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ORIGINAL RESEARCH

Perceived Causes and Effects of Overcrowding Among Nurses in the Emergency Departments of Tertiary Hospitals: A Multicenter Study

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Purpose: Emergency department (ED) overcrowding is a significant concern in many hospitals in Saudi Arabia, resulting in long waiting times, delays in treating patients who need urgent care, and, consequently, decreased patient satisfaction. Additionally, ED overcrowding has been linked to increased nurse turnover rates. Therefore, this study aimed to assess nurses' perceived causes and effects of overcrowding in the EDs of five tertiary hospitals in Saudi Arabia.

Methods: This study used a descriptive cross-sectional design. We surveyed 311 nurses working in the EDs of five tertiary hospitals in Saudi Arabia using the convenience sampling technique. The self-administered questionnaires used in the study were developed by the researchers. The study was conducted from October 16 to November 10, 2022. Consensus-Based Checklist for Reporting of Survey Studies was followed.

Results: The results revealed that the primary perceived causes of ED overcrowding in five tertiary hospitals were unnecessary visits due to a lack of standard procedures (mean = 2.70; SD = 0.58) and lack of inpatients beds (mean = 2.69; SD = 0.65). The perceived effect of overcrowding was stress and burnout among nurses (mean = 2.85; SD = 0.47). The perceived causes and effects of overcrowding in the ED were found to be highly significant ($p < 0.001$) based on Pearson correlation and Spearman's rank correlation.

Conclusion: Unnecessary visits due to a lack of standard procedures lead to overcrowding. In addition, a lack of inpatient beds in the ED affects the care provided to patients seeking immediate medical attention. This may prolong patient waiting time, causing their conditions to deteriorate and prolonging hospital stay. Overcrowding leads to increased stress and burnout among nurses. The results of this study can be used to develop a comprehensive action plan to address ED overcrowding and its effects on patients, staff, and ED flow.

Keywords: nurses, overcrowding, patient safety, quality of care, stress, burnout, staff turnover

Introduction

The emergency department (ED) is an important part of the hospital that offers services to the public and provides quick access to unstable patients who require emergency care.[1] However, quick access to medical care and treatment, coupled with a lack of standard procedures related to ED visitation, can increase the number of individuals visiting the ED, causing overcrowding.[2] In 2019, the volume of ED visits in the United States was approximately 143 million, and approximately 14% of the ED visits resulted hospital admission.[3,4] Saudi Arabia experienced 1,572,296 ED visits from September 2019 to December 2021.[5]

A previous study conducted at a university hospital in Saudi Arabia reported 53,309 instances of overcrowding and 57,290 instances of overcrowding in the ED, calculated through occupancy rate.[6] Overcrowding in EDs is a major problem that requires a solution.[7] In addition, the increasing number of ED visits due to a lack of standard procedures or

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poor adherence to protocols related to ED visitation remains problematic.[8] Overcrowding in EDs leads to delayed patient treatment and poor quality of care.[9] The negative effects of overcrowding can influence the entire hospital operations, number of resources, quality of care, and patient outcomes.[10] ED overcrowding reduces nurses' performance satisfaction regarding the care they provide to patients.[11] This leads to issues such as stress and occupational burnout.[12]

An evidence-based understanding of the causes and effects of overcrowding is crucial to identify appropriate solutions.[13] Furthermore, overcrowding continues in many EDs in Saudi Arabia, resulting in long waiting times, delays in treating patients who need urgent care, and, consequently, decreased patient satisfaction. The overcrowding situation in EDs also increased nurse turnover. An appropriate solution cannot be identified without recognizing the specific cause. Therefore, identifying the root cause of overcrowding in EDs could help pinpoint appropriate solutions to prevent adverse effects on patients and healthcare professionals, particularly nurses. Additionally, the results of the present study enable reproducibility and generalizability as it was conducted in multiple hospitals in the Southern Region of Saudi Arabia.

