

ORIGINAL ARTICLE

Assessment of the effectiveness of pain management among trauma patients in the emergency department

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ABSTRACT

Background: In the emergency department (ED), pain is the most common complaint, especially among trauma patients. However, two-thirds of trauma patients are discharged from EDs with moderate to severe pain. Therefore, pain management is an important part of care in trauma patients.

Objective: To assess the effectiveness of pain management among trauma patients in the ED.

Method: This is a retrospective cohort study conducted on adult trauma patients who attended the ED in King Abdulaziz medical city in Jeddah from June 2016 to July 2018. The study evaluated if the pain was evaluated during the patient encounters, and the pain score was registered. Furthermore, we assessed if pain medications were administered, their type and dosage, and the pain score evaluation before and after administration. Pain score was scored using the numeric pain scale. Data were collected from the health information system (Best care®) and analyzed using Statistical Package for the Social Sciences version 24.

Results: Initial pain assessment occurred only in 69% of our population, while assessment after medication administration happened in 71% of patients. The median between the time of arrival and the time of Initial Assessment was 19 minutes. The mean difference between pain scores before and after pain management was one on a numeric pain scale with a *p*-value of 0.001. 36.7% of Patients received appropriate medication based on their pain score improvement result. Opioid was used as an initial pain management drug in 35% of patients.

Conclusion: There is a big room for the improvement in pain management in trauma patients in EDs. Emergency care providers should observe the timeliness and appropriateness of pain management. Evaluation and re-evaluation of pain before and after pain medications or other pain-relieving intervention needs to be more frequent and efficient.

Keywords: Pain, management, emergency department, assessment, effectiveness, trauma.

Introduction

The main complaint of patients referred to hospitals is pain, which represents almost 80% of all the causes of emergency department (ED) visits [1]. The main complaint of trauma patients is pain, and it is reported by 91% and 70% of patients in the ED and pre-hospital settings, respectively [2-4]. In Europe, almost 38 million individuals visit hospital ED annually due to injuries, with 5.3 million of them admitted for further treatment [5]. According to the World Health Organization, injury is the leading cause of death in both genders, with an age range of 15-44 years old, and the third cause of death and disability in other age groups [6].

Pain management of traumatic patients by health care professionals in the ED and pre-hospital settings is a crucial element of care [7]. Inadequate relief of trauma

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pain is a problem that was commonly reported by patients [8]. Trauma patients report low satisfaction with their pain management [9]. A multicenter study from Canada and the United States showed that 74% of patients discharged from ED with moderate or severe pain [10]. Patients discharged from ED from Europe reported moderate to severe pain [11].

There are several pain assessment tools, which are reliable and valid; however, the verbal rating scale and numeric rating scale are simple and quick tools for measuring pain in the ED [12-14]. Documented scoring of pain is advocated before and within interventions to guide and improve pain management [14-16]. Emergency medical services staff in pre-hospital settings report suboptimal assessment and management of pain in trauma patients [3,17]. The lack of effective pain management has a negative impact on patients, healthcare providers, and resources in ED settings [4]. Studies showed that patients who primarily were treated in EDs and were well managed for pain reported higher overall satisfaction with the hospital services [18-20]. However, there is a global agreement that pain is not adequately managed in the ED [21,22]. This study was conducted to assess the effectiveness of pain management among trauma patients in the ED.

Subjects and Methods

This retrospective cohort study was conducted on all adult trauma patients who attended the ED at King Abdulaziz Mmedical city (KAMC) in Jeddah from June 2016 to July 2018. Representative sample size was calculated based on the number of trauma patients presented to the ED during the mentioned period. Four hundred and three trauma patient records were reviewed. Patients included were those with acute trauma and older than 18 years. In contrast, we excluded patients who had Glasgow coma score level less than 13, chronic pain, unstable vital signs, less than 90 systolic pressure upon arrival to ED, and intoxication. The remaining 332 patient records were reviewed for pain assessment and interventions. The pain was assessed before and after the administration of pain medications using a numeric pain scale. Data which were collected from the health information system (Best care ®) included gender, age, trauma description, pain assessment at different stages, drug information, and Canadian triage acuity scale (CTAS) score. Statistical Package for the Social Sciences program version 24 was used to analyze the data. The relationship between pain and other variables was performed using the Chi-square test.

Results

This study included 332 trauma patients who were admitted to the ED. The median between the time of arrival and time of initial assessment was 19 minutes, and a mean $\pm$ standard deviation (SD) of 125.54 ± 254.56 minutes. Upon presentation to the ED, 222 (69%) of patients were assessed for pain, whereas 100 (31%) did not have an initial pain assessment. After pain medication administration, 229 (71%) of patients were re-assessed for pain. The mean $\pm$ SD of pain score before

intervention was 3.36 ± 1.845 (Figure 1), whereas the mean $\pm$ SD of pain score after the intervention was 2.29 ± 1.662 (Figure 2). The mean $\pm$ SD of the difference between pain before and after was 1.069 ± 1.894 , there was a significant difference between pain score before and after pain management ($p = 0.001$); however, it wasn't clinically significant as the minimum clinically significant difference should be ≥ 2 . Regarding gender, there was no significant difference between males and females in pain score ($p < 0.6$).

