

The Effectiveness of Emergency Triage Systems: A Systematic Review

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Abstract

Triage is the first process of assessment and prioritization of all patients who present to emergency departments (EDs) into categories according to their condition and level of urgency. In this study, a systematic review of the literature on the effectiveness of triage systems was conducted in Saudi Arabia. Following PRISMA guidelines, six large databases were searched for relevant articles published between 2003 and 2023. Three authors reviewed the titles, abstracts, and full texts. The databases were searched using the following keywords: *triage systems*, *CTAS*, *emergency department overcrowding*, *non-urgent or inappropriate visits to the ED*, *ED overutilization*, and *triage and ED overcrowding in the Middle East*. A total of 1,051 articles were identified, of which 245 met our inclusion criteria. From the findings of these studies, in relation to the factors that reduce triage efficacy in the Middle East and specifically in Saudi Arabia, it can be argued that there is a need for more studies and solutions to address these issues. Patients are in need of health education, and alternative solutions must be considered to address the high percentage of non-urgent visits to the ED. Emergency department triage is the first screening step that sorts patients in emergency situations by categorizing their urgency levels to prioritize patients for evaluation and treatment. Because the ED is an integral hospital department and a complicated, fast-paced environment, ED healthcare services have evolved to be delivered through effective triage systems to reduce waiting times and overcrowding.

Keywords: Triage, ED, CTAS, overcrowding.

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INTRODUCTION

In Saudi Arabia, many patients present at the ED with non-urgent problems, which can result in prolonged waiting times and delayed intervention for more acutely ill patients (Elkum *et al.*, 2009; Qureshi, 2010; Rehmani & Norain, 2007). This may reflect the fact that in Saudi Arabia, the ED is a popular source of primary healthcare for patients who do not have access to primary care providers; the ED is utilized rather than primary healthcare clinics (Elkum *et al.*, 2009; Rehmani & Norain, 2007). With increasing ED utilization, formalized triage systems have been developed to identify and prioritize those patients presenting with life-threatening conditions to transfer them to appropriate medical services. There are a range of factors influencing the effectiveness of triage systems, such as ED staff decision-making and insufficient resources (Gerdtz, *et al.*, 2009). The purpose of this review is to examine the reasons for non-urgent presentations to the ED and explore the effectiveness of current triage systems. When

possible, this review draws on Middle Eastern literature and data from Saudi Arabia.

LITERATURE REVIEW METHODOLOGY

Search Strategy

A comprehensive search of the literature from 2003 to 2023 was performed using the MEDLINE, CINAHL, PubMed, Cochrane Library, Ovid, and Current Health databases for non-urgent ED visits in the Middle East and internationally. Databases were searched using the following keywords: *triage systems*, *CTAS*, *emergency department overcrowding*, *non-urgent or inappropriate visits to the ED*, *ED overutilization*, and *triage and ED overcrowding in the Middle East*. These keywords were used to find articles or studies that examined the effectiveness of triage systems and to determine the reasons for ED overcrowding caused by non-urgent visits (Savioli *et al.*, 2022).

The Problem of Non-Urgent Overcrowding in the Emergency Department (ED)

Non-urgent visits to the ED are those made for conditions for which care can be delayed for up to several hours, usually without fear of an increased risk of adverse outcomes (Niska *et al.*, 2010). In EDs, cases of varying severity and urgency accumulate, because patients' needs are unpredictable. However, the problem of serving non-urgent cases in the ED is now becoming a worldwide concern (Uscher-Pines *et al.*, 2013). Overcrowding leads to extended waiting times for patients and causes a significant increase in ED workload. It has also caused considerable anxiety among ED staff and aggravates the stress experienced by patients.

To reduce delays in the ED, hospital administrators and researchers have developed methods for categorizing ED patients. As part of reviewing this process, several researchers have suggested that labeling ED patients as urgent or non-urgent—or as “appropriate” or “inappropriate”—is often counterproductive and can be incorrect in terms of diagnosis and treatment outcomes. Importantly, the paucity of a universal standard that reliably describes the suitability of using the ED prompted the creation of a broad base of evaluative triage tools. These tools were later standardized and integrated into ED operational use.

Triage scales are measurements using ordinal data that assist ED staff in identifying the degree of urgency based on the maximum waiting time that can be tolerated by the patient without detrimental outcomes (Australasian College for Emergency Medicine, 2006; Warren *et al.*, 2008). For example, many patients brought to the ED due to accidents are triaged as non-urgent cases (Uscher-Pines *et al.*, 2013). However, there is evidence that patient categorization based on triage scales is inaccurate and fails to admit as much as 5% of patients who actually require hospital admission. Besides triage scales, other common methods for categorizing patients as urgent or non-urgent include their diagnosis, admission status, the amount of ED resources needed to evaluate and treat them, and whether their condition could have been treated at the level of primary healthcare.