Literature Review

Overcrowding is primarily caused by an excessive number of patients in the ED waiting for medical consultation, diagnosis, management, transfer, or discharge that compromise the routine of the department.[14,15] Overcrowding can be characterized as an inequality between supply and demand in the ED.[14] ED overcrowding negatively affects the operations of the entire hospital, and is a globally recognized problem.[10] ED overcrowding is linked to poor clinical outcomes among patients who need immediate care.[16] This has serious consequences for the workforce and the ED system, including an overall surge in expenses.[17] This occurrence is a global public health issue and a matter of patient safety concern.[18]

The input-throughput-output conceptual model explains ED flow; for instance, overcrowding occurs due to the number of patients waiting for medical consultation (input), postponements in evaluating and treating patients already in the ED (throughput), or restrictions on patients leaving the ED after receiving treatment (output).[18] Furthermore, ED overcrowding is often calculated by dividing the number of patients present in the ED by the number of beds or through the mean occupancy rate.[19] The National Emergency Department Overcrowding Study Score (NEDOCS) is a simple tool to measure ED overcrowding. NEDOCS has a predictive power to assess for clinical perception of overcrowding in the ED.[20,21] In addition, the Emergency Department Work Index (EDWIN) is used to measure ED overcrowding through occupancy rate and licensed ED beds. However, a previous study has shown that NEDOCS had the highest sensitivity, specificity, and positive predictive value compared to EDWIN.[21]

ED overcrowding is a significant concern for ED staff, including physicians, nurses, and paramedics, as well as patients, in both high-income and developing countries.[22] However, overcrowding does not suggest a normal routine or a busy working environment in the ED. Rather, it refers to patients seeking routine care delivery in the ED during regular working hours due to the shortage of inpatient beds in the wards. ED staff exert considerable effort to efficiently provide the most effective emergency care to their patients, and overcrowding hinders their performance.[23]

Disproportions between the number of ED treatment spaces and patients' demand for prioritization, lab tests, diagnostic imaging, and consultations of different specialties based on the patients' condition affect the ED flow.[15] In addition, the effects of high occupancy are above 90%, and 20–30% block access to emergency care. Such high occupancy rates in EDs cause unfavorable patient outcomes, delays in treatment, increased rate of mortality and duration of inpatient stay, and hospital readmissions. Most hospital admissions involve patients from the ED (50–75%). This explains the high occupancy of EDs.[15]

Well-documented effects of ED overcrowding include morbidity and mortality related to treatment delays of high- and low-acuity patients, adverse events, and diversion of ambulances.[24] Moreover, ED overcrowding causes excessive costs related to medical expenses and staff burnout.[18] However, these factors have been largely ignored. Furthermore, ED overcrowding has been associated with patients admitted to inappropriate wards, delays in physician consultations, access blocks, delays in critical care such as administration of antibiotics to patients with sepsis, decreased patient safety, increased inpatient occupancy leading to decreased inpatient bed capacity, and unproductive ED flow due to unnecessary peaks in scheduling surgery requests.[25] Owing to a prolonged waiting time, acutely ill patients leave the ED without

being seen despite needing urgent intervention.[26] This results in longer hospital stays that increase the costs of care.[26] Furthermore, ED performance and quality of care are measured by patient satisfaction. Quality of care refers to the degree of healthcare services provided to patients and improvement in their desired outcomes.[27]

Moreover, ED overcrowding is a concern as it is related to the safety and the quality of care rendered to critically ill patients seeking immediate medical attention.[28] Identifying the perceived causes of overcrowding in the ED is important for mitigating its potentially harmful effects on patients. Previous studies have reported various causes of ED overcrowding, which vary by setting.[28,29] For instance, Alhussain et al reported that the main cause of overcrowding in Saudi Arabia was non-urgent visits to EDs.[30] According to Salway et al, overcrowding in the ED can be attributed to several factors, including visits from poor and uninsured patients, surgical scheduling, seasonal illness, and unnecessary visits.[31]

Khubrani and Al-Qahtani stated that hospitals have attempted to resolve ED overcrowding multiple times.[29] However, Savioli et al affirmed that identifying the precise definition of overcrowding, including the main cause and aggravating factors, is important to propose and implement an appropriate solution.[19] The negative effects of overcrowding on patients and ED staff can be prevented through proper identification of the primary cause of the issue. Therefore, this study aimed to assess nurses' perceived causes and effects of overcrowding in the EDs of five tertiary hospitals in Saudi Arabia.

Methods

Design

A descriptive cross-sectional design was used in this study.

