

## Original Article

DOI: 10.22114/ajem.v0i0.45

## Educational Intervention Effect on Pain Management Quality in Emergency Department; a Clinical Audit

Maryam Janati<sup>1</sup>, Hamid Kariman<sup>1</sup>, Elham Memary<sup>2</sup>, Elnaz Davarinezhad-Moghadam<sup>3</sup>, Ali Arhami-Dolatabadi<sup>1\*</sup>

1. Department of Emergency Medicine, Imam Hossein Hospital, Shahid Beheshti University of Medical Sciences, Tehran, Iran.

2. Department of Anesthesiology, Imam Hossein Hospital, Shahid Beheshti University of Medical Sciences, Tehran, Iran.

3. Department of Emergency Medicine, Faculty of Medicine, Tehran University of Medical Sciences, Tehran, Iran.

\*Corresponding author: Ali Arhami-Dolatabadi; Email: aliarhami@yahoo.com

### Abstract

**Introduction:** Pain is a frequent complaint of patients who are referred to the emergency department (ED), which is ignored or mismanaged and, almost always, approached in terms of determining the cause of pain instead of pain management. Pain management is a challenging issue in the ED.

**Objective:** This study was conducted to determine the effect of emergency resident's education about pain assessment and pain-relief drugs in the improvement in pain management.

**Method:** A clinical audit was carried out during the year 2015 in the ED of Imam Hossein Hospital, Tehran, Iran. All patients over 16-year-old who had been complaining of pain or another complaint that included pain were eligible. Data were collected using a preformed checklist. One senior emergency medicine resident was responsible for filling the checklist. In the first phase, patients were enrolled into the study and were divided into two groups according to whether they had or did not have a pain management order. In the second phase, the first- and second-year emergency medicine residents were trained during the various classes that they were required to attend, through a workshop conducted by experienced professors, and based on existing valid guidelines. In the third phase, patients were enrolled into the study, and the same checklists were completed.

**Results:** A total of 803 patients (401 before training and 402 after) were assessed. The mean age of the patients before and after training of the residents was  $59.19 \pm 44.45$  and  $40.24 \pm 19.40$  years, respectively. The demographic characteristics of patients were not significantly different before and after the training period ( $p > 0.05$ ). The most common cause of pain was soft tissue injury, both before (36.3%) and after training (34.3%). The most frequent drug that was administered for pain control was morphine, both before (62.5%) and after (41.4%) training. Although the number of patients with moderate pain intensity was higher during the after-training period, pain control quality was described to be better in this group and success rate of pain control was significantly increased after training ( $p < 0.001$ ).

**Conclusion:** Findings from the present study showed that there was a significant deficiency in pain management of the admitted patients, and the most common reason for this was the physician's fear of the drug's side effects. However, significant progress was seen after the training regarding pain management process in ED.

**Key words:** Acute pain; Emergency department; Medical audit; Pain management

**Cite this article as:** Janati M, Kariman H, Memary E, Davarinezhad-Moghadam E, Arhami-Dolatabadi A. Educational Intervention Effect on Pain Management Quality in Emergency Department; a Clinical Audit. *Adv J Emerg Med.* 2018;2(2): e16.

### INTRODUCTION

Pain is one of the most common complaints that makes patients visit the emergency department (ED) (1). Pain is a subjective and multidimensional event categorized into acute and chronic, and the emergency physicians encounter both the types (2). Pain affects the physical, social, and mental activity of patients and can reduce their quality of life (3, 4). Patients in pain, usually, are unable to properly use their respiratory muscles, leading to the accumulation of secretions in the airway resulting in atelectasis or pneumonia. Also,

improper pain management can result in elevation of serum levels of neuroendocrine hormones which may result in vital signs instability including hypertension, tachycardia, and aggravation of underlying heart failure, and may even cause coagulation disorder. The suffering of pain is also accompanied by some psychological features such as anxiety, anorexia, insomnia, and depression. It was reported that unrelieved pain indirectly increases the cost of treatment for the individual and community health system (5-7).

On the other hand, appropriate pain management results in patients' satisfaction, improved quality of life, and reduced hospital stay and related costs (8-11).