Regarding the solution for overcrowding, several actions are needed, not only at the medical level but also at the administrative level. These actions can be divided into two levels that act in synergy: 1) micro-level actions applied at the level of the ED, such as the acceleration of diagnostic pathways, fast tracking, outpatient services outside the ED setting, homecare, observation units, team triage, and artificial intelligence (AI) and machine learning; and 2) macro-level actions applied at the hospital and/or care system level, such as simplifying the admission process, reverse triage, smoothing elective admissions, early discharge, weekend discharge, a full-capacity protocol or action plan, and legislation and guidelines (Sartini *et al.*, 2022).

Non-urgent and Primary Care

Due to the presumption that non-urgent patients' conditions are suitable for primary healthcare, there is an assumption that patients with minor complaints can benefit more from the services of a general practitioner (GP) or from primary healthcare services than from ED care. However, because identifying patients who require only primary healthcare is not always self-evident (Bezzina *et al.*, 2005), in the present study, it was of interest to explore the possible reasons why patients in Saudi Arabia choose ED care in preference to GP primary healthcare by asking them directly.

Additionally, considering the varied role and extent of GP practice, it is understandable that there are no clear criteria regarding how to separate urgent from non-urgent cases (Hayden *et al.*, 2010; Tranquada *et al.*, 2010). The argument often centers on the nature of the patient's condition, whether it is life-threatening or minor in character, further comparing it to conditions that are perceived to be either acute, emergent, or urgent. Given these significant shortfalls of ED care for non-urgent patients, there is growing interest in the reasons for their attendance at EDs.

Reasons for Non-urgent ED Visits

Non-urgent and Demographic or Social Characteristics

Currently, there is great interest in determining the social drivers and demographic characteristics of ED patients. Parameters routinely used in studies in this area of healthcare research include age, gender, income, socio-economic status, ethnic origin, and educational attainment. For example, there are significant barriers preventing patients from accessing primary healthcare. These barriers include psychosocial factors, GP accessibility and availability, primary healthcare service schedules, and ED accessibility, all of which strongly affect the choice of ED. In addition to the patient's knowledge about the capability of the ED, personal factors that increase the use of ED resources include the patient's desire to ask for a second opinion, convenience, and trust in the quality of service provided by the ED.

In the UK, a reduction in the after-hour availability of primary healthcare services resulted in a significant increase in the number of non-urgent patient visits to the ED (Thompson *et al.*, 2009). Carret *et al.*, (2007) attempted to identify the reasons for patient attendance at the ED in preference to other primary healthcare providers. In their Canadian study involving 1,783 ED patients, they compared urgent and non-urgent ED patient visits. The researchers asked the respondents why their primary care physicians were not contacted prior to visiting the ED. The study found that problems with accessibility (32%), the patient's perceived need (22%), ED follow-up (20%), ED familiarity (11%), and greater confidence in ED care (7%) were the most common barriers to the use of primary healthcare services. However, up to 7% of the respondents reported

that they had visited the ED before their primary care physician for no apparent reason. Evidently, there are multiple reasons why non-urgent patients attend the ED, making it difficult to plan successful interventions directed toward changing patients' primary healthcare behaviors.

A systematic review also included a proposed multifactorial theoretical model of the reasons for non-urgent ED visits (Uscher-Pines *et al.*, 2013). This model, shown in Figure 1, proposes that patients arrive at their decision to seek ED care due to multiple moderating

factors, some of which are independent of each other. For example, the patient might initially experience an acute symptom of either a new problem or exacerbation of a chronic condition that they did not previously perceive as urgent. Following this, several options for care are considered, such as the primary care physician (PCP), the ED, or self-care. In their study, the researchers reviewed various causal pathways suggested for attempting interventions in the reduction of ED attendance. Note that two of these, which are shown as linked in Figure 1, are the convenience of ED care and the availability of alternative PCP services.