45% of patients only received pain medication in ED, with only 36.7% of them got the appropriate choice of medication (Figure 3). The most administrated drug was Morphine (45.3%), followed by Acetaminophen (30.7%), followed by Fentanyl (17.3%). Other pain medications included diclofenac (3.4%), tramadol (2.2%), meperidine (0.6%), and ketorolac (0.6%) (Figure 4).

The correlation between C-TAS and time of initial assessment is shown in Figure 5, showing a negative correlation.

The improvement of the pain score is shown in Figure 6.

Discussion

In the present study, there was a mean long duration taken for initial assessment of pain, where the meantime between the time of arrival and time of initial assessment was 125 minutes (almost 2 hours). The percent of patients

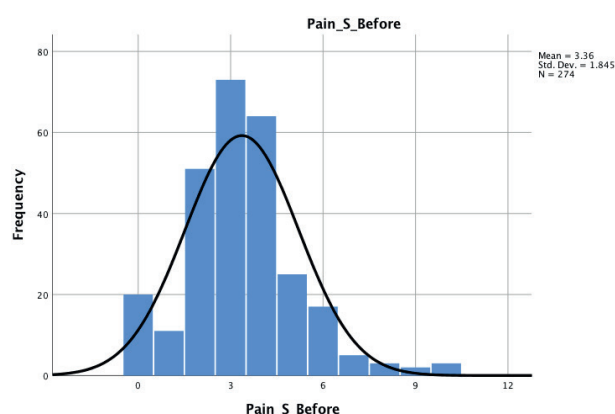


Figure 1. Pain score before intervention.

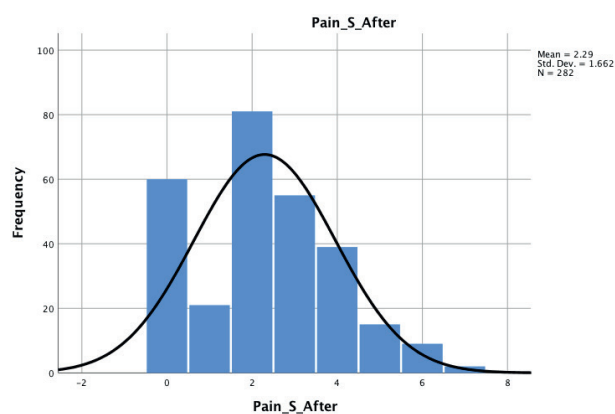


Figure 2. Pain score after intervention.

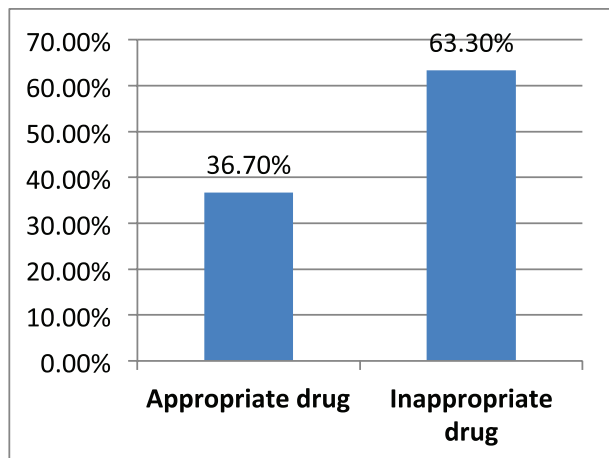


Figure 3. The percent of appropriate and inappropriate drug used.

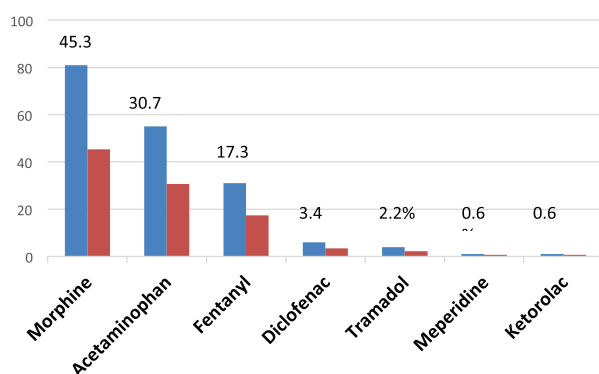


Figure 4. The drugs administrated by patients.

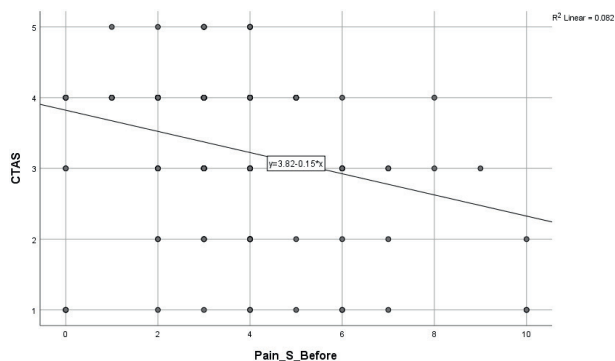


Figure 5. Correlation between initial pain score and C-TAS.