Acute pain management is a challenging work in the ED (12). Regardless of the clinical advancements and a broad spectrum of painkillers, it seems that patients still experience insufficient pain control (13). The causes of impaired pain control include inappropriate estimation of pain intensity, lack of adequate knowledge about available options, and increased fear of medication's side effect. The factors that influence the patients' pain explanation include sex, race, level of education, culture, and socioeconomic state. Awareness about the pain characteristics includes knowledge of the severity and nature of the pain, for example, acute versus chronic pain or nociceptive versus neuropathic pain, and knowledge about the drugs' adverse effects and efficacies, resulting in choosing an appropriate treatment (14).

The high prevalence of pain and inadequate pain control in ED illustrates the need for educational and research efforts in this area (13). This study was conducted to determine the effect of emergency resident's education about pain assessment and pain-relief drugs in the improvement in the pain management.

## METHODS

### **Study design**

A clinical audit was designed in the ED of Imam Hossein Hospital, Tehran, Iran. It was carried out during the year 2015. The study protocol was approved by the ethics committee of Shahid Beheshti University of Medical Science. The investigators adhered to the principles of secrecy throughout the study.

### **Study population**

All patients over 16-year-old who had been complaining of pain or any other complaint that included pain were eligible. Patients who were transferred to the cardiopulmonary resuscitation (CPR) room at the time of entry, admitted in intensive care unit (ICU), patients with limb and life-threatening injury, altered level of consciousness, history of mental illness, and pregnant women were excluded.

### **Data gathering & intervention**

Data was collected using a checklist which included demographic information of the patients, pain intensity, the prescribed drug, dose, and injection method. One senior emergency medicine resident, as one of the investigators, was responsible for

filling the checklist.

In the first phase, 401 patients were enrolled into the study and were divided into two groups according to whether they had or did not have a pain management order. In the group where the drug was prescribed, the time of administration and the possible side effects of the injected drug and the severity of pain after receiving the analgesic agents were asked from the patient and recorded. In the other group who did not receive any analgesic, they were asked about the pain severity after transferring the patient to the ED. In the absence of an order to control the pain, the cause was enquired from the in-charge emergency physician.

In the second phase, the first- and second-year emergency medicine residents were trained during the various classes that they were required to attend, through a workshop conducted by experienced professors and based on the existing valid guidelines (15, 16). Pain control was conducted in which the residents were educated regarding the side effects of drugs and their indications, and the method of evaluating pain intensity. The residents who did not actively participate in the classes were excluded.

In the third phase, 402 patients were enrolled into the study, and the same checklists were completed, and all steps of the first phase were carried out again.

### **Statistical analysis**

The extracted data from the checklists were classified by subject and analyzed using SPSS version 21. Descriptive statistics including mean, frequency, percentage, and standard deviation (SD) were used to characterize the study population. The groups were compared using paired t-test and McNemar's test, and a p-value less than 0.05 was considered as significant.

## RESULTS

A total of 803 patients (401 before training of emergency medicine residents and 402 after) were assessed. The mean age of the patients before and after training of the residents was  $59.19 \pm 44.45$  and  $40.24 \pm 19.40$  years, respectively. Table 1 presents the demographic information of the patients; no significant difference was seen before and after the training period.

Table 2 illustrates the characteristics of pain in the patients studied before and after the training period. The most common cause of pain was soft tissue injury, both before (36.3%) and after the training (34.3%).

The most frequently administered drug for pain

**Table 1:** Patients' demographic information before and after training period

Variables	Before training	After training	P
	(n = 401)	(n = 402)	
	Number (%)		
<b>Gender</b>			
Male	254 (63.3)	230 (57.2)	0.523
Female	147 (36.66)	172 (42.8)	
<b>Educational level</b>			
Illiterate	13 (3.2)	8 (2.0)	0.372
Under diploma	117 (29.2)	75 (18.7)	
Diploma	214 (53.4)	248 (61.7)	
Advanced diploma	35 (8.7)	44 (10.9)	
Baccalaureate	22 (5.5)	27 (6.7)	
<b>Patients' occupation</b>			
Unemployed	165 (41.1)	143 (35.6)	0.133
Manual worker	45 (11.2)	30 (7.5)	
Employee	68 (17.0)	122 (30.3)	
Free job	115 (28.7)	107 (26.6)	
Other businesses	8 (2.0)	0 (0)	
<b>History of addiction</b>			
Yes	20 (5.0)	23 (5.7)	0.321
No	381 (95.0)	379 (94.3)	

