

## Examination of Pain Assessment and Multimodal Analgesia Records in Trauma Patients

### Travma Hastalarında Multimodal Analjezi ve Ağrı Değerlendirme Kayıtlarının İncelenmesi

<sup>1</sup>İlknur TURA, <sup>1</sup>Sevilay ERDEN

<sup>1</sup>Department of Nursing, Faculty of Health Sciences, Cukurova University, Adana, Türkiye

İlknur Tura: <https://orcid.org/0000-0002-1371-9458>  
Sevilay Erden: <https://orcid.org/0000-0002-6519-864X>

#### ABSTRACT

**Objective:** This study aimed to reduce the side effects of multiple pain sources and investigate the effectiveness of multiple analgesics in trauma pain.

**Materials and Methods:** The research was conducted with nurse observation forms of 190 trauma patients hospitalised in the emergency unit of a university hospital between March 1 and September 30, 2019. In the statistical analysis, per cent mean, min-max values and standard deviation were used for descriptive data. Paired Simple t-test was used for repeated measurements of the double-dependent variable.

**Results:** The mean age of the patients included in the study was 40.94±15.18 years, and 65.8% were male. While the cause of 47.9% of traumas is traffic accidents, 37.9% of the patients have multiple traumas. The pain was evaluated in 55.7% of the patients, and multimodal analgesia was applied in 71.6% of the patients, and it was determined that the pain of the patients decreased.

**Conclusion:** Accordingly, this study supports the treatment of trauma pain with multiple sources of pain with a multimodal analgesia approach. In addition, the pain was not appropriately assessed as recommended in the acute pain guidelines. Therefore, nurses should increase awareness of pain assessment records for effective pain management.

**Keywords:** Emergency department, multimodal analgesia, nursing, pain

#### ÖZ

**Amaç:** Bu çalışmada, travma hastalarında ağrı değerlendirilmesi ve multimodal analjezi kayıtlarının incelenmesi amaçlanmıştır.

**Materyal ve Metot:** Araştırma 1 Mart-30 Eylül 2019 tarihleri arasında, bir üniversite hastanesinin acil ünitesinde yatan, 190 travmalı hastanın hemşire gözlem formlarıyla yapıldı. Araştırmanın verileri Hasta Bilgi Formu ve Multimodal Analjezi Değerlendirme Formu ile toplanmıştır. Verilerin istatistiksel analizinde tanımlayıcı verilerde yüzde ortalama, minimum-maksimum değerleri ve standart sapma kullanıldı. İkili bağımlı değişkene ait tekrarlı ölçümler için Paired Simple t- testi kullanıldı.

**Bulgular:** Araştırmaya dâhil edilen hastaların yaş ortalaması 40,94±15,18 olup, %65,8'i erkektir. Travmaların % 47,9'unun nedeni trafik kazaları iken, hastaların % 37,9'unda multiple travma mevcuttur. Hastaların % 55,7'sine ağrı değerlendirilmesi yapılmış olup, %71,6'sına multimodal analjezi uygulandığı ve hastaların ağrısının azaldığı saptandı. Ayrıca, gözlem formlarında farmakolojik olmayan ağrı tedavisine ilişkin hemşire kaydına rastlanmadı.

**Sonuç:** Buna göre, bu çalışma travma ağrısının çoklu ağrı kaynakları ile multimodal analjezi yaklaşımı ile tedavisini desteklemektedir. Ek olarak, ağrı, akut ağrı kılavuzlarında önerildiği gibi uygun şekilde değerlendirilmemiştir. Bu nedenle hemşireler, etkili ağrı yönetimi için ağrı değerlendirme kayıtlarının farkındalığını arttırmalıdır.

**Anahtar Kelimeler:** Acil Servis, ağrı, hemşirelik, multimodal analjezi

#### Sorumlu Yazar / Corresponding Author:

İlknur Tura  
Cukurova University, Faculty of Health Sciences, Department of Nursing, Postcode: 01380, Adana, Türkiye.  
Tel: +90 322 338 6484 /1132  
E-mail: [ilknurtura@gmail.com](mailto:ilknurtura@gmail.com)

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## INTRODUCTION

Emergency services are one of the units where stress is very intense due to its complexity. For this reason, it is often impossible to make holistic evaluations in patient groups where treatment and care are critical.<sup>1</sup> Trauma patients are among the groups where treatment and care are critical. In cases where patient circulation and workload in emergency services are high, the immediate physiological needs of trauma patients may be more important.<sup>1,2</sup> However, the multidimensional nature of trauma and tissue injuries causes severe pain in patients.<sup>3</sup> In traumatised patients, both the cause of trauma and pain affects the patient's systems negatively.<sup>2,4</sup>