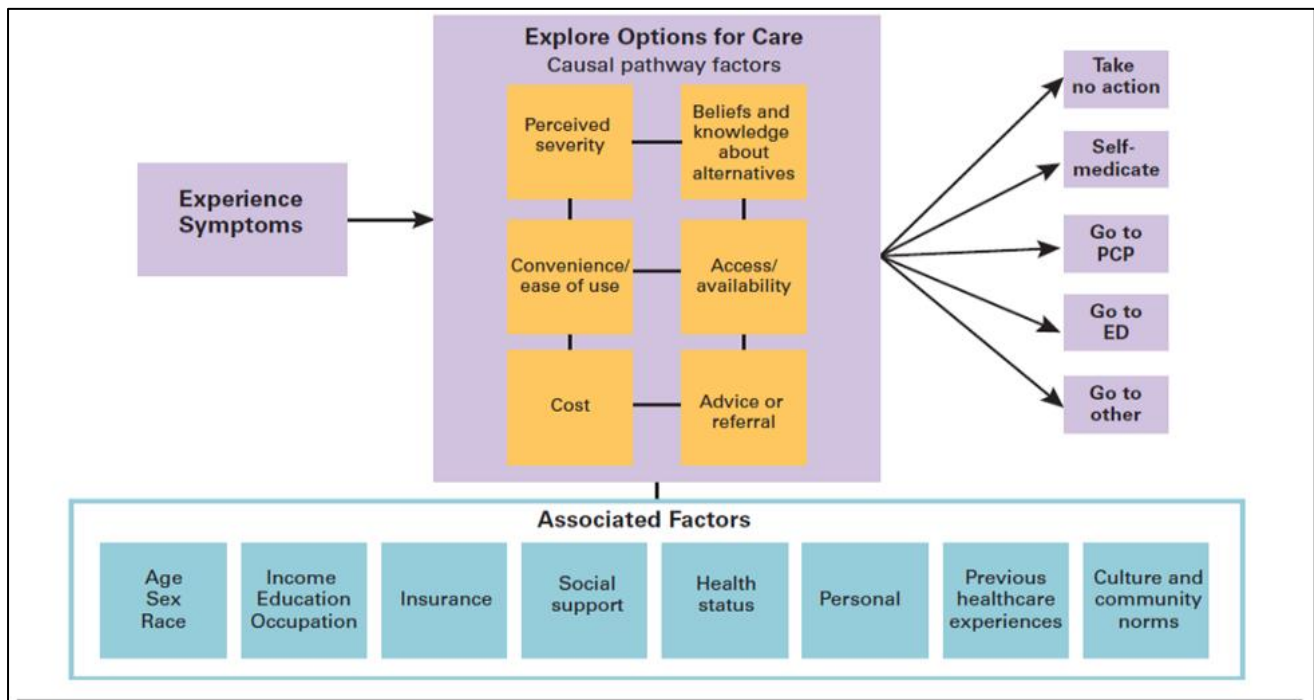


Figure 1: Conceptual model of non-urgent emergency department use (Uscher-Pines *et al.*, 2013)
 ED = emergency department; PCP = primary care physician

Considering the complexity of the model shown in Figure 1, it is reasonable to assume that strategies to reduce unnecessary ED visits will have varying degrees of success. Therefore, until members of the community surrounding specific hospital services are able to understand the difference between non-urgent and urgent conditions, ED staff will continue to be faced with the prospect of needing a system to allocate their limited resources without compromising patient safety and quality of care. Hence, despite concerns about the relative efficacy and fairness of the triage system, it is, nonetheless, the currently accepted framework for assessing the large volume of people who attend the ED.

Triage

Triage is the first process of assessment and prioritization of all patients who present to EDs into categories according to their condition and level of urgency (Ekwall *et al.*, 2008). In terms of priority, any patient who arrives at the ED requiring treatment must be triaged to determine the level of priority. Triage, or the

ability to rapidly determine patient acuity, is one of the emergency nurse's most important skills. It is a dynamic process, as patients' status can change rapidly.

Triage was introduced into EDs to address urgency and crowding and to enhance the quality of health services to minimize overcrowding and reduce delays. The aim of triage is to distribute the workload of the ED for better utilization of resources. Some have argued that all patients seeking emergency care need to be assessed and classified into priorities to determine those who have the most urgent problems and are in need of immediate care.

According to the literature, triage systems aim to ensure clinical rights for the patient and provide an effective tool for departmental organization, monitoring, and evaluation (FitzGerald *et al.*, 2010). The primary aim of triage is to quickly identify and treat patients with life-threatening conditions.

The purpose of triage is to ensure that patients are managed in the order of urgency and that they receive management in a timely and proper manner. When a number of patients arrive at the ED at the same time with a variety of complaints, triage is an important strategy that underpins the delivery of emergency care. Effective triage systems, regardless of where they are implemented, share several important features. First, they provide a single entry point for all presenting patients to ensure that they undergo the same assessment process. Second, they include a suitable physical environment that offers private assessment as well as first aid equipment and hand-washing facilities. Third, there is an appropriate patient-processing system to enable the flow of patient data from triage assessment to treatment and, ultimately, discharge. Finally, accurate and timely information is essential (Ganley & Gloster, 2011).

