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Assessing the quality of pre-hospital care from the perception of nurses working in emergency departments in Makkah, Saudi Arabia

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Abstract
Trauma is a significant contributor to mortality and morbidity in Saudi Arabia and worldwide, and it continues to be the primary cause of death among younger individuals. During trauma care, Pre-hospital care providers are the primary first responders most of the time.
Aim*: The goal of this research is to evaluate the level of pre-hospital care as perceived by nurses employed in the emergency department located in Makkah City.*
Methods:*The study is quantitative descriptive research using a cross-sectional design through a questionnaire as a data collection tool targeting staff nurses in emergency departments in Makkah City.*
Results: *overall Means and standard deviations for Weighing the eminence of pre-hospital care for trauma patients from Nurses' perception indicate that those trauma patients sometimes receive highly qualified pre-hospital care.*

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I. Introduction:

Worldwide, trauma is considered one of the essential contributors to comorbidity as well as mortality among humankind. Lower risk of early and late morbidity and mortality due to trauma is associated with immediate utilization of pre-hospital care (Li, Mok & Nolan, 2022). One of the essential things to effectively treat trauma is to provide injured patients with pre-hospital care of the highest possible standard. The magnitude of the patient's injuries and the amount of time it will take to recover are directly related to the middle of care they receive before being transported to the hospital.

During trauma care, Pre-hospital care providers are the primary first responders most of the time. The patient's level of trauma is heightened whenever there is a delay in their arrival at the hospital and their receipt of appropriate care. Studies show that barely half of all patients are at the healthcare facility during the golden hour (Sultan, Zemede& Zewdie, 2021). This impacts the patient's ability to heal and the degree of damage inflicted on them. Trauma is among the primary contributors to morbidity and mortality in many parts of the world. A lower risk of early and late morbidity and mortality due to trauma stays related with immediate utilization of pre-hospital care.

The weight of responsibility resulting from traumatic injury is a big concern affecting public health worldwide. One of the most essential things to effectively treat trauma is providing injured patients with the highest possible standard of pre-hospital care. Trauma is among the primary contributors to morbidity and mortality in many parts of the world. Lower risk of early and late morbidity and mortality due to trauma is associated with immediate utilization of pre-hospital care (Li, Mok & Nolan, 2022). The magnitude of the patient's injuries and the amount of time it will take to recover are directly related to the standard of care they receive before being transported to the hospital.

Intermediate and delayed death can occur as a direct and indirect result of exposure to trauma. Death might occur within a few hours of the initial trauma due to treatable complications from moderately severe injuries. Infection, failure of multiple organs, or other late consequences can result in delayed mortality, which can occur days to weeks after the event. Therefore, providing high-quality pre-hospital care is of the utmost

importance in preventing the situation from becoming even extremely serious and, more specifically, lowering the fatality rate brought on by trauma injuries.

The treatment of wounds and burns, the immobilization of fractures, and the maintenance of oxygen levels and blood pressure in patients with traumatic brain injuries are all examples of the types of care that can be provided by emergency medical technicians who arrive at the scene of an accident as quickly as possible. The death and morbidity rates associated with severe illnesses and injuries are lowered when high-quality pre-hospital care is provided. Providing high-quality emergency care outside of hospitals is predicted to prevent around 45% of deaths and 35% of injuries (Sultan, Zemede& Zewdie, 2021).

According to numerous studies, a significant proportion of fatalities resulting from injuries are attributable to inadequate pre-hospital care. This includes care that does not correctly alleviate the patients from their trauma and aches, as well as care that fails to address crucial problems that aggravate trauma, such as preventing further bleeding (Li, Mok & Nolan, 2022). Providing patients with the highest quality care is essential to prevent trauma and save lives. Avoiding the incidence of trauma is the most effective strategy to decrease the incidence of illness and death caused by effects of trauma; nevertheless, providing adequate pre-hospital care also helps reduce morbidity and mortality rates. The three causes of death that account for most fatalities in the first few hours after a traumatic event are airway blockage, hypoxia, and bleeding. All of these factors can be mitigated by administering appropriate pre-hospital care.