In trauma patients, analgesia treatment, which uses more than one analgesia method due to more than one source of pain (skin and muscle cut, nerve damage, etc.), provides more effective pain control than a single analgesic approach. Therefore, pain management of trauma patients with multiple sources of pain requires multimodal analgesia.<sup>2,4</sup> Multimodal analgesia combines analgesia techniques by using different analgesics' action mechanisms and provides effective pain control with low-dose analgesics.<sup>4</sup> Pharmacological and non-pharmacological analgesia methods are used in multimodal analgesia.<sup>4,5</sup> Studies have found that when multimodal analgesia is applied in trauma pain, the level of pain and the amount of analgesic consumption decrease.<sup>5</sup> Multimodal analgesia is based on multidisciplinary teamwork.<sup>5-7</sup> Nurses are the most important health professionals in the process, from evaluating pain to monitoring the effect of analgesia on the patient.<sup>8,9</sup>

In recent years, although the number of studies on the pain management of these patients has been predominantly, pain control cannot be achieved effectively.<sup>5-9</sup> Pain assessment is appropriate for the first step to control pain.<sup>6</sup> The patient should be actively added to the pain treatment, a valid and reliable pain assessment should be used, the weight of the pain and its location in the body should be questioned, and appropriate analgesia should be evaluated according to the type of pain, evacuation and intensive care hose. In addition, the pain evaluation should be repeated after each analgesia, and all data obtained should be recorded in the observation formula and shared with the healthcare team.<sup>7,8</sup> Nursing studies on multimodal analgesia in trauma patients are limited in the literature.<sup>5-9</sup>

This study aimed to reduce the side effects of multiple pain sources and investigate the effectiveness of multiple analgesics in trauma pain.

## MATERIALS AND METHODS

**Ethical Approval:** Written permission was obtained from the Çukurova University Faculty of Medicine

Non-Interventional Clinical Research Ethics Committee (Date: 04.01.2019, decision no: 15) and the Chief Physician of Çukurova University Medical Faculty Balcalı Hospital (Date: 12.02.2019, no: 18649120-302) for the implementation of the study. The Clinical Research Ethics Committee waived informed consent, the requirement for individual patient consent, due to the retrospective and anonymous nature of the study. The study was conducted in accordance with the principles of the Declaration of Helsinki.

**Design:** This retrospective and descriptive study aims to examine pain assessment and multimodal analgesia records in trauma patients.

**Setting and Sample:** This research was conducted at a university hospital in Turkey. In the study, nurse observation forms of patients hospitalised with a diagnosis of trauma between January 1, 2018, and December 31, 2018, in the emergency unit of a university research hospital were examined. Nurse observation forms of 190 trauma patients who were 18 years of age or older, who could be contacted and who received treatment for at least 12 hours were included in the study. Non-pharmacological methods should be applied in the second plan because the reason for including patients who received treatment for at least 12 hours in trauma and because they are among the patient groups whose urgent analgesia needs should be met. Therefore, the patient groups under observation in the emergency department were included within a certain period. In addition, nurse observation forms of patients who were unconscious and could not communicate verbally (60 patients), had a history of chronic pain, alcohol and drug addiction, had metastatic disease (18 patients) and died (107 patients) were not included in the sample of the study.

**Data Collection Tools:** The study's data were collected using the Patient Information Form (PIF) and Multimodal Analgesia Assessment Form (MAAF) created by the researchers by scanning the literature.<sup>1-9</sup> Pain was assessed using the Numeric Rating Scale (NRS: 0-10). The PIF consists of a total of 6 questions that includes age, sex, cause of trauma, trauma site, chronic disease, and information on medications used continuously. MAAF includes pharmacological and non-pharmacological analgesia methods. Opioids, non-opioid analgesics, and auxiliary analgesics (such as antidepressants, anticonvulsants, and local anesthetics) have been studied in pharmacological analgesia methods. In non-pharmacological analgesia methods, the application of peripheral techniques, cognitive behavioral techniques, and other non-pharmacological methods (acupuncture, hypnotherapy, etc.) were examined, and pain assessment status before and after analgesia

was questioned.

**Data Collection:** Data collection forms were prepared by scanning the literature, and 1-year non-electronic patient records in the Emergency Service archive were examined. The researcher examined these records for six months, from March 2019 to September 2019, and it took approximately 10-15 minutes to review each patient file.

