS) under Vision 2030 reflects a broader national effort to elevate healthcare standards, enhance patient outcomes, and integrate cutting-edge technologies across the continuum of care. Nursing have emerged as pivotal actors in this transformation—bridging the gap in the hospital-based treatment through rapid intervention, clinical expertise, and technological proficiency. Emergency department (ED) overcrowding is a significant challenge faced by healthcare systems worldwide. It adversely affects the quality of care, patient outcomes, and the efficiency of healthcare providers. Solutions such as establishing alternative care centers, improving infrastructure, optimizing bed capacity, and strengthening referral systems can play a crucial role in alleviating this crisis. Implementing these strategies will not only enhance the quality of services but also reduce costs, improve patient satisfaction, and increase the overall efficiency of the healthcare system. These measures can be adapted and customized to suit local conditions in any country. Continuous evaluation and updating of these approaches are essential for their long-term sustainability and effectiveness.

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