Setting

This study was conducted at the EDs of five government and private tertiary hospitals in Saudi Arabia. Each ED has a capacity of 26–38 beds that cater to the acute care of patients of all age groups and operate 24 hours a day. The department provides initial management for a broad spectrum of diseases and traumatic injuries, some of which are life-threatening and require immediate attention.

Sample Size and Sampling Technique

This study included 311 nurses working in the EDs of five tertiary hospitals in Saudi Arabia. The inclusion criteria were as follows: (1) working in the ED of a tertiary hospital, (2) having at least three months of experience in the ED, and (3) holding a license to practice nursing in Saudi Arabia. Nurses of any nationality were invited to participate in the study. The sample size was calculated from the total population of ED nurses per hospital using the Roasoft sample size online calculator, with a confidence level of 95%, a margin of error of 5%, and 90% power of test. The desired sample sizes were 61 out of 71 ED nurses for Hospital 1, 66 out of 79 ED nurses for Hospital 2, 55 out of 64 ED nurses for Hospital 3, 67 out of 80 ED nurses for Hospital 4, and 62 out of 73 ED nurses for Hospital 5.

Research Instruments

The researchers developed two instruments for use in this study. In developing the questionnaires, the researchers performed a scoping review of published articles related to causes and effects of overcrowding, appraised preexisting-validated questionnaires similar to the topics of the present study and brainstormed with the research team to identify common themes. Subsequently, we drafted the list of questions and ensured that the language and wording were appropriate to avoid vagueness and misinterpretation. The first instrument measured the perceived causes of overcrowding in the ED and consisted of 10 items rated on a three-point Likert scale (3 = *agree*, 2 = *neutral*, and 1 = *disagree*.) The second questionnaire was used to assess the perceived effects of overcrowding in the ED and consisted of 14 items rated on a three-point Likert scale (3 = *agree*, 2 = *neutral*, and 1 = *disagree*).

Both questionnaires were sent to a panel of experts for validation. The panel comprised a nurse manager with 16 years of ED experience and two senior ED nurse specialists. They recommended the addition of one item ("financially disadvantaged patients without insurance who lack primary care") to the first questionnaire. Accordingly, an additional

indicator was added to the original nine items. The experts unanimously accepted all indicators in the second questionnaire assessing the perceived effects of overcrowding in the ED.

After the experts' approval, a pilot study was conducted with 50 ED nurses from two tertiary hospitals; these two hospitals were excluded from the actual study. Cronbach's α was used to test the reliability of the questionnaires. The 10-item questionnaire assessing the perceived causes of ED overcrowding had an average interim covariance of 0.210 and an α value of 0.885 (see Supplementary Table 1: Reliability test results of the perceived causes of overcrowding questionnaire).

The 14-item questionnaire assessing the perceived effects of overcrowding in the ED had an average interim covariance of 0.130 and an α value of 0.835 (see Supplementary Table 2: Reliability test results of the perceived effects of overcrowding questionnaire). An α value ranging from 0.73–0.95 indicates high reliability.[32]

Data Collection

Prior to data collection, the research proposal was submitted to the Institutional Review Board (IRB) of the concerned organization for review and approval. Following approval, the researcher sent a letter to the chief nursing officers of the hospitals to request permission to collect data in the EDs. The letter included the consent form and questionnaires. After approval, the researchers visited the EDs and secured permission from the nurse managers. The ED managers were provided with a copy of the chief nursing officer's approval to collect data.

The researchers then met the available target participants and explained the purpose and benefits of the study and the participants' right to withdraw from the study. Thereafter, written informed consent was obtained from the participants wishing to participate in the study. The researchers revisited the EDs six times, from October 16 to November 10, 2022, to reach the pre-defined number of participants to include in the sample. Participants available during the visits were provided 20–30 minutes to answer and complete the questionnaires. The participants were asked to answer the survey in a meeting room near their units. The researcher allowed participants to ask questions and provide comments pertaining to the survey before the completion and collection of the survey to avoid confusion and ensure the quality of data collection. The data collection did not face any difficulties.

The participants were instructed to place the questionnaire in the provided envelope, seal it to maintain anonymity and confidentiality, and hand it to the researchers. To avoid bias, the researcher ensured that the inclusion criteria were strictly followed during participant selection. After collecting, summarizing, and sorting the questionnaires, data were forwarded to the statistician for analysis. The Consensus-Based Checklist for Reporting of Survey Studies was followed.