**Table 2:** Characteristics of pain in patients before and after training period

Variables	Before training	After training	p
	(n = 401)	(n = 402)	
	Number (%)		
<b>Main cause of pain</b>			
Bone fracture	109 (27.3)	54 (13.4)	0.616
Soft tissue injury	145 (36.3)	138 (34.3)	
Renal colic	6 (1.5)	20 (5.0)	
Biliary colic	2 (0.5)	2 (0.5)	
Headache	29 (7.3)	52 (12.9)	
Chest pain	51 (12.8)	54 (13.4)	
Nonspecific Abdominal pain	47 (11.8)	56 (13.9)	
Musculoskeletal pain	7 (1.8)	26 (6.5)	
Other	4 (1.0)	0 (0/0)	
<b>History of drug sensitivity</b>			
Yes	2 (0.5)	2 (0.5)	0.920
No	399 (99.5)	400 (99.5)	
<b>Pain relief medication history</b>			
Chronic use	33 (8.2)	22 (5.5)	0.257
Recent use	7 (1.7)	0 (0.0)	
No use	361 (90.0)	380 (94.5)	
<b>Type of used medication</b>			
Ibuprofen	15 (37.5)	8 (38.1)	0.564
Acetaminophen	10 (25.0)	3 (14.3)	
Diclofenac	4 (10.0)	8 (38.1)	
Other	11 (25.7)	2 (9.5)	
<b>Pain score on arrival</b>			
Mild	1 (0.2)	2 (0.5)	0.905
Moderate	80 (20)	144 (35.8)	
Sever	320 (79.8)	256 (63.7)	
<b>Administered pain control drug</b>			
Morphine	50 (62.5)	123 (41.4)	0.592
Ketorolac	6 (7.5)	25 (8.4)	
Acetaminophen	12 (15.0)	112 (37.7)	
Nitroglycerine	11 (13.8)	34 (11.4)	
Other drugs	1 (1.3)	3 (1.0)	
<b>Pain reduction success rate</b>			
Change in pain intensity ≥ 3 score	46 (11.4)	282 (67.9)	<0.001*
Failure to receive medication or change in pain intensity <3	354 (88.6)	119 (32.1)	

\* McNemar test was used

**Table 3:** Causes of impaired pain control among studied patients in two studied periods

Variables	Before training (n = 401)	After training (n = 402)
	Number (%)	
Lack of doctor's education	279 (69.4)	1 (0.2)
Doctor's busy work	15 (3.7)	64 (15.9)
Failure to prescribe proper dosage	29 (7.2)	3 (0.7)
Inappropriate drug administration frequency	1 (0.2)	0 (0.0)
Inappropriate drug administration	2 (0.5)	3 (0.7)
Failure of injection by nurse	3 (0.7)	0 (0.0)
Disagreement of other services	22 (5.5)	21 (5.2)
Lack of availability of drug	3 (0.7)	10 (2.5)
Refusal to receive drug from patient	0 (0.0)	17 (4.2)

control was morphine, both before (62.5%) and after (41.4%) the training. Cause of pain ( $p = 0.616$ ), sensitivity to the drug ( $p = 0.920$ ), history of analgesic intake ( $p = 0.257$ ), pain intensity ( $p = 0.905$ ), and pain control drug type ( $p = 0.592$ ) were not significantly different in the two studied periods. Although the number of patients with moderate pain intensity was higher during the post-training period, pain control quality was described as better in this group, and the success rate of pain control significantly increased after the training ( $p < 0.001$ ).