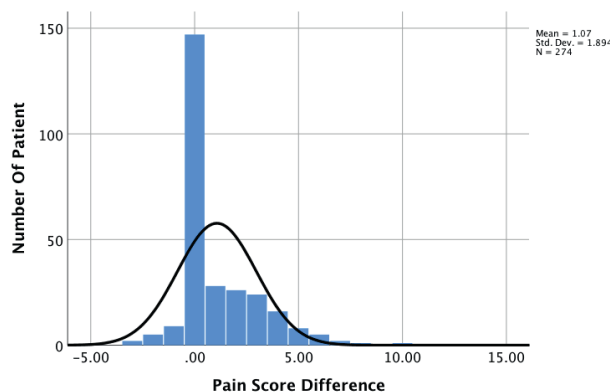


Figure 6. The improvement of pain score.

who received an initial assessment was moderate 69%, whereas 31% were not assessed for pain at all. Regarding the re-assessment of pain, there was 71% performed re-assessment.

The current study showed that the mean pain score before the intervention was 3.36, whereas the mean pain score after the intervention was 2.29. Although there was a statistically significant difference between the mean of pain score before and after the intervention, this was not clinically significant, as according to the clinical practice guidelines of KAMC, the clinical significance should be ≥ 2 .

In the current study, gender had no impact on pain score, where males and females showed no significant difference in pain score ($p < 0.6$). In a previous study [23], it was found that gender alone was not a significant predictor of change in pain for patients attending ED with the pain-related complaint.

The primary basis for pain relief is the administration of systematic analgesic agents or non-steroidal anti-inflammatory drugs (NSAIDs) [24-26]. In one study from a low-income country, it was found that less than half of patients with documented pain received medication for pain at ED; also, it was stated that high-income countries suffer improper management of pain in traumatic patients [27].

Although Saudi Arabia has a good income, in this study, only 45% of patients administered medication in ED, and only 36.7% of them obtained the appropriate medication. The most commonly used medications for pain management were Morphine, Acetaminophen, and Fentanyl. Among 81 patients who administered Morphine, there were six had a pain score of seven or above, whereas among 31 patients administered Fentanyl, there were three had a pain score of seven or above. The curve between pain score difference and pain score improvement showed the greatest improvement in the pain score at zero degrees.

In a review paper, it was reported that NSAIDs and Acetaminophen were commonly used in the treatment of acute pain; however, the relief of moderate to severe acute pain usually required opioid agents, and regarding the restrictions for using opioids, then analgesic can be helpful for better management [28].

The original C-TAS was an adult-center classification that provided guidelines as to what presentations would fit in a given triage level [29]. The C-TAS involves five levels: level one is known as resuscitation, level two, emergent, level three urgent, level four less urgent, and level five non-urgent [30]. The current study revealed that there was a poor negative correlation between C-TAS and the time of initial assessment.

In the present study, there was improper management of pain, and this can return to several factors such as age, race, underlying illness, physician awareness, the ability of the patient to express pain, and fear of complications [28]. It was revealed that pain scoring might not accurately reflect the experience of the patient [31]. It was reported that the adequate pain management in trauma patients require several factors including, determining

the adequate analgesic to relieve moderate and severe pain, adequate assessment of age-specific pharmacologic pain management, identification of serious adverse effects of pain medications, with regular re-assessment of patient re-evaluation of the pain management regimen [32]. Hence, further investigations are recommended to understand the factors that affected proper pain management.

Conclusion and Recommendation

Pain management in the ED requires improvement. Timeliness of pain management should be addressed. A further study about the correlation between pain scores and/or scales and the proper medications for each score and/or scale is recommended, to achieve better care among trauma patients in the ED. Assessment and re-assessment of pain before and after the intervention is insufficient. The time length to receive pain management has a huge impact on patients' recovery overall, thus pain management should be addressed as a priority after managing the airway, breathing, and circulation. Trauma patients did not receive effective pain management in the ED. We need to study what are the reasons behind this inadequacy among pain control and to initiate an improvement towards patients' care in ED.

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List of Abbreviations

C-TAS	Canadian triage acuity scale
ED	Emergency department
KAMC	King Abdulaziz medical city
NSAIDs	Non-steroidal anti-inflammatory drugs
SD	Standard deviation

Authors' contributions

All authors were involved in the idea development, data collection, analysis, and writing.

Conflict of interest

The authors declare that there is no conflict of interest regarding the publication of this case report.

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Consent to participate

Not applicable.

Ethical approval

Ethics approval and consent to participate: IRB approval is obtained by the number RSS18/035/J in 29/7/2018

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