Problem statement:

Trauma is a significant contributor to illness and death both in Saudi Arabia (SA) and worldwide, particularly among younger individuals. In a recent literature review conducted by Alferdausa and Shaher (2021), the existing trauma system in SA was evaluated. The study revealed notable variations in prehospital trauma schemes, including differences in the frequency of trauma cases, access to resources, availability of organized emergency medical services (EMS) responses, and demographic factors.Makkah city considered the holy capital city. According to the general authority of Statistics report (2019), around 2.500.000 Pilgrims performed hajj while 19.000.000 people performed the rituals of Umrah regardless of the residents of Makkah. The Makkah area has the highest number of ambulances and medical vehicles, followed by Riyadh(Alotaibi & Khan, 2018). Those factors require structured prehospital care that needs to be assessed and evaluated.

Aim:

The goal of this research is to evaluate the quality of pre-hospital care based on the perspective of nurses employed in the emergency department of Makkah City.

Research Question:

- What is the level of the quality of pre-hospital care from the nurses' perception of the quality of pre-hospital care specifically within the emergency department in Makkah City?
- What are the differences between the quality of pre-hospital care and the nurses' perception within the emergency department at Makkah City in relation to hospital names?

II. Literature Review:

Search strategy

The study involved the analysis of studies on prehospital care from Google Scholar, PubMed, and MEDLINE studies. The strategy employed a maximum of five articles to obtain the required information using keywords of prehospital, trauma, and emergency nurses and physician, on the causes, challenges, and remedy mechanisms employed by the earlier scholars on the subject matter.

Keywords. Prehospital care, trauma care, emergency nurses, and physicians.

Prevalence of Trauma:

According to the global report in 2017, a significant number of individuals, approximately 4.5 million, lose their lives each year due to a lack of qualified pre-hospital emergency care (James et al., 2020). Furthermore, inadequate attention to pre-hospital emergency care by nurses has resulted in many others suffering from long-term disabilities (Khan et al., 2020; Lourens et al., 2020). These statistics highlight the critical importance of improving the quality of pre-hospital care provided by nurses to prevent unnecessary mortality and long-term disabilities.

Providing high-quality emergency care outside of hospitals is predicted to prevent around 45% of deaths and 35% of injuries (Sultan, Zemede& Zewdie, 2021). The three causes of death that account for most fatalities in the first few hours after a traumatic event are airway blockage, hypoxia, and bleeding. All of these factors can be mitigated by administering appropriate prehospital emergency medical care.

Factors affecting the quality of pre-hospital care:

In Northwest Ethiopia, Abate and Mekonnen (2020) assessed the acquaintance and practice of nurses as per the quality of pre-hospital services. The research concluded that the familiarityand nursing practiceconcerning pre-hospital emergency care needed an improvement. It was, therefore, recommended that responsible bodies should introduce specialized development programs and proper in-service training for nurses.

A study done in Sweden by Ivic et al. (2022) aims to explore prehospital emergency nurse (PEN) experts' involvements in taking care for the sick bestowed with non-specific main grievances. The study revealed that experience and a systematic method enhanced medical safety. Feedback from managers was found to strengthen the nurse's ability to deliver quality pre-hospital emergency services.

The quality of care provided by the SRCA relies on two key levels of EMS personnel: paramedics, who deliver progressive life support facilities, and emergency medical specialists, who offer basic life help services and are available 24 hours a day across all centers (MOH, 2018). A study by Alnoaimi et al. (2022) in Bahrain was done against the backdrop that the lack of local educational programs for Emergency Medical Facilities (EMS) was attributed to the quality of service delivery among licensed EMS providers in Bahrain. The study findings indicated that there were low-level competencies in major areas not shielded by the expatriate nurse' syllabuses, notably, working in an self-sufficient environment, perilous thinking as well as policymaking skills, disaster answer skills, EMS information base, and the ability to cope with the various prehospital environment stressors. The study concluded that there is a need for further modified training programs for emigrant EMS nurses in Bahrain.