Statistical Analysis

Data were analyzed using IBM SPSS Statistics Version 29.0 (Armonk, NY: IBM Corp). The participants' demographic data were analyzed using frequency and percentages regarding count data. Means and standard deviations (SD) were calculated for each continuous variable to assess the nurses' perceived causes and effects of ED overcrowding. Finally, the Pearson correlation coefficient was used to identify the significant relationships between the reported causes and effects of ED overcrowding.

Ethical Considerations

This study was approved by the institutional review board (IRB) of the Ministry of Health (MOH), General Directorate of Health Affairs, Najran (IRB Registration Number with KACST, KSA: H-11-N-081 and IRB Log Number: 2022–08 HI). The government and private hospitals that participated in this study were under the umbrella of the MOH. Therefore, the hospitals acknowledged and recognized the IRB approved by the General Directorate of Health Affairs.

After providing the participants with information regarding the nature of the study, written informed consent was obtained. Participation in the study was voluntary. Participants were informed that they were free to withdraw from the study at any time without any consequences. Moreover, participants were assured that their personal information would be kept confidential.

Results

The participants of the present study were mostly female (87.14%), aged 25–30 years (37.94%), had worked in the ED for 2–5 years (42.77%), had a bachelor's degree in nursing (90.68%), and Filipinos by nationality (44.69%) (Table 1). The primary perceived causes of ED overcrowding in the five tertiary hospitals were unnecessary visits due to a lack of standard procedures (mean = 2.70; SD = 0.58) and a lack of inpatient beds (mean = 2.69; SD = 0.65). The perceived effects of overcrowding were stress and burnout among the nurses (mean = 2.85; SD = 0.47). The nurses' perceived causes and effects of overcrowding in the ED were found to be highly significant ($p < 0.001$) based on Pearson correlation and Spearman's rank correlation.

Table 2 shows the perceived causes of overcrowding based on the responses of the nurses assigned to EDs. The perceived causes of overcrowding were ranked as follows: "unnecessary visits due to a lack of standard procedures" (M = 2.70; SD = 0.58), "lack of ED inpatient beds" (M = 2.69; SD = 0.65); "prolonged length of stay in the ED" (M = 2.65; SD = 0.58); "shortage of attending ED nurses on shift" (M = 2.63; SD = 0.69); "delayed laboratory and other diagnostic test results" (M = 2.45; SD = 0.79); "seasonal illnesses" (M = 2.42; SD = 0.83); "surgical scheduling" (M = 2.40; SD = 0.66); "shortage of attending physicians on shift" (M = 2.38; SD = 0.81); "delayed physician consultations" (M = 2.32; SD = 0.81); and "poor and uninsured patients lacking primary care" (M = 2.19; SD = 0.86). Thus, the main perceived cause of overcrowding was unnecessary visits due to a lack of standard procedures, and the least important cause was poor and uninsured patients lacking primary care.

Table 1 Demographic Profile of the Participants

Demographic Characteristics	Frequency	Percentage
Gender		
Male	40	12.86
Female	271	87.14
Age		
25–30 years	118	37.94
31–35 years	96	30.87
36–40 years	41	13.18
41–45 years	36	11.58
46 years or older	20	6.43
Length of experience		
3 months–1 year	23	7.4
2 years–5 years	133	42.77
6 years–9 years	76	24.44
10 years or more	79	25.4
Educational qualification		
Diploma in nursing	14	4.5
Bachelor's in Nursing	282	90.68
Master's in Nursing	15	4.82
Nationality		
Egyptian	7	2.25
Filipino	139	44.69
Indian	86	27.65
Saudi	59	18.97
Somalian	4	1.29
Sudanese	7	2.25
Yemeni	9	2.90

Table 2 Perceived Causes of Overcrowding in the ED

Rank	Indicator	Mean	SD
1	Unnecessary visits due to a lack of standard procedures	2.70	0.58
2	Lack of ED inpatient beds	2.69	0.65
3	Prolonged length of stay in the ED	2.65	0.58
4	Shortage of attending ED nurses on shift	2.63	0.69
5	Delayed laboratory and other diagnostic test results	2.45	0.79
6	Seasonal illnesses	2.42	0.83
7	Surgical scheduling	2.40	0.66
8	Shortage of attending physicians on shift	2.38	0.81
9	Delayed physician consultations	2.32	0.81
10	Poor and uninsured patients lacking primary care	2.19	0.86

Abbreviation: SD, Standard deviation.