**Statistical Analysis:** In the statistical analysis, descriptive data were given as numbers, mean percentages, minimum - maximum values and standard deviation. Paired sample t-test was used in normally distributed data for repeated measures of the binary dependent variable. A one-way ANOVA test was used in the data showing normal distribution in repeated measurements with more than one categorical variable. If there was a significant difference, the Bonferroni test was used from the Post Hoc analysis tests. In all tests applied,  $p < 0.05$  was considered statistically significant.

**RESULTS**

This section contains the statistical data and data of the patients included in the study. The average age of the patients included in the study is  $40.94 \pm 15.18$ , and 65.8% are male. While the reason for 47.9% of the traumas is traffic accidents, 37.9% of the patients have multiple trauma. (Table 1).

The distribution of the types of analgesia applied to the patients according to their types is given in Table 2. It was found that multimodal analgesia was applied to 71.6% of the patients, and no methods related to non-pharmacological analgesia were applied. It has been determined that 32.1% of weak opioids and non-opioid analgesics are used in combination with multimodal analgesia. It was determined that while opioids were used at a rate of 16.3% and non-opioid analgesics were used at a rate of 12.1% in a single type of analgesia, among opioid analgesics, weak opioids were the most frequently used with a rate of 8.9% and acetaminophen was the most commonly used among non-opioid analgesics with the rate of 5.8% (Table 2).

**Table 1.** Distribution of patient information (n:190).

Demographic Information		n (%)
Age, Mean $\pm$ SD (Min-Max)		40.94 $\pm$ 15.18 (18-80)
Gender	Male	125 (65.8)
	Female	55(34.2)
Cause of Trauma,	Traffic accident	91 (47.9)
	Penetrating tool injury	44 (23.2)
	Fall	38 (20)
	Assault	17 (8.9)
Regions of Trauma	Multiple	72 (37.9)
	Extremity	46 (24.2)
	Head-neck	40 (21.1)
	Thorax	14 (7.4)
	Abdomen	13 (6.8)
	Other (pelvis, urogenital)	5 (2.6)
Chronic Disease		41 (21.6)
Constantly Taking Medication		37 (19.5)

SD: Standard Deviation; Min: Minimum; Max: Maximum.

**Table 2.** Distribution of types of analgesia applied to patients (n:190).

Types of Analgesia Applied to Patients		n (%)
Pharmacological Analgesia	<b>Single Types of Analgesia</b>	<b>54 (28.4)</b>
	<b>Opioid Analgesics (Tramadol, Fentanyl, Morphine)</b>	<b>31 (16.3)</b>
	Weak Opioid (contramal)	15 (7.9)
	Strong Opioid (fentanyl, morphine)	8 (4.2)
	Strong Opioid + Weak Opioid	8 (4.2)
	<b>Non-Opioid Analgesics</b>	<b>23 (12.1)</b>
	Acetaminophen (parol)	11 (5.8)
	Acetaminophen + NSAA	7 (3.6)
	NSAA (dichloron, ketorolac)	4 (2.1)
	Adjuvant Analgesics (ketamine)	1 (0.6)
	<b>Multimodal Analgesia</b>	<b>136 (71.6)</b>
	<b>Opioid Analgesics + Non-Opioid Analgesics</b>	<b>61 (32.1)</b>
Weak Opioid + Nonopioid	41 (21.6)	
Strong Opioid + Nonopioid	34 (17.9)	
Opioid + Nonopioid + Adjuvant Analgesic	-	
Non-Pharmacological Analgesia	Peripheral Techniques	-
	Cognitive (Cognitive) Behavioral Techniques	-
	Other Methods (Acupuncture, Hypnotherapy etc.)	-

In Table 3, the pain was assessed at 55.7% of the patients, and it was found that pain was significantly reduced in both multimodal analgesia and patients who received a single type of analgesia ( $p = 0,0001$ ). In Table 4, pain levels were examined according to the trauma characteristics and types of analgesia, and a significant difference was found between the pain levels after multimodal analgesia according to the causes of trauma ( $p=0.024$ ) and the region of

trauma ( $p=0.030$ ). In addition, the groups this significance originated from were analysed. As a result of the analysis, a significant difference was found between falling and assault, according to the reasons for trauma after multimodal analgesia, and other regions (pelvis and urogenital), and multiple sections according to the trauma region. ( $p<0.05$ ) (Table 4).