Árnason et al. (2021) examined how differences in pre-hospital emergency care nurses, anesthesiologists, and nurse anesthetists' competence influenced the effectiveness of prehospital emergency anesthesia in trauma patients' treatment. This prospective, observational, and multicenter study was done between May 2015 and November 2016, with the sample size recruited from Nordic countries. Results indicated that the pre-hospital tracheal intubation achievement rate was higher in more experienced airway nurse providers.

Study design:

The present study is quantitative descriptive research using a cross-sectional design through a questionnaire as a data collection tool.

Population:

This study's population is the nurses working in emergency departments within the selected setting and providing direct trauma care.

Sampling strategy:

Random sampling will be used, using stratified Random sampling. Depending on the working hospital, nurses will be stratified into four strata, and then a random selection will be used.

Sample size: Referring to Makkah Health Cluster administration, the total amount of nurses occupied in emergency sectors within the selected setting is 370. One hundred eighty-nine nurses will be included using G power to calculate the representative.

Inclusion criteria:

Nurses currently working in emergency departments with at least one year of experience providing direct care to trauma cases, regardless of age and nationality. One year of experience was considered to ensure competency and privilege.

Instrument:

The electronic questionnaires will be used as data collection methods to evaluate the quality of pre-hospital services for reported trauma patients within the designated setting from the perception of nurses working in emergency departments.

Pre-hospital Emergency Trauma Care Assessment Tool, a seven-question review developed by (Delaney, P et al., 2021), will be used. The survey was extended to thirteen as six questions were added to the original tool using the Pre-Hospital Trauma Life Support procedure for providing care.

The instrument is alienated into two sectors; the primary part includes the participants' demographic data, such as years of experience, specialty, and specialized trauma certification. At the same time, the second part includes the corresponding outcomes from pre-hospital interventions, which include 13 questions.

Validity and reliability:

Reliability analysis was conducted using Cronbach's alpha for PETCAT at both interludes to evaluate the consistency of the measurements. Item discernment guides were determined using point-biserial association to evaluate each item's aptitude to envisage the ultimate PETCAT score. Inter-rater reliability was assessed using Cohen's Kappa. The ordinary error of measurement (SEM) was calculated to examine the outcome of dimension error on distinct test scores. A lower SEM value indicates a smaller number of scores attributed to dimension errors, indicating higher dependability. Suitable values for SEM must fall within 5% of the series of probable test scores (0-10). Statistical significance assessments were made using the Wilcoxon sign-rank assessment, with an implication level of $p < 0.05$.

Data analysis:

Analysis of Nurses' Perception of the Quality of prehospital care

standard deviations and Means were evaluated for a separate concept and correlated items; items were then classified in downward order bestowing to the subsequent scale:

Never		Rarely		Sometimes		Mostly		Always	
1	2	3	4	5	6	7	8	9	10

Table 1 Means and standard deviations for Measuring the quality of pre-hospital care for trauma patients from Nurses' perception in the emergency department at Makkah City

NO	Statement	Mean	SD	Rank	Status of quality of pre-hospital care for trauma patients determinant	p-value**
1	How often do patients at risk for aspiration arrive with a secured airway?	5.02	3.19	11	Sometimes	0.000
2	How often do trauma patients arrive in the recovery position on the other side, allowing fluids to drain from their mouths?	4.67	3.10	13	Sometimes	0.000
3	For patients needing spinal precaution, how often do patients arrive with neck immobilization?	5.84	3.21	1	Sometimes	0.000
4	For patients who presented with a 2rmal ventilation rate (12-20), how often do they arrive with O2 placed while maintaining SPO2 ≥ 94	5.49	3.18	4	Sometimes	0.000
5	For patients who presented with decreased ventilation rate < 10, how often do they arrive on assisted ventilation device (Bag Valve Mask) while maintaining SPO2 ≥ 94	5.25	3.24	9	Sometimes	0.000
6	How often do trauma patients arrive with a peripheral line Cannula in place and running intrave2us fluids?	5.38	3.09	7	Sometimes	0.000
7	How often is the presence of shock assessed and identified for patients presenting with trauma?	5.24	3.10	10	Sometimes	0.000
8	For externally hemorrhaging patients, how often do patients arrive with direct pressure applied followed by pressure dressing?	5.58	3.15	3	Sometimes	0.000
9	For externally hemorrhaging patients needing a tourniquet, how often are tourniquets applied to extremities hemorrhage?	4.97	3.10	12	Sometimes	0.000
10	For patients suffering a significant hemorrhage, how often is their condition improved by receiving rapid transport?	5.43	3.07	5	Sometimes	0.000
11	For patients suffering from fractured extremities, how often do patients arrive with a splint?	5.41	3.17	6	Sometimes	0.000
12	For patients presenting with trauma, how often the neurological status (Glasgow Coma Scale, Pupillary examination) was assessed and identified?	5.31	3.27	8	Sometimes	0.000