Table 3 shows the perceived effects of overcrowding based on the responses of the nurses assigned in the ED at the five hospitals included in the study. The effects of overcrowding were ranked as follows: "increased stress and burnout among the nurses" ($M = 2.85$; SD = 0.47), "increased total length of stay in the hospital (LOS)" ($M = 2.81$; SD = 0.48), "high clinician and nursing staff turnover" ($M = 2.71$; SD = 0.60), "increased stress and burnout among the physicians" ($M = 2.68$; SD = 0.61), "decreased ED staff productivity" ($M = 2.47$; SD = 0.79), "increased violence toward ED staff" ($M = 2.29$; SD = 0.84), "increased mortality among patients needing immediate care" ($M = 2.18$; SD = 0.87), "increased ambulance diversion" ($M = 2.10$; SD = 0.84), "increased costs of care owing to prolonged ED stay" and "increased hospital financial losses" ($M = 2.05$; SD = 0.91), "reduced quality of care" ($M = 1.96$; SD = 0.90), and "increased medical errors" ($M = 1.82$; SD = 0.91). Thus, the main perceived effects of overcrowding were increased stress and burnout among the nurses, extended total length of stay in the hospital, and higher turnover rates among clinician and nursing staff.

As shown in Table 4, the Pearson correlation value implies a strong relationship between the overall identified causes and effects of ED overcrowding in the questionnaires as perceived by the nurses, with highly significant *p*-values

Table 3 Perceived Effects of Overcrowding in the ED

Rank	Indicator	Mean	SD
1	Increased stress and burnout among nurses	2.85	0.47
2	Increased total length of stay in the hospital	2.81	0.48
3	Increased clinician and nursing staff turnover	2.71	0.60
4	Increased stress and burnout among physicians	2.68	0.61
5	Decreased productivity of the ED staff	2.47	0.79
6	Escalated violence toward staff in the ED	2.29	0.84
7	Patients leaving the ED without being seen	2.26	0.80
8	Increased mortality among patients needing immediate care	2.18	0.87
9	Permanent consequences of disability due to late diagnosis	2.14	0.91
10	Increased ambulance diversion	2.10	0.84
11.5	Increased hospital financial losses	2.05	0.91
11.5	Increased costs of care	2.05	0.91
13	Reduced quality of care	1.96	0.90
14	Increased medical errors	1.82	0.91

Abbreviation: SD, Standard deviation.

Table 4 Relationship Between the Overall Causes and Effects of ED Overcrowding

Statistical Tool	Statistical Value	*p*-value	Interpretation
Pearson correlation	0.6560	0.0000	Significant

(0.0000). A higher perception of causes was associated with a higher perception of effects, and vice versa. Additionally, the Pearson's correlation result was based on the total response of all nurses (n=311) from the five hospitals regarding their perceived causes and effects of ED overcrowding.

Discussion

The present study aimed to identify nurses' perceived primary causes and effects of overcrowding in the EDs of five tertiary hospitals in Saudi Arabia. Unnecessary visits due to a lack of standard procedures, lack of inpatient beds, and prolonged length of stay in the ED were identified as the primary perceived causes of overcrowding in EDs. In addition, the primary perceived effects of overcrowding were increased stress, burnout of ED nurses, and increased clinician and nursing staff turnover.

Moreover, 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 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.

The present results are in line with a previous study that examined several countries, including Ireland, Canada, and Australia, and reported a substantial and unsustainable increases in ED visits.[18] In Saudi Arabia, 150,727 ED visits were reported per year.[33] Frequent and highly frequent visitors represent a substantial proportion of patients presented to EDs. In addition, non-urgent visits to the ED can be attributed to a lack of community access to primary healthcare services and inadequate awareness among the public regarding the role of EDs.[30] Furthermore, the increasing number of ED visits remains an unresolved problem leading to overcrowding.[8]