Triage Reliability and Validity

Ensuring the reliability and validity of the triage system are the necessary first steps in enhancing triage practice, which in turn can improve the quality of healthcare delivery, such as the effective use of resources and staff allocation and decreased variation in delays to care. The reliability of the triage system can be assessed by measuring the inter-rater agreement between triage nurses and physicians. The validity of triage systems has been assessed by comparing admission rates, ED resource use, and the mortality of triage levels. As stated, a valid triage system will have low admission rates for non-urgent cases and will require few emergency department resources. When the needs or demands for medical treatment significantly exceed the available resources, decisions must be made about how to distribute these resources in recognition of the fact that not all needs can be satisfied immediately and some may not be satisfied at all (Iserson & Moskop, 2007).

Effective management of resources can significantly influence the overall outcome of the triage system's efficacy when a disaster occurs. Therefore, a triage system with excellent reliability and validity will improve practice not only in accurately determining urgency, but also in allowing for many other administrative demands. However, triage can be less beneficial when the triage staff lack experience and training. Furthermore, insufficient resources may lead to unexpected consequences that compromise triage validity (Christian *et al.*, 2008). In addition to having good validity and reliability, a successful triage system must be feasible and effective. Ensuring team adherence and procedural expeditiousness is essential (Magalhães-Barbosa *et al.*, 2018)

Triage Efficacy

The triage system is effective in the ED because it prioritizes patient care in a complex, fast-paced healthcare environment. Triage systems are most commonly linked with EDs, where they are used to distinguish urgent cases from those who can wait. The

key issue is not increasing or reducing waiting times overall, but the effectiveness with which triage nurses allocate shorter waiting times to the highest priority patients, thus redistributing patient waiting times according to need (Qureshi, 2010). Therefore, it is important to decide what level of care or treatment is considered necessary to meet the patients' identified needs.

Triage can help assess the resources required for patient treatment if hospital resources are insufficient for all patients who need to be treated immediately. When resources are increased, such as additional physical, personnel, and supporting resources, management demand will increase as well (Hoot & Aronsky, 2008). Therefore, triage enables patients to be allocated to the most appropriate assessment and treatment options to avoid unnecessary ED utilization and to increase patient care and safety (Ganley & Gloster, 2011). Triage is effective in EDs because it allows healthcare staff to allocate appropriate care to the most urgent cases.

There is no evidence that patient outcomes are worse if they are not seen within recommended times (FitzGerald *et al.*, 2010). However, a systematic review of the evidence for reducing ED visits and waiting times concluded that triage is a useful risk management tool. When EDs are busy, the process of triage may cause delays in care, but if it adds extra value by initiating examinations or treatment, then it may save time.

The lack of education and training and poor communication among emergency staff are the most serious factors that affect the efficiency of the triage process (Gerdtz *et al.*, 2009). Effective communication and a well-trained staff with good knowledge are essential for making accurate assessments when working in a triage environment (Gerdtz *et al.*, 2009).

ED Overcrowding and Triage Systems in the Middle East and Saudi Arabia

Little research has been conducted in the Middle East, and more specifically in Saudi Arabia, on ED overcrowding and triage systems. Health and cultural systems differ among hospitals, which means that applying a Western triage system can create challenges (Aljohani & Lyneham, 2008).

The number of patients attending EDs in Saudi Arabia is increasing significantly, and most EDs do not use a formal triage system. Studies have found that a formal, reliable, and validated triage process gives access to emergency care depending on clinical urgency and availability of resources (Aljohani & Lyneham, 2009). A review of the literature from the Middle East showed that between 59.4% and 75% of patients presenting to EDs had non-urgent problems. Taken together, these studies demonstrate that the inability of ED staff to promptly attend to patients presenting with non-urgent complaints is the leading cause of overcrowding.

Dissatisfaction with primary healthcare services and the possibility of having emergency care without waiting for an appointment appear to be two main factors influencing non-urgent visits to EDs. Thus, triage systems were introduced in Middle Eastern EDs to address these issues. However, a lack of training as well as errors in decision making among triage staff affects the quality of emergency care services (Gertz *et al.*, 2009). Some studies have examined potential strategies to overcome the issues associated with the triage process. For example, providing a fast-track area in the ED has shown a significant decrease in the rate of overcrowding, length of stay (LOS), and the number of patients who leave without being seen (LWBS) (Elkum *et al.*, 2009). Studies have also found that adding a patient assessment room to the ED decreased waiting times for non-urgent admissions by 50%.