**Table 3.** Pain levels according to the types of analgesia of the patients (n: 106).

	Pain Levels According to the Types of Analgesia*			
	Single Type		Multimodal	
	Before Analgesia (n=27)	After Analgesia (n=27)	Before Analgesia (n=79)	After Analgesia (n=79)
Mean ± SS (Min-Max)	7.37±1.41 (5-10)	2.55± 1.21 (1-6)	8.10±1.47 (4-10)	1.26±1.16 (0-6)
Statistical Evaluation t-test / p	t=17.036 <b>p=0.0001</b>		t=-37.489 <b>p=0.0001</b>	

\*: Percentage of patients assessed for pain: 55.7%; Min: Minimum; Max: Maximum.

**Table 4.** Distribution of pre and post-analgesia pain levels according to trauma information (n: 106).

Trauma Information		Pain Levels According to Types of Analgesia			
		Single Type		Multimodal	
		Before Analgesia Mean ± SD	After Analgesia Mean ± SD	Before Analgesia Mean ± SD	After Analgesia Mean ± SD
<b>Cause of Trauma</b>	Traffic accident	7.33±1.37	2.83±1.41	8.25±1.51	1.23±0.97
	Penetrating tool injury	7.50±0.92	2.25±1.03	7.93±1.52	1.37±1.14
	Fall*	6.83±1.83	2.33±0.81	8.00±1.36	0.80±0.94
	Assault*	-	-	7.60±1.51	2.60±2.30
<b>Statistical Evaluation</b>		f=1.550 p=0.228	f=0.455 p=0.716	f=0.431 p=0.732	f=3.331 <b>p=0.024</b>
<b>Regions of Trauma</b>	Multiple*	6.90±1.51	2.45±0.93	8.00±1.39	1.15±1.01
	Extremity	7.44±1.42	2.88±1.05	8.25±1.43	1.18±1.10
	Head-neck	7.66±0.57	1.33±0.57	8.00±1.60	1.22±1.11
	Thorax	9.50±0.70	4.50±2.12	8.83±0.98	1.50±1.04
	Abdomen	7.00±0.00	1.50±0.70	7.60±2.19	1.00±1.00
	Other (pelvis, urogenital)*	-	-	8.50±2.12	4.00±2.82
<b>Statistical Evaluation</b>		f=1.638 p=0.200	f=3.634 <b>p=0.020</b>	f=0.505 p=0.772	f=2.641 <b>p=0.030</b>

\*: Bonferonni p values of Post-hoc multiple comparison test.

### DISCUSSION AND CONCLUSION

Due to their complex and dense structure, in emergency units, the physiological needs of patients are generally prioritised while pain control can be ignored. However, pain control is very important in trauma patients where treatment and care are critical. In this context, multimodal analgesia is recommended for trauma patients with multiple pain sources.<sup>1,2</sup> In our study, the rate of applying multimodal analgesia was 71.6%, which is between 6.6% and 42.8% of trauma patients in the literature.<sup>6,10,11</sup> The published guidelines stated that appropriate multimodal anal-

gesia techniques should be applied to the patient in acute pain.<sup>4,9,12,13</sup> Studies have shown that multimodal analgesia reduces pain, the amount of opioid consumption, and severe the side effects such as respiratory depression.<sup>7,8,14</sup> Burton et al.<sup>15</sup> determined that multimodal pain management reduces the number of opioids used and the prescribed dose in patients with thoracic trauma. Similarly, Hatton et al.<sup>16</sup> found that multimodal pain management applied in elderly patients decreased the number of opioids used and, thus, the complications. The most important reason is that the multiple analgesia met-

hod is thought to provide effective analgesia because it affects both peripheral and central pain sources and causes fewer side effects at low doses.

This study has shown that a single type of analgesia was applied to 28.4% of hospitalised patients due to trauma. It is observed that weak opioids are used more frequently among opioids, and acetaminophen is used in non-opioids as a single type of analgesia. In the literature, it is seen that weak opioids<sup>6,17</sup> and NSAAs are frequently preferred for trauma pain.<sup>18,19</sup> Hatton et al.<sup>19</sup> determined pain relief in pain treatment in which only NSAAs are applied, but analgesia alone is insufficient in patients with severe trauma. This situation confirms that trauma pain originates from multiple sources, including peripheral oedema and inflammation. As a matter of fact, in severe acute pain such as the pain of trauma, pain guidelines recommend that strong opioids and multimodal analgesia should be preferred first.<sup>9,12,13,20</sup> However, studies in the literature show that healthcare professionals avoid opioid use even if the pain is severe, so multimodal analgesia is not used frequently.<sup>20,21</sup> This is thought to be due to the severe side effects of opioids.<sup>22</sup> Although opioids continue to be used as the "gold standard" for pain management,<sup>13</sup> may lead healthcare professionals to be cautious in the early stages of trauma to avoid the risk of respiratory depression and opioid addiction in the patient.

