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Original Research Article

Difficulties in resuscitating adult skeletal injury and trauma: a systemic review

Turki Abdullah S. Al-Ajmi*, Abdullah Salah Al-hussain, Mohammed Fuad Al-Abdulqader

Department of Medicine, Imam Mohmmed bin Saud University, Riyadh, Saudi Arabia

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***Correspondence:**
Dr. Turki Abdullah S. Al-Ajmi,
E-mail: turki--aj@hotmail.com

ABSTRACT

Background: Trauma resuscitations are complicated, high-risk, and time-sensitive actions that need the coordination of different specialists arriving from multiple areas in the hospital. This systematic review aimed to understand the main key challenges of trauma resuscitations using a broad search in various database.
Methods: A systematic review of published articles between the years 2000 and 2016 was conducted using different electronic databases such as PubMed, Medline and Embase to identify studies evaluating trauma resuscitations challenges. Different keywords were used in this study to recognize relevant articles. The titles of all articles were scanned in the first stage. Irrelevant articles were omitted and the abstracts of the rest articles were reviewed in the second stage. Finally, the full text of all articles which met the inclusion and exclusion criteria were reviewed and a data extraction sheet was made to summarize all the articles. Data were analyzed descriptively.
Results: Twenty studies were reviewed including; RCT (3 studies), QRCT (5 studies), and descriptive study (12 studies). The results showed that there are four main trauma resuscitation challenges including pre-hospital challenges, error-related challenges, equipment and technical challenges, and finally general challenges.
Conclusions: Trauma resuscitation is one of the most critical aspects of emergency care. It is necessary to promote resuscitation care and focus on patient outcomes in terms of mortality and more importantly, functional outcomes. Considering these main factors affecting trauma resuscitation will improve patients' outcomes and help those who are engaged in providing services.

Keywords: Challenges, Errors, Trauma resuscitation

INTRODUCTION

Trauma is known as a key health issue around the world that affects patients in both developed and developing countries and accounts for 10 000 deaths every day.[1] Injury occurs abruptly and unexpectedly and traumatic injuries are the main causes of mortality and disability globally that affects young, healthy, and productive persons.[2] In 2010, a total of 180,811 deaths were classified as injury-related in the US.[3] According to the Global Burden of disease injuries caused 5.1 million deaths, 9.6% of all mortality in 2010. In 2013, trauma was also estimated for 11% of disability-adjusted life-years (DALYs).[4] The World Health Organization (WHO) estimated that road accidents would be third leading cause of death globally by 2020.[5]

The two most leading causes of death due to trauma are neurological injury and blood loss.[1] For example, it has been estimated that Haemorrhage is responsible for 30-40% of all trauma death, accounts for 80% of early in-hospital deaths.[6] These two leading causes of death are potentially preventable with resuscitation strategies altering the outcome in both.[7] Early resuscitation

decisions influence outcome in trauma situations.[8] Resuscitation is an endeavour to preserve or re-establish life through creating and maintaining the airway, breathing, and circulation by cardiopulmonary resuscitation (CPR), defibrillation, and other relevant strategies.[2] Resuscitating trauma patients is a complex, time-sensitive and challenging task.[9] There has been substantial development in trauma resuscitation in the past 20 years coupled with a strong improvement in the patients outcomes.[10] To promote trauma resuscitation, considering other effective factors in survival of major trauma patients, is essential such as preclinical therapy and transportation, operative and intensive care unit treatment, and early in-hospital trauma management.[11]

Timely and well-organized trauma resuscitation are vital factors for successful patient outcomes, with the first hour of trauma resuscitation often stated to as the ‘‘Golden Hour’’.[12] To promote successful patient outcomes a good pre-hospital communication to develop an efficient management of critically injured patients during trauma resuscitation in necessary. Trauma resuscitation is a multi-professional related activity which must deliver rapid and focused intervention in a planned manner to recognize and manage potentially life-threatening injuries.[13] Before the arrival of the patient, trauma team members should, develop essential planning based on pre-hospital information, and organize needed equipment. This management can improve the care provided and lead to better patient outcomes.[14] As there are no studies to identify key challenges in trauma resuscitation till now, this systematic review was conducted to review the previous published articles. It would help to understand effective factors in survival of major trauma patients through developing appropriate policies and strategies.