A recent review of triage systems in Saudi Arabia found that triage decision making is generally a medical responsibility. For this reason, a triage nurse usually depends on ED physicians to make decisions that interfere with the actual role of triage nursing. Furthermore, patients are mostly uninvolved in triage decisions. Therefore, triage nurses' and patients' contributions to the triage decision is an important matter in need of further research. It is necessary to provide qualified triage staff and sufficient resources, and it is important for decision makers to allocate these resources professionally to improve the quality of healthcare delivery in EDs. For example, infrastructural improvements in the ED can provide a better environment for triage staff. Awareness campaigns about ED services should be disseminated in Middle Eastern communities to curb inappropriate utilization of EDs. Additionally, policy-makers should exert greater effort in developing public trust in other primary healthcare services (Qureshi, 2010) so that EDs are not considered the first point of access for primary care health issues.

Since the above review, few Middle Eastern studies have been published. Recent Saudi research found that most triage systems used are likely to be an adaptation of the Canadian, Manchester, or Australasian Triage Scales (Aljohani & Lyneham, 2008). Following this review, the management of triage in hospitals across Saudi Arabia has remained inconsistent, resulting in confusion within Saudi Arabian health services, because when staff change hospitals, the triage system is likely to be different. This lack of consistency can mean that the efficiency of triage systems cannot be compared.

A retrospective study was the first in the Arab region to evaluate the feasibility and validity of the Canadian Triage and Acuity Scale (CTAS) by comparing specific ED quality indicators with pre-established CTAS triage goals and evaluating the relationship between CTAS triage level and waiting times. Time to see physician, total LOS, and LWBS are effective indicators of an ED's performance and triage efficacy.

Registration to physicians and LOS profiles, determined by triage level, are essential for the management of the ED and enhancing patient flow through collaborative efforts (Elkum, 2011).

In addition, a quasi-experimental study conducted in a tertiary care hospital in Abu Dhabi in the United Arab Emirates investigated the impact of a fast-track area in the ED and also aimed to determine the effectiveness and quality measures in non-urgent cases. The study showed that of 10,485 patients reviewed from 2005 to 2006, 6,987 (> 60%) were non-urgent cases. The waiting times and LOS for non-urgent conditions decreased by approximately 30 minutes, and the LWBS rate dropped by 85% after providing the fast-track area in ED. Thus, a fast-track system appears to be an effective strategy to enhance patient flow in EDs (Devkaran *et al.*, 2009).

The studies discussed above found that the inappropriate utilization of EDs affects emergency care services. The use of EDs for cases that might be non-urgent affects those in need of emergency care. The high percentage of apparently non-urgent visits to Middle Eastern EDs increases waiting times and overcrowding, which could compromise the effectiveness of the triage process and the quality of ED services. Thus, it is important to examine the factors that influence patients' preferences for visiting the ED for non-urgent reasons. Research has pointed to several factors that may lead patients to choose emergency services instead of primary and specialized health services in Middle Eastern communities. Some of these factors are: (1) the desire to receive care on the same day, (2) the possibility of having laboratory tests and other investigations that are not provided in primary care clinics, (3) the lack of trust in primary healthcare services, and (4) convenience for patients who prefer medical treatment that is available 24 hours per day (Jerius *et al.*, 2010; Qureshi, 2010; Rehmani & Norain, 2007).

From the findings of these studies about factors influencing triage efficacy in the Middle East, and specifically in Saudi Arabia, it can be argued that there is a need for further studies and solutions to address these issues. Patients need health education, and alternative solutions must be considered to address the high percentage of non-urgent visits to EDs.

Team Triage

A review of the literature suggests that triage in EDs can decrease overcrowding and LOS. Delay issues could be reduced when a doctor and nurse team performs triage even for a limited period, conducting processes such as medical evaluation, analgesia, examination, and discharge. The authors found that team triage reduced the time to see a doctor or radiologist and reduced LOS in the ED, and recommended that to improve triage efficiency, doctor/nurse team assessments should start immediately (Subash *et al.*, 2004).

Some researchers have argued that the team triage strategy has been more successful than triage involving a nurse working alone. One study aimed to assess the importance of team triage in an ED and found significant differences between team triage and individual triage nurse assessments in reducing overcrowding and the number of patients leaving without being seen by a physician. The study found that patients were treated and assessed by an experienced physician and nursing triage, regardless of urgency. There was a significant increase in the number of patients seen and discharged within 20 minutes. This positive effect of team triage on LWBS did not continue when the researchers ended the intervention. Thus, from the findings, team triage was found to reduce waiting times, which resulted in a decrease in the number of patients visiting the ED who left without being seen and increased patient satisfaction (Subash *et al.*, 2004).