Our study has shown that adjuvant analgesics were used in 21.6% of the patients who received multimodal analgesia. Similarly, in a study of trauma patients, approximately one-third of patients received adjuvant analgesics.<sup>23</sup> In our study, it is seen that only ketamine was preferred among the auxiliary analgesics. Oddo et al. stated that ketamine should be used with opioid analgesia in patients with severe head trauma.<sup>24</sup> Aminiahidashti et al.<sup>25</sup> found that the combination of ketamine and propofol causes fewer respiratory problems and provides more effective analgesia in addition to the sedation effect in emergency departments. Since ketamine reduces intracranial pressure and provides analgesia, it has been preferred in head trauma in recent years.<sup>25,26</sup> However, although it is known that adjuvant analgesics have fewer side effects, their use in practice is not common. This situation suggests that the beliefs of healthcare professionals in the analgesic effectiveness of adjuvant analgesics are weak, and therefore they are not used sufficiently.

Comprehensive pain assessment ensures patient involvement in pain management and allows the nurse to evaluate the effectiveness of pain management. Therefore, evaluating patient outcomes for effective pain assessment and management plays a "key role" in effective pain management.<sup>3</sup> When the nurse observation forms included in the study were examined, it was determined that nurses evaluated pain

only in 55.7% of trauma patients (Table 3). When the nurse observation forms included in the study were examined. When the literature was reviewed, many studies showed that pain assessment was generally not performed in patients.<sup>3,5,27</sup> Erden et al.<sup>3</sup> examined the pain assessment records of nurses and stated that they did not use any pain scales to assess pain or record pain. At the same time, Samarkandi<sup>27</sup> reported that nurses had insufficient knowledge of pain assessment. Rafati et al.<sup>28</sup> stated that nurses did not use a standard scale when assessing pain, and pain severity was included in only 6% of the records. In this context, the reasons for the inadequate assessment of pain in patients in the emergency room may be related to the high workload of nurses and the continuous variation in the number of patients due to emergency room conditions.

In this study, pain levels were significantly reduced after analgesia in patients who received both multimodal and single types of analgesia ( $p < 0.05$ ). When the literature is reviewed, it is seen that the pain of patients who undergo multimodal analgesia is reduced and is consistent with our study.<sup>2,6-9,29</sup> In studies conducted with patients with thoracic trauma, it was reported that pain levels significantly decreased after multimodal analgesia.<sup>7,8</sup> Similarly, in another study in which both single and multimodal analgesia was applied, it was found that more effective pain control was achieved in patients who received multimodal analgesia.<sup>29</sup> Based on these data, we emphasise the effectiveness of multimodal analgesia in controlling trauma pain, which is both severe and has multiple pain sources.

In our study, it was found that pain significantly decreased in all trauma regions after multimodal analgesia ( $p < 0.05$ , Table.3). According to results obtained from the limited number of studies in the literature, it was found that pain was significantly reduced in the abdominal and pelvis region.<sup>18</sup> Findings in the literature show that different patient characteristics, trauma sites, and tissue damage levels can lead to different pain levels after multimodal analgesia, and in another study in the head-neck, abdominal, thoracic, and spinal regions.<sup>30</sup>

In conclusion, in this study, even if pain assessment was not performed in all patients, it was determined that the pain levels of the patients administered multimodal analgesia decreased. Accordingly, this study supports the treatment of trauma pain with multiple sources of pain with a multimodal analgesia approach. In addition, it was observed that pain assessment was not performed as recommended in the pain guidelines, and there was a lack of records. As nurses, we must increase our awareness of the importance of pain assessment records for effective pain management.

**Ethics Committee Approval:** Written permission was obtained from the Çukurova University Faculty of Medicine Non-Interventional Clinical Research Ethics Committee (Date: 04.01.2019, decision no: 15) and the Chief Physician of Çukurova University Medical Faculty Balcalı Hospital (Date: 12.02.2019, no: 18649120-302) for the implementation of the study. Informed consent, the requirement for individual patient consent was waived by the Clinical Research Ethics Committee due to the retrospective and anonymous nature of the study. The study was conducted in accordance with the principles of the Declaration of Helsinki.

**Conflict of Interest:** No conflict of interest was declared by the authors.

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