Furthermore, ED overcrowding was strongly associated with prolonged length of patient stay at the ED due to a lack of inpatient beds.[34] Prolonged length of stay was found to delay the goal of emergency care, resulting in poor quality of care and adverse patient outcomes.[35] Moreover, during a period of ED overcrowding, the highest percentage of deaths (38%) occurred among patients aged between 30–44 years, while 36% deaths occurred among patients aged between 60–74 years.[29]

Previous studies have reported that an increase in patient waiting time due to overcrowding is the primary cause of the increase in the number of patients who leave the ED without being examined by a physician despite needing immediate medical care. However, it was observed that the group of patients who left the ED shortly thereafter returned to be hospitalized due to the progressive worsening of their health conditions.[14] A poor quality of treatment provided to patients in the ED, increasing number of re-consultations and hospitalizations, worsening of patient condition leading to higher treatment costs, and dissatisfaction of ED staff were among the serious effects of overcrowding.[36]

Furthermore, the ED overcrowding phenomenon has been reported as the major cause of staff reduction in the ED owing to a high level of stress and burnout that leads to job dissatisfaction.[10] In addition, the main stressor in the ED is overcrowding due to a constant in and out flow of patients and family members, which is a significant source of burnout among nurses.[37] ED overcrowding results in poor quality of patient care and high mortality rates.[13] Therefore, hospitals should prioritize the development of strategies to mitigate the problems and potential effects of overcrowding on the well-being of patients and ED staff.[14]

Moreover, the decreasing number of EDs and continuous increase in the number of patients needing emergency care create a serious health problem.[38,39] ED overcrowding adversely affects patients and their related factors, communities, delivery of emergency care, and healthcare delivery systems.[1] However, refining the efficiency of human resources and developing accurate measures of ED overcrowding will guarantee improvement in patient flow.[40] The emergency triage prediction model can also improve ED staff working efficacy and minimize workload intensity.[41] This study identified the primary causes and effects of ED overcrowding. The results can help guide organizational managers and leadership to implement necessary actions to reduce overcrowding, provide quality emergency care, and improve patient outcomes.

Limitations

The present study had some limitations. First, the generalizability of the results is limited due to the small sample size and the study being conducted at only five tertiary hospitals in Saudi Arabia. Further studies are needed to comprehensively assess the primary causes and effects of overcrowding in EDs with larger participant numbers and across multiple settings involving all ED staff, not only nurses. Second, most participants in the present study were female, reflecting the predominantly female composition of ED staff nurses in the five tertiary hospitals surveyed.

Implications for Practice

Patients in the ED need quick access to medical care and treatment. Providing quality emergency care improves patient outcomes. However, issues such as overcrowding compromise the provision of appropriate and immediate care. This negatively affects patient outcomes, ED flow, and ED staff, particularly nurses, as most ED staff include nurses. Nurses are often the first point of contact for patients and family members in the ED, and most ED staff turnover involves nurses. The study results revealed that unnecessary visits due to a lack of standard procedures, lack of ED inpatient beds, and prolonged length of stay in the ED were the primary causes of overcrowding in five tertiary hospitals in Saudi Arabia. This led to stress and burnout among ED nurses. Identifying the major cause of overcrowding is vital to mitigate the negative effects of overcrowding. Organizational managers and leadership should take necessary actions to reduce overcrowding, enhance the quality of emergency care, improve patient outcomes and satisfaction, and minimize nurse turnover.

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. Moreover, ED overcrowding leads to increased stress and burnout among nurses, which increases staff turnover. Identifying the primary cause of overcrowding is vital to mitigate its effects on patients, ED staff, and ED flow. Organizational managers and leadership should take necessary actions to reduce overcrowding, provide quality emergency care, improve patient outcomes and satisfaction, and minimize nurse turnover.

Data Sharing Statement

The data that support the results of this study are available from the corresponding author upon reasonable request.

Ethical Approval and Consent to Participate

This study was approved by the Institutional Review Board (IRB) of General Directorate of Health Affairs of the Ministry of Health (MOH), Najran (IRB Registration Number with KACST, KSA: H-11-N-081 and IRB Log Number: 2022-08 HI). Written informed consent was obtained from all participants prior to conducting the study. Furthermore, all methods were conducted in accordance with the principles outlined in the Declaration of Helsinki.

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Disclosure

The authors report no conflicts of interest in this work.

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