13	How often do the record of the vital signs handed over to the Emergency department's healthcare providers?	5.62	3.26	2	Sometimes	0.000
OVERALL		**5.32**	**2.84**	**-**	**Sometimes**	**0.000**

From the table, it can be seen that announcement number 2, "How repeatedly do trauma patients reach in the recovery position on other side consenting for any fluids to drain from their mouth?" recorded the Sometimes level mean price amongst the accounts being evaluated by the study example, thus was classified first with a mean of (4.67). In contrast, statement number 3, "For patients needing spinal precaution, how often do patients arrive with neck immobilization?" was classified previously with (5.84) mean.

The means and standard deviations to assessing the quality of pre-hospital care for trauma patients from Nurses' perception in the emergency department at Makkah city according to the variables (Hospital name) as displayed in **Table 2** to show the worth of the statistical changes between the mathematics averages, a triple scrutiny of variance was used.

Category	means	N	standard deviations
King Faisal General Hospital	3.68	42	2.39
King Abdul Aziz General Hospital	4.13	40	2.63
Hera General Hospital	5.21	44	2.61
Al-Noor Specialist Hospital	7.39	59	2.11

Table 3: *One Way ANOVA for the differences in* **Assessing the quality of pre-hospital care for trauma patients from Nurses' perception in the emergency department at Makkah city***on variables* **Hospital name***)*

Source	**Type III Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
Between Group	423.862	3	141.287	24.196	0.000
Within Group	1056.894	181	5.839		
Total	1480.757	184			

As for Evaluating the quality of pre-hospital care for trauma patients from Nurses' perception in the emergency department at Makkah City, Table (3) shows significant differences according to Hospital name. Table 4 shows Scheffe's post-hoc test, which shows they are statistically, suggestively different as per the Hospital name.

Table (4) Scheffe's test for multiple comparisons

Hospital name	Mean	King Abdul Aziz General Hospital	Hera General Hospital	Al-Noor Specialist Hospital
King Faisal General Hospital	3.68	0.865	0.037*	0.000*
King Abdul Aziz General Hospital	4.13	-	0.248	0.000*
Hera General Hospital	5.21		-	0.000*
Al-Noor Specialist Hospital	7.39			-

Table (4) shows differences in **Assessing the quality of pre-hospital care for trauma patients from Nurses' perception in the emergency department at Makkah** City. Statistical analysis revealed a significant difference in the mean values between nurses working at King Faisal General Hospital and Hera General Hospital, with the mean values favoring those at Hera General Hospital. Additionally, there was a significant difference in the mean values between nurses at King Faisal General Hospital and Al-Noor Specialist Hospital, with the mean values favoring those at Al-Noor Specialist Hospital. These findings suggest that there are variations in the perception of pre-hospital care quality among nurses across different hospitals, with some hospitals performing better than others. Moreover, there is a substantial variance in the mean value between those in (King Abdul Aziz General Hospital) and (Al-Noor Specialist Hospital) and in favor of those in (Al-Noor Specialist Hospital). Moreover, there is important transformation in the mean value between those (Al-Noor Specialist Hospital) and (Hera General Hospital) and in favor of those (Al-Noor Specialist Hospital).