METHODS

A systematic review was conducted using an electronic search of PubMed, Medline and Embase to identify studies evaluating trauma resuscitations challenges. After choosing the relevant database, the relevant keywords were used in the search. The key words were used in this study includes “Trauma”, “resuscitations”, “challenges”, “pre-hospital”, and “errors”.

We included all types of study (randomized control trials, QRT descriptive and cohort studies). All the studies found based on the keywords and published between 2000and 2016 and in English language were included in the review. We also included other relevant published articles which were listed in the articles bibliography. Studies that were not published yet or were in other languages were excluded. After omitting duplicate articles, two reviewers checked articles separately in three stages. At the first stage, the titles of all found articles were scanned quickly. After omitting non-relevant articles, during the second stage, the abstract of remaining articles was reviewed and finally all the relevant full text articles were reviewed. A data extraction sheet was made to summarize all the articles and a descriptive method were used to analyze the data.

Figure 1 shows the review stages and also the number of relevant articles retrieved during various stages. From electronic sources, a total of 447 articles were found at the first stage. Only 145 articles met the inclusion criteria and the rest were excluded. After reviewing the abstract, 53 articles met the inclusion and exclusion criteria and finally the full text of 25 studies were reviewed and their information were extracted and included in the data extraction sheet to summarize all the articles for further assessment.

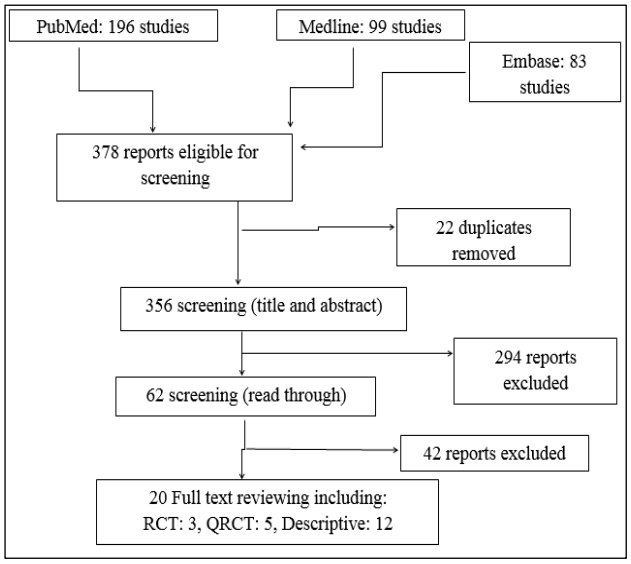

Figure 1: Review stages.

RESULTS

Twenty studies were reviewed including; RCT (3 studies), QRCT (5 studies), and descriptive study (12 studies). The results of the study showed that there are four main trauma resuscitation challenges including pre-hospital challenges, error-related challenges, equipment and technical challenges, and finally general challenges.

Pre-hospital challenges: Before the patients’ entrance to emergency department a bunch of challenges were predictable. The initial management of major trauma was insufficient in most of studies (14 studies). Insufficient notification and communication between pre-hospital staff and trauma teams before bringing the patients to the hospitals were also found as another pre-hospital challenge (9 studies).

Error-related challenges: They included medical errors such as failure to record, and perhaps observe (11 studies). Errors related to standardizing decision making and obtaining consensus from expert trauma clinicians (9 studies). Trauma teams faced significant challenges in interpretation errors (8 studies).

Equipment and technical challenges: Lack of abbreviated or "damage-control" surgical tactics related to airway obstruction, hemopneumothorax, intracranial hemorrhage and intracavitary bleeding were found in 13 studies. Delay in early transfusion (9 studies), inappropriate imaging technology (8 studies), and lack of using Video Review (8 studies) were also noted.

General challenges: Insufficient interactions of medical staff with family (7 studies), nursing challenge such as change management, and inappropriately engaging the patients which make them feel unsafe during trauma resuscitation in the emergency department (6 studies) were observes.