In support of the above findings, a more recent study provided evidence suggesting that team triage reduces wait times, which then reduces the number of patients who LWBS. These two studies suggest that team triage is more effective than conventional triage in reducing the number of patients who LWBS. Furthermore, a systematic review found that assigning a physician to the triage team increased the accuracy and efficiency of the initial patient evaluation and addressed patient concerns (Oredsson *et al.*, 2011).

In contrast, lack of training and experience among the triage team may affect the efficacy of the triage process. For example, some patients or their families may not be satisfied when triaged by a nurse rather than a doctor. However, there is no evidence to suggest that physicians are any better or more cost-effective at triage than experienced nurses. Nonetheless, there is evidence that the effectiveness of triage is associated with the experience of the nurse, particularly in emergency care (FitzGerald *et al.*, 2010).

Team triage improves waiting times in the ED (Corkery *et al.*, 2021) and results in decreased ED observation placement and increased time in ED observation. In summary, team triage in which nurse practitioners (NPs) and practitioner aids (PAs) order tests and nurses place IVs and collect laboratory results did not increase testing and led to increased discharges, lower time to discharge, and lower time to admission (Heslin *et al.*, 2020).

Triage Nurse and Patient Flow

To cope with overcrowding, triage frameworks provide guidelines for creating suitable environments to maintain the quality of triage assessments and prevent medical errors. Studies have identified factors that influence emergency nurses, including busyness of the department, discomfort when dealing with the patient, and absence of teamwork. Thus, nurses play a significant role in medical environments by not only triaging in EDs

but also by affecting the quality of triage in terms of reducing waiting times for doctor assessment. This relates to how triage nurses can influence patient flow through EDs.

An observational cohort study in a South African ED compared triage systems to the absence of triage or to very informal systems. The objective of their study was to evaluate the effect of nurse triage in EDs, and the outcome measure was the waiting time from arrival to doctor assessment. The results showed a reduction in waiting time by a mean of 178 minutes. According to their findings, waiting times were dramatically reduced with the involvement of triage nurses.

However, triage staff reliability is an important practical issue and should be carefully considered and evaluated. The assignment of a triage rating system can be potentially harmful if it is unreliable and if assignment to a lower acuity category is coupled with delays, nonpayment, or a refusal of care. These factors can also influence patient flow.

Introducing a fast track for patients with less severe symptoms results in shorter waiting times, shorter LOS, and fewer patients leaving without being seen. Team triage, with a physician on the team, will likely result in shorter waiting times, shorter LOS, and fewer patients leaving without being seen. There is limited scientific evidence that the streaming of patients into different tracks, performing laboratory analysis in the emergency department, or having nurses request certain x-rays leads to shorter waiting times and LOS (Oredsson *et al.*, 2011).

The findings above show that emergency nurses are important in planning and implementing patient flow improvement strategies. Nurse leaders in departments or hospitals are often responsible for patient flow efforts, and staff nurses are often responsible for implementation. These findings show that there is a need for nurses to receive information on the importance of developing patient flow, best practice strategies, and techniques for process improvement. Thus, nurses leading patient flow improvement initiatives should establish implementation timelines that account for adequate staff training and other delays that may arise.

Factors Influencing Triage Decisions

Although triage is seen as beneficial, several issues have been identified. It has been argued that some patients deteriorate in the ED due to incorrect triaging and poor decision making. Unprofessional decision making may interfere with the outcomes of the triage process and affect patient care. Triage decisions must be made appropriately to match the objectives of clinical criteria and must optimize time to medical intervention (Gerdts *et al.*, 2009).

In addition, accuracy in decision making relies on the ability to regulate the complexity, ambiguity, and presentation of the task. Beginners' decision making depends on context-free rules, while experts' decision making tends to be more experience-based and intuitive; hence, decision-making approaches differ.

The triage decision-making process is influenced by factors such as interruptions to the triage process, time constraints and a stressful work environment, nurse skills and a lack of formal staff training in triage, personal capacity (internal factors), and the types of examinations and tests needed (Qureshi, 2010). Nurses make decisions every day while planning and delivering care within their scope of practice. Therefore, when decisions are made quickly or not based on evidence, there is a higher chance of medical error.

Triage nurses apply a range of factors to make triage decisions and begin emergency care, including personal capacity, experience, insight, pre-hospital data, and communication with staff. In Saudi Arabia, the nurses in some EDs are not involved in triage decision making; however, it is important for health policymakers to reflect critically on the staged application of a nurse triage system to improve ED efficiency (Qureshi, 2010).