III. Discussion:

Managing a patient's airline is well-thought-out as the first step in managing trauma patients according to (ATLS, …) beside that according to Crewdson, Rehn, & Lockey (2018), identifying progressive airway

management was assigned as one of the topmost five researchable significances in the scope of pre-hospital critical care.

For the patient at risk for aspiration who are arriving with secured airways, the result shows that the mean of nurses' perception was 5.02, which indicate sometimes. The finding is contradicted by (Trimmel, Beywinkler, Hornung, Kreutziger, &Voelckel, 2018), as During the study that ran between (2006-2016) a total of 23060 patients were reported, and airways were managed successfully. The possible explanation of this result might be the EMS team's level of skills and competency and the restricted privileges to perform and use definitive airways. On the other hand, for patients arriving in a recovery position, allowing for any fluids to drain from their mouth, with the current study, the results indicated that the mean was 4.67 of nurses' perception. The result from the study contradicts the recommendations that have been developed from a systematic review that has been implemented by (Rehn, Hyldmo, Magnusson, Kurola, Kongstad, Rognås, Juvet, & Sandberg, 2016), which aims to develop recommendations and guidelines for EMS in managing airways. A strong recommendation emphasizes that for unconscious trauma patients. At the same time, definitive airways were not secured. The integral approach is turning the victim to his/her lateral position while maintaining spinal alignment.

Cervical spine protection and neck immobilization are one of trauma patients' initial and primary management. According to Kim, Bang, Kang, Jang, Kim, Choi, & Kim (2020), the efficiency of cervical halt has great clinical importance in the primary management of trauma patients. The current study shows that nurses perceived the frequency of patients who require spinal precaution and arriving at the emergency department with neck immobilization sometimes as the mean among the study samples was 5.84.

For patients presenting with significant trauma, Advance Shock Life Support strategies advocate for "balanced" restoration with a primary 1 L of crystalloid solutions formerly definitive control of bleeding (ATLS, 2018). althoughregarding the role of fluid resuscitation, initiating crystalloid fluids for resuscitation besides blood transfusion are usually provided as part of hospital management due to storage requirements. In contrast, a study was conducted by Zhang, Chen, Zhu, Lin, Liu, Liu, Ji, Chan, & Fan (2020) to identify preventable deaths in multiple trauma patients. The result shows that preventable death due to hypovolemic shock was 12.5%.

The current study illustrates that the mean of nurses' perception indicates the arrival of trauma patients to the emergency department with an inserted cannula and initiated crystalloid fluids is sometimes (5.38).

Finally, the study shows that nurses perceived the arrival of trauma patients with appropriate splinting of suspected fractured extremities as sometimes as the mean was 5.41, which is similar to the finding in a study that has been conducted by Lucumay, Sawe, Mohamed, Sylvanus, George, Mfinanga, & Weber (2019) purposes to define pre-referral steadiness offered to adult trauma patient referred to hospital. The results show that patients with extreme hurts had no or insufficient bandages among the studied sample.

IV. Conclusion:

This study assessed the quality of pre-hospital care from the nurses' perception within the emergency sectors at Makkah hospitals. The study included 185 nurses who are working in four hospitals in Makkah. The study indicated that the nurses who are continuing the care in the emergency department for trauma patients after the provided care at sense by pre-hospital providers perceived the total mean as 5.32, which sometimes indicate which mean that the received patients sometimes are arriving at emergency departments with secured airways. At the same time, they are at risk for aspiration, and sometimes, patients are arriving to emergency departments with neck immobilization and require spinal precautions. Also, the result indicates that patients sometimes arrive at emergency departments with proper oxygenation and ventilation based on their condition and requirements. The study also highlights that patients sometimes arrive at emergency departments with an inserted cannula and running fluid in case of hemorrhagic shock. The results reflect the degree of the health services provided by pre-hospital healthcare providers. The results also reflect the necessity to invest in Saudi nurses working in emergency departments at Makkah, as the percentage of nurses holding post-graduate diplomas in emergency services was 1.6% despite the availability of different educational programs. On the other hand, the study also addressed a low percentage of nurses holding ATCN, which has a significant impact on the care nurses provide in emergency departments for trauma patients.

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