DISCUSSION

This systematic review was conducted to understand the challenges in trauma resuscitation. The results of the study revealed four main challenges including pre-hospital challenges, error-related challenges, equipment and technical challenges, and general challenges. Inaccurate pre-hospital notification can cause lots of issues such as higher workload for providers, delayed arrival of team members.[15] It is very important to do a rapid assessment and intervention for the severely injured trauma patient. Delays in suitable operative intervention have been recognized as sources of preventable mortality and morbidity.[17,18] It indicates that not only improved equipment and training are need to be provided in the pre-hospital or emergency department setting, but also patients with severe injuries require urgent surgical intervention that necessitates fully equipped operating room.[19] Previous studies introduced different strategy to reduce the time for entrance of patients to emergency department.[20]

To positively influence trauma-related mortality and morbidity, improvements in various stages in the whole process should be considered.[21] These include: before reaching hospital, the first 20 minutes of resuscitation and the 20 minutes after reception. Patients' outcome consequently can be affected through some interventions within these stages. Within the first 20 min of resuscitation a bunch of activities such as chest decompression, administration of fluids and blood products along with evaluation of bleeding, warming, haemodynamic monitoring and conducting appropriate tests. The 20 min after reception is considered as the critical decision-making period and the time most likely to be when delays happen such as delays in CT scanning and other relevant imaging, operative intervention and suitable disposition. Fortunately, the Advanced Trauma Life Support (ATLS) shows a decrease in error rates and also a reduction in the resuscitation time.[22]

One of the most useful methods issuing "direct to operating room" (DOR) for severe injured patients at elevated risk for requiring surgery. Crew Resource Management (CRM) can be applied to increase interpersonal communication. Poor decision making, and lack of leadership results in ineffective information sharing. Attending to different educational courses can help trauma team members to prepare for resuscitating of patients. For instance, Hughes et al, indicated that those who attended in the CRM promoted their skills in different fields such as medical-related knowledge, emergency department and medical-related knowledge to the resuscitation area, team leader skill, communication of plan, and role assignment.[23]

Developing information and communication technologies (ICT) is an effective strategy to support field data collection and information flow between the place of accident and command and emergency department.[24,25] To promote patient safety culture and resolve the risks that rise during trauma resuscitation, it is suggested to consider multidisciplinary team to work together in emergency department. Lots of staffs' errors usually happen because of lack of familiarity with equipment, insufficient communication, and poor documentation of emergency nurses.[26] Steinemann et al, introduced training with simulation as a method which can enhance teamwork and task speed and reduction in total resuscitation time.[27] This suggested method also can lead to process improvement, decrease patient mortality, and improve quality of care.[28]

Trauma resuscitation needs fast decision making on the basis of information that is usually inaccurate, inaccessible, or vague. It warrants to use directive leadership as an effective tool when trauma severity is high or when the team is inexperienced.[29] The stressful environment of Emergency Department affects both the patients and healthcare providers. Patients who are attended in the emergency unites due to trauma may face many of threats. Promoting healthcare providers relationship with patients can reduce their fears. The results of a case control study showed that comfort talk, touch, eye contact, and nurses' posture help patients relieve the pain of injury.[30] Provision of essential information, staying with patients, hand holding, reassuring or positive words, immediate and competent medical/physical care, and supporting the family are other strategies to help patients.[31] Previous studies supported family presence in the procedure of resuscitation.[33] In contrast, other studies showed some negative effect of parents attending in the invasive procedures. They found that families of critically ill patients may progress anxiety, depression, and posttraumatic stress syndrome.[35,36]

CONCLUSION

Errors can increase morbidity and mortality in the trauma patient. They happen in more than half of all trauma resuscitations mostly due to the lapsein key duties, delay in diagnosis, or mistake in judgment or technique, all of which can contribute to morbidity and mortality in a trauma patient.[22] One of the best way to supervise trauma

team performance is using video analysis of resuscitations.[37] It is also more effective than medical record review in perceiving management errors and measuring adherence with the ATLS.[38] Nevertheless, further studies need to be conducted in order to identify the obstacles and improve the quality of trauma care, and further studies suggesting evidence based solutions should be conducted to optimize the available evidence it trauma care.

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