Triage decisions are affected by the number and combination of patients' clinical features and, to a lesser extent, by other factors, such as the skill mix of the nursing and medical staff, staff experience, and triage guidelines (Qureshi, 2010). Triage decisions are governed by six steps: 1) visual cues, 2) chief complaints, 3) focused assessment, 4) hypothesis construction, 5) acuity determination, and 6) reassessment of the acuity. However, the triage decision-making process was also affected by factors such as interruptions in the triage process, time constraints and high workload, nurse skills and lack of formal staff training in triage, personal capacity (internal factors), and types of examinations and tests used (Andersson *et al.*, 2006).

Clinical Implications and Suggested Strategies for Improving Triage Systems

Triage can help differentiate urgent from non-urgent cases, which decreases the risk associated with longer ED waiting times. To conduct triage effectively, there are guidelines and strategies that can assist in creating an effective system. Triage staff should have excellent communication and assessment skills as well as knowledge of legal and professional principles.

For triage to provide effective distribution of casualties and sort out minor injuries, it must be standardized to improve its quality and efficacy. Standard triage systems allow the classification taxonomy for a new patient to be developed and lead to a system for the classification of presentational urgency (Australasian College for Emergency Medicine, 2006). However, issues such as poor decision making and

insufficient resources may occur in many ED situations and impact the effectiveness of the triage system. Therefore, reducing triage issues in the ED, such as overcrowding and delays, must follow effective strategies that are capable of addressing such issues.

Triage remains the main gateway to the ED, and it is essential to secure this access for optimal ED functioning and safe care. Triage in the ED involves interdisciplinary collaboration with healthcare professionals who may have differing views (i.e. physicians who do not feel that nurses have triaged adequately and/or nurses who do not feel that physicians are responding quickly enough to high acuity patients) (Ouellet *et al.*, 2023).

1. Nurse practitioner (NP)

Although not yet introduced in Saudi Arabia, international evidence suggests that nurse practitioner (NP) roles in the emergency department are another strategy that can reduce delays and overcrowding (Carter *et al.*, 2010). Patient satisfaction can be improved through additional contact time with the NP.

An NP can improve communication and shorten LOS (Carter *et al.*, 2010). Thus, patients may be more satisfied with the whole care experience under NP care, because they receive more health information and better discharge instructions. For the role of the NP to be accepted, patients must trust the NP to deliver high-quality care; otherwise, they will prefer to wait for a physician in the ED, exacerbating overcrowding and delays. Some researchers have argued that the NP role in the ED has faced opposition from other health disciplines for reasons such as the possibility of NPs making errors in prescribing medications or requesting unnecessary X-rays, which may put them at legal risk. Furthermore, opposition from other health professionals, such as doctors and radiologists, regarding patient risk management has limited the development of the ED NP's job description.

Moreover, the use of multiple thinking strategies during ED triage indicates that this is a complex task requiring multiple cognitive actions. Registered nurses (RNs) and NPs assess patients during triage to estimate the urgency of the main complaint and general condition. Hence, in terms of applying thinking strategies, the RN and NP need to collect data by asking questions, assessing the patient, and measuring physiological functions so that they can evaluate these data to decide on the most appropriate treatment for the patient.

2. Telephone triage

The Tufts Managed Care Institute listed strategies associated with triage systems in the ED, although some may relate only to the US healthcare context. These strategies include access to office appointments, patient education, triage telephone

services, and patient co-payments. Patient education may reduce the number of non-urgent ED visits. Triage and telephone services help avoid the cost and LOS for ED visits, and, finally, patient co-payments discourage unnecessary visits to the ED.

With regard to the strategy of using telephone triage by nurses, this may result in other issues, such as a lack of healthcare resources. Some studies have found that telephone triage may make triage difficult because nurses may not immediately locate suitable professionals from the appropriate departments to whom to refer callers, and also because it is often difficult for patients to contact their health physician to schedule suitable appointments even though the telephone triage nurse has recommended that course. Therefore, the triage nurses in the study found themselves advising callers to go to a hospital ED because there was nowhere else to refer them.

Telephone triage is a “systematic process in which a nurse screens a caller’s symptoms” for themselves or others. The nurse assigns a level of urgency based on the described change in health status and directs the appropriate action using standard protocols. The nurse directs the caller to the most appropriate healthcare setting or gives advice for care at home. It does not result in a diagnosis. (Eriksson *et al.*, 2020)

There is a substantial base of evidence regarding the operational and clinical effectiveness of telephone-based triage and advice services for the management of requests for urgent healthcare. The most commonly reported outcomes concerned the accuracy and appropriateness of decision making, patient compliance with the advice given, the safety of the decision making, and patient satisfaction (Turner *et al.*, 2015).