Table 3 explains the causes of impaired pain control in the patients in the two studied periods. The most common cause of impaired pain control included lack of doctor's education (69.4%) before training and the doctor's busy work (15.9%) after training. There was no significant correlation between the success rate and sex ( $p = 0.579$ ), ethnicity ( $p = 0.09$ ), occupation ( $p = 0.964$ ), history of allergy ( $p = 0.222$ ), history of analgesic intake ( $p = 0.165$ ), prevalence of substance abuse ( $p = 0.123$ ), and pain control drug type ( $p = 0.592$ ). There was a significant relationship between the level of education ( $p = 0.002$ ), initial complaint ( $p < 0.001$ ), and the patient's primary pain intensity level ( $p = 0.003$ ) with the success rate. This means that the highest rate of success was obtained in the group with higher pain intensity (94.3%, 33 out of 35). The mean dose of the narcotic (morphine) administered increased from 3.75 mg before training to 4.5 mg after training, which was significant ( $p < 0.001$ ).

## DISCUSSION

The findings from the present study showed that there was a significant difference in the pain management process before and after training the emergency medicine residents. No pain assessment was performed in the ED before the training. Consequently, pain control had not been properly implemented. The most important reason

included the physician's fear regarding the drug's side effects, lack of knowledge about opioid dosage, lack of experience in the ED, lack of knowledge about the available pain control medications, and lack of proper supervision by the senior residents. However, after about 6 months of the education process, pain control significantly improved, and the factor of fear and lack of knowledge in the physicians decreased. However, problems such as crowding and the disagreement of other services are important causes of impaired pain control.

The impact of educational intervention on the improvement in the quality of ED services, which is responsible for the administration and provision of immediate medical or surgical care, has been investigated in previous studies. For example, a study was conducted by Newton-Brown et al. to show the effectiveness of the implementation of educational strategies in improving knowledge of doctors about the usefulness of nerve blocks in the reduction of acute pain in elderly with fracture neck of femur in the ED. This study showed that the implementation of educational and awareness strategies could improve acute pain management (17). Also, Bayou et al. designed a study to assess pain management in patients with burns and compare the pain control practices with the standard pain control practice and the effect of implementation of educational strategies in enhancing the compliance to standards. The study showed that educational strategies improve pain management (18). Additionally, Sampson et al. reported that the use of audit feedback is useful for knowing about the function of ED in pain management, which was also seen in the present study (19).

Considering the results of the current study and some other similar studies, it is obvious that educational intervention is effective in improving the pain management process in ED, and the intervention had been taken into account in several ways. For example, the study by Kasasbeh et al. that

assessed the ability of action learning in enhancing the management of cancer pain showed that action learning results in achieving high-quality standards in pain management. This study showed that whatever the pain intensity and pain degree, the response to the treatment was better (20). The interesting point that severe pain responds better to treatment was repeatedly reported in the current literature (21).

In the current survey, educational courses had a useful effect on the administration and dosage of opioids in terms of pain management. Similarly, another study showed the effect of training courses in increasing the use of fentanyl and the morphine, from a dose of 2.5 mg to 5 mg, for improved pain management (22).

Regarding the results of the current study and the discussed literature, it seems that inappropriate conditions for controlling the pain of patients with intervention in the ED and providing the necessary training can be corrected. Therefore, it is suggested that periodic and regular education in this field should be on the agenda.

#### **Limitations**

The first limitation of this study was the lack of an educational course for nurses as a practical group in pain management in the ED. The second limitation was the absence of documented data for patients' addiction; therefore, we had to rely on patients' awareness statement. According to a randomized residents survey, a number of

residents have been included in the study several times, and some had not entered the study at all.

#### **CONCLUSIONS**

The findings from the present study showed that there was a significant deficiency in pain management of the admitted patients, and the most common reason for this was the physician's fear of the drug's side effects. However, significant progress was seen after the training regarding pain management process in ED.

#### **ACKNOWLEDGEMENTS**

We would like to thank all the ED staff of Imam Hossein Hospital, Tehran, Iran. This article has been extracted from Dr. Maryam Janati's thesis for emergency medicine residency at Shahid Beheshti University of Medical Sciences, Tehran, Iran.

#### **AUTHORS' CONTRIBUTION**

All the authors met the standards of authorship based on the recommendations of the International Committee of Medical Journal Editors.

#### **CONFLICT OF INTEREST**

None declared.

#### **FUNDING**

None declared.

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