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# Acute Postoperative Pain in Trauma Patients - The Fifth Vital Sign

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## Abstract

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**AIM:** To determine average pain intensity perceived by trauma patients at hospital admission, lowest and highest pain intensity during their hospitalisation and their satisfaction with provided pain treatment.

**PATIENTS AND METHODS:** The research included 114 operated patients at the Clinical Department of Trauma Surgery. We used the standard Numerical Rating Scale (NRS) for a clinical measure of pain.

**RESULTS:** The average pain intensity at hospital admission was NRS median 7 (range 4–10), the severest perceived rate of pain during hospitalisation was NRS median 5 (range 4–7). Ninety-four percent of our respondents were satisfied with provided pain treatment. Thirty-two percent of patients were not asked to assess their pain during their hospitalisation, and 40.4% of patients assessed their pain occasionally.

**CONCLUSION:** Female patients, as well as patients admitted to the emergency department, reported higher NRS scores. Those respondents who perceived severe pain answered more often that medical staff didn't ask them to assess their pain on any occasion. Good communication between medical staff and patients, together with adequate assessment and evaluation of acute pain are of great importance in its treatment.

## Introduction

A trauma patient is an injured person who requires immediate care given by a multidisciplinary team of healthcare workers. Injuring is mostly related to traffic accidents, falls, and acts of violence, or it occurs by action of external forces. Injuries and acute conditions ask for urgent medical interventions, sometimes surgical, and even lead to admission into hospital's intensive care units, depending on the clinical status of the patient. They are sudden and unexpected for a patient and followed by unpleasant and frightening medical procedures and activities. Pain is the most common symptom in the emergency department, reported by 78% of patients. Sixty percent of those patients have been administered with analgesic after a longer period of waiting [median 90 minutes] [1]. Also, two-thirds of patients who had massive traumas report the pain strong enough to influence their life quality for several years after the

injury [2]. Young age, multiple surgeries, the presence of nerve damage and poorly treated pain are factors associated with the development of persistent pain and particularly relevant to trauma patients [2, 3].

Despite the advances in medicine, acute postoperative pain is still a problem for surgical patients. Using the pain as a fifth vital sign, together with exact knowledge of how to evaluate and treat pain, can help nurses and other healthcare workers in overcoming many obstacles in successful pain treatment [4]. Despite the scientifically proven undesirable effects of untreated acute pain and existing variety of drugs and pain treatment techniques, inadequate control of acute pain is more of a rule than the exception. Numerous studies show that acute pain is efficiently treated in less than 50% of patients [5]. Between 30% and 80% of patients experience pain after surgery, and the majority of those patients [more than 80%] report the pain intensity as moderate, severe or extreme [6]. Medical scholars around the world agree that experience of

severe postoperative pain is mostly reported by patients who were emergently admitted, and it is one of the most important predictors for development of chronic pain, which leads to poor life quality [3, 7, 8].

There are four objectives of our research: (I) to determine pain intensity right on admission to the hospital, as well as the lowest and the highest pain intensity during hospitalization; (II) to determine whether the gender of patients, emergency of their admittance, and their experience of previous surgical procedures affect their perception of pain intensity, (III) to determine the adequacy and clinical significance of pain evaluation done by nurses; (IV) as well as level of contentment among patients with provided pain treatment.

## Patients and Methods

Our cross-sectional quantitative research was conducted at the Clinical Department of Trauma Surgery (University Hospital Centre Osijek), in Osijek, Croatia. The research was conducted on 114 operated patients, 74 (65%) men and 40 (35%) women. Inclusion criteria consisted of patients over the age of 18, who were operated at the Clinical Department of Trauma Surgery, and whose length of stay after the surgery was three or more days. Also, they should have been well oriented in time and space, and able to understand questions presented in our questionnaire. Respondents were included in research in order of discharge from the department, in a period of April 25<sup>th</sup> to June 25<sup>th</sup>, 2014. Ethical approval for our research has been obtained from the Committee for Ethical and Class Issues of Nurses and Medical Technicians at the University Hospital Centre Osijek.

### Instruments

Numerical rating scale (NRS) has been used for measurement of perceived pain. Patient determines pain intensity by picking a number from 0 to 10, where 0 signifies no pain, and 10 signifies severest possible pain. NRS is routinely used by nurses in postoperative care, it is widely acknowledged and reliable [9]. We accepted the recommendation to divide the scale into three groups: (I) no pain and mild pain – NRS 0-3; (II) moderate pain – NRS 4-6; and (III) severe pain – NRS 7-10 [10].

In the questionnaire, we were pursuing information regarding suffered pain from our respondents, and this includes their perception of pain immediately before hospitalization, the lowest and the highest pain intensity during hospitalization, duration of pain in the course of their hospital stay, behavior of medical staff in pain evaluation, and the level of

contentment among patients with provided pain treatment. General data cover age, gender, type of accident, and previous experience of surgical procedures.

### Data collection

The examination was conducted individually on the day of patient's hospital discharge. Respondents have been asked to fill out the questionnaire before they leave the department. Right before the start, instructions were read to them, and they were informed about the main objectives of this research. It was always emphasised that they will participate in this research anonymously as volunteers, and afterwards, they signed an agreement of participation. It took them about five to ten minutes to fill out the questionnaire.

### Analysis

Normality of distribution is statistically tested by Kolmogorov-Smirnov test. The average values of continuous variables are expressed by median and interquartile range. Nominal indicators are shown by an absolute and relative number. Differences between categorical variables are tested by  $\chi^2$  test and Fisher's exact test. To determine the differences between two independent groups we used the Mann-Whitney test, and in the case of three or more independent groups, the Kruskal-Wallis test. The evaluation of association is expressed by Spearman's rank-order correlation coefficient. To assess the importance of given results, we determined  $\alpha = 0.05$  as a level of importance. We used the SPSS for Windows (version 9.0, Carry, NY, USA) for all statistical analyses.

## Results

The research was conducted on 114 participants, 74 (65%) men and 40 (35%) women. Average age (median) of the respondents was 52 years (interquartile range of 41 to 62 years of age); 46 years for female respondents (interquartile range of 39 to 48 years of age), and 58 years for male respondents (interquartile range of 42.7 to 67.7 years of age). Eighty-two respondents (72%) were urgently admitted to the hospital, most common type of accident was falling (68 respondents, or 60.2%), while 29 respondents (25.7%) had a traffic accident. The more frequent cause of trauma for men was a traffic accident, while women were mostly injured by falling (Fischer's exact test,  $p = 0.013$ ).

Sixty-two respondents (54.4%) have had some surgical procedure, 39 female (52.7%) and 23

male respondents (57.5%). An average number of past procedures is 1 (interquartile range from 1 to 3), in the span of 1 to 9 surgical procedures, equally with regards to gender.

Average pain intensity on arrival to the hospital was rated 7 (interquartile range from 4 to 10), and female respondents perceived significantly higher pain intensity (Mann-Whitney test,  $p < 0.001$ ). Lowest pain intensity perceived by patients during hospitalisation was rated 2 (interquartile range 1 to 3), whereas male patients assessed their pain significantly lower than participating female patients (Mann-Whitney test,  $p = 0.001$ ) (Table 1).

**Table 1: Average pain intensity according to the gender of the respondent.**

	Median (interquartile range)	Minimum/maximum	P*
Pain intensity on arrival to the hospital (NRS)			
Male	7 (3.75 – 8)	0 – 10	<0.001
Female	9 (7.3 – 10)	1 – 10	
Total	7 (4 – 10)	0 – 10	
Lowest pain intensity perceived during hospitalisation			
Male	1 (1 – 2)	0 – 6	0.005
Female	2 (1 – 3)	0 – 5	
Total	2 (1 – 3)	0 – 6	
Highest pain intensity perceived during hospitalisation			
Male	4.5 (4 – 7)	2 – 10	0.001
Female	6 (5 – 8)	4 – 10	
Total	5 (4 – 7)	2 – 10	

\*Mann-Whitney test; Numerical Rating Scale.

Patients undergoing elective procedures more frequently assessed the intensity of highest perceived pain during hospitalisation as mild (Fischer's exact test,  $p = 0.010$ ). Their previous experiences of surgical procedures had no impact on assessing the level of severest pain during actual hospitalisation (Table 2).

**Table 2: The highest pain intensity with regards to type of hospital admission and patient's previous surgical procedures**

Highest pain intensity perceived during hospitalisation	Number (percentage) of respondents according to rating groups			Total	P*
	NRS 0 – 3	NRS 4 – 6	NRS 7 – 10		
Type of hospital admission					
Routine (elective)	8 (61.5%)	17 (26.2%)	6 (16.7%)	31 (27.2%)	0.010
Emergency	5 (38.5%)	48 (73.8%)	30 (83.3%)	83 (72.8%)	
Experience of previous surgical procedures					
Yes	7 (53.8%)	35 (53.8%)	20 (55.6%)	62 (54.4%)	> 0.950
No	6 (46.2%)	30 (46.2%)	16 (44.4%)	52 (45.6%)	
Total	13 (100%)	65 (100%)	36 (100%)	114 (100%)	

\*Fisher's exact test; Numerical Rating Scale.

Respondents who reported severe pain as the highest perceived level of pain during hospitalisation, more frequently answered that they felt pain constantly, regularly, or some time during their hospital stay (Fisher's exact test,  $p < 0.001$ ). Those respondents who perceived severe pain as the highest intensity of pain during hospitalisation frequently answered that medical staff hadn't asked them to assess their pain on a scale from 0 to 10 on any occasion. Lower pain intensity was reported by those patients who were asked to assess their pain periodically or even every day (Fischer's exact test,  $p < 0.001$ ) (Table 3).

**Table 3: The highest pain intensity perceived during hospitalisation with regards to interventions of medical staff**

Highest pain intensity perceived during hospitalisation	Number of respondents according to rating groups			Total	P*
	NRS 0 – 3	NRS 4 – 6	NRS 7 – 10		
Have you felt pain during your hospital stay?					
Constantly, or regularly	0	0	2	2 (1.8%)	<0.001
Some time	0	2	11	13 (11.4%)	
Periodically	13	63	23	99 (86.8%)	
Do you think that medical staff did everything to help you control your pain?					
Yes, definitely	13	63	32	108 (94.7%)	0.240
Yes, to a certain extent	0	2	4	6 (5.3%)	
Have you been asked by medical staff to assess your pain on a scale from 0 to 10?					
Yes, every day	8	15	8	31 (27.2%)	<0.001
Sometimes	3	35	8	46 (40.4%)	
No	2	15	20	37 (32.5%)	
Are you satisfied with provided pain treatment during your hospital stay?					
Yes	13	64	31	108 (94.7%)	0.033
Partly	0	1	5	6 (5.3%)	
Total	13	65	36	114 (100%)	

\*Fisher's exact test; Numerical Rating Scale.

Patients who assessed the intensity of pain during hospitalisation as severe were mostly only partially satisfied with hospital treatment provided (Fischer's exact test,  $p = 0.033$ )

## Discussion

Every patient, especially one suffering from some traumatic injuries, represents a challenge to a nurse because urgent and adequate help in acute pain management can reduce the consequences which accident can eventually leave on his psychological and physical health. The median of pain intensity measured right on patients admission to the hospital was 7 (interquartile range 4-10), and our results are similar to those revealed in Berben et al. (2011). Their respondents averagely rated pain intensity with pain score 6 (interquartile range 3-8), while the polytrauma patients reported a high median pain score 8 (interquartile range 7-10) [11]. Despite the pain treatment and the use of different analgesics, patients are still reporting that they feel postoperative pain. Highest pain intensity is usually perceived on the first and second day after the surgical procedure, and our results are also by other similar research projects [12, 15]. Average pain score of the severest postoperative pain perceived during hospitalisation was rated 5 (interquartile range 4-7), the significantly lower score was reported by male respondents, while female respondents also perceived higher pain intensity on admission to the hospital, as well as the higher intensity of all types of pain suffered during hospitalisation. Genetic, anatomical, physiological, neuronal, hormonal, psychological and social factors modulate pain differently among male and female patients and represent evident gender differences between those two sexes. Increased pain sensitivity and many more painful diseases were commonly reported among women [16]. However, in their

literature survey, Ip et al. [2009] concluded that gender is not a predictor of postoperative pain, but they also confirmed that there are other studies which claim the opposite [17]. Our research, as well as many others [12, 13], confirm that gender is a predictor of postoperative pain.

This research shows that pain was periodically felt by 86.8% of respondents, while 11.4% of patients perceived pain for some time, and 1.8% of patients felt pain constantly during hospitalization, and those numbers represent significantly different results from those obtained by J. Tocher et al. (2012), whose research reveals that slightly more than a half of the surgically treated patients [51%] reported they felt pain for some time during hospitalization, while 26% of patients felt pain all or most of the time and 23% of patients experienced pain only occasionally [12]. The reason for this discrepancy could be in the fact that all of our respondents came from the same hospital unit, and that acute pain is well treated in our Clinical Department for Trauma Surgery. The results reveal good cooperation and advanced teamwork of nurses and medical doctors in doing everything in their power to reduce the pain of their patients. Studies show different understanding and assessment of pain present in various hospital units, as well as utilisation of various tools for pain evaluation [18].

Certainly, everyone included in the patient care should strive for the most efficient pain treatment, but the question rises whether we should eliminate pain in its entirety because pain is the first sign of possible clinical, especially postoperative, complications. Maybe it is sufficient to reduce the pain to the level where it is no longer an interfering problem for a person, but it keeps an alert and defence role in the human organism. On the other hand, some studies recommend the aggressive treatment to prevent acute pain turning into chronic pain [19], so pain must be controlled in the hospital to prevent the development of chronic pain out of the hospital. Clinicians can identify those at risk by reviewing their average pain scores on the day of discharge [20].

Ninety-four point seven percent of patients were satisfied with the provided pain treatment, 5.3% of patients were only partly satisfied, and there was not even one patient who claimed his/her dissatisfaction with provided pain treatment during hospitalisation. Patients report their contentment with provided pain treatment despite their high ratings of pain on the NRS, which is by results published in the similar studies [12, 13, 21, 22]. Although, Idvall (2002) concludes that contentment could be irrelevant or non-essential end-point of pain treatment [23].

Idvall (2008) presented results of the research project which used modified questionnaire of the Strategic and Clinical Quality Indicators in Postoperative Pain Management (SCQIPP), and the lowest ranked question there was the one about the pain assessment and usage of tools for evaluation of

pain. In other words, nurses inadequately communicated with patients and therefore missed to evaluate pain on a regular basis. Unfortunately, this is not an isolated case, which is obvious from a couple of other studies [13, 14]. Our research doesn't show much brighter picture for that matter, for only 27.2% of patients said they've been asked to assess their pain every day during their hospital stay, while 40.4% of patients answered that kind of question occasionally, and 32.5% of patients didn't communicate with nurses about intensity of their pain at all. Studies confirm that nurses have a positive attitude towards applying the tools for pain evaluation [25], which indicates that nurses are aware of the importance of regular pain assessment, but for some reason, they don't act in a way they know they should [24]. One of the reasons for this kind of situation is a lack of nurses in hospital units and, therefore, they are overloaded with work – everything is done quickly, routinely, and communication with patients is sometimes insufficient. Documentation on pain evaluation is often incomplete, and nurses are not even aware of that [26]. Scholten et al., in their study (2015), showed that documented levels of pain are found in max 52% of cases, depending on institution [27].

Our research also shows that urgent patients suffering pain on admission to the hospital also perceive a higher level of postoperative pain, and same results can be found in other scientific publications around the world [3, 7, 8]. Trevino et al. (2014) found that high initial pain intensity predicts chronic pain in the trauma [20].

Previous experiences of surgical procedures, as could be seen from our results, have no effect on assessing the level of highest pain perceived during actual hospitalisation. It is assumed that people are dealing with pain better if they know when it is going to appear, or if they are expecting pain of certain extent in a certain period [28]. However, Eccleston (2011) emphasised that informing the patients about the pain they are going to experience doesn't necessarily have to have positive results [28] and advocates the use of common strategies. For example, if a person prefers distraction as a strategy of reducing the intensity of pain, detailed informing can disturb the efficiency of distraction and therefore disable the possibility of reducing pain.

In conclusion, we often treat all of our patients in the same way, but people differ greatly in their pain perception. They don't feel the same intensity of pain; some react better to certain medications than the other, so the evaluation of pain must be prompt and accurate. A great problem is already mentioned shortage of medical staff – nurses don't have the time, the strength, or the will to do more than it is necessary for their patients, and patients, on the other hand, need their attention, they like to hear a kind word, and several minutes of talk with informed person means a lot to them.

When summarising the results of this research, we conclude the following:

I. The average pain intensity perceived by trauma patients at hospital admission was NRS median 7 (range 4-10), the lowest perceived rate of pain was NRS median 2 (range 1-3), and the severest pain was rated NRS median 5 (4-7).

II. Female patients, as well as patients admitted to the emergency department, perceived higher postoperative pain, but the experience of previous surgical procedures didn't affect the level of actual NRS ratings.

III. Thirty-two point five percent of patients were not asked to assess their pain, and 40.4% of patients were asked that question occasionally during their hospital stay. In comparison to other patients, those respondents who perceived severe pain answered more often that medical staff didn't ask them to assess their pain on any occasion.

IV. Despite the pain, almost all of our patients were satisfied with provided pain treatment.

Good communication between medical staff and patients, as well as adequate assessment and evaluation of acute postoperative pain, are of great importance in