A recent study by Moon & Cho (2022) reported that smartphone-based education improves clinical competency, knowledge, performance, attitude, and confidence in nursing and medical science practice. With a smartphone-based triage education program, distance training and repeat clinical decision-making practices have been rendered possible. Therefore, the purpose of their study was to develop a mobile app-based online education program to improve emergency nurses’ triage competency and verify the effectiveness of the education program (Moon & Cho, 2022).

3. Education for triage

In addition to the strategies mentioned above, educational strategies in decision making and communication skills provide great benefits for an effective triage system. Educational programs for developing decision making and knowledge are required in triage to present the best triaging system in the ED. However, insufficient hospital funding or resources and low motivation among staff will make applying these

strategies more challenging. Thus, overcrowding and delay issues in EDs may remain unchanged or worse without improved education.

Several studies have shown that education and ongoing training in triage are essential to improve triage decisions for good health outcomes. Prior to being assigned to triage roles, triage staff should have sufficient training and experience in the triage system.

The researchers recommended that a triage nurse should meet several requirement criteria: no less than three months of experience in the ED, educational preparation, Advanced Cardiac Life Support (ACLS) certification, critical care nursing or a certificate in emergency care, and completion of training workbooks, in-service education sessions, competency assessment programs, unit-based orientation programs, and training in triage guidelines. There is a worldwide demand to enhance uniformly modified triage education curricula and triage guidelines for the variability in triage training and experience as well as ongoing training and research in triage systems. Triage guidelines used in triage education and training assist triage staff in prioritizing ED patients in all healthcare settings, including psychiatric EDs. However, there are no ideal triage guidelines that can predict how to recognize all the complexities involved in urgent conditions (Aghabary *et al.*, 2023).

Education in triage can potentially contribute to increased accuracy in triage assessments. Accurate triage is of the utmost importance for patient safety, and triage assessment in emergency care requires a high degree of knowledge, critical thinking, and in-depth clinical reasoning, in addition to compliance with the triage scale used (Olsson *et al.*, 2022).

Directions for Future Research

This review has identified a number of significant gaps in the literature found in the Middle East, specifically in Saudi Arabia. The few studies discussing the effectiveness of triage systems have mainly focused on non-urgent visits leading to overcrowding. No studies were found that evaluated triage systems from nursing or patient perspectives and, in particular, none that compared nurses’ assessments of triage ratings to those of the patients.

There is a need for research and comparative studies to evaluate the effectiveness of ED triage systems in the Middle East generally, and in Saudi Arabia in particular. A review of the literature indicates that there is a lack of studies examining several relevant issues in the Middle East and Saudi Arabia. The first is to examine how ongoing training and education programs for triage staff can effectively improve ED services in Saudi Arabia and other Middle Eastern countries. The second area that needs further attention is how the promotion of public health awareness about triage system categories

and the appropriate use of ED services by the public can decrease non-urgent visits. Third, primary healthcare services in Saudi Arabia must be evaluated regularly to examine the reasons that influence patients' decisions to present to the ED with non-urgent problems, resulting in overcrowding. Additionally, further research is needed to test the innovative approaches suggested, such as the use of NPs and telephone triage. The final issue is to understand how triage nurses deliver effective care and to conduct research examining their experiences.

CONCLUSION

Emergency department (ED) triage is the first screening step that sorts patients in emergency situations by categorizing their urgency levels to prioritize patients for evaluation and treatment. Because the ED is an integral hospital department and a complicated, fast-paced environment, ED healthcare services have evolved to be delivered through effective triage systems to reduce waiting times and overcrowding. Hence, the triage system is intended to decrease LOS and overcrowding for patients with serious medical conditions that require immediate intervention. Although there are clear benefits to the triage system, there are also significant issues. A lack of education and training, incorrect triage decisions, and limited resources are the most serious factors that impact the efficiency of the triage system. However, regardless of its limitations, this review argues that strategies can strengthen the system and provide quality healthcare. Overcrowding of Middle Eastern EDs—such as for non-urgent visits—has been found to decrease the efficiency of triage systems and has compromised the quality of healthcare. In view of the growing population and an increasing demand for healthcare in EDs throughout the Gulf region, there is a need for both local and international studies to investigate the reasons for these delays in EDs and to enhance the quality of care (Elkum *et al.*, 2009). Therefore, it is recommended that comparative studies examining triage systems in the Middle East be conducted so that strategies can be implemented to improve the management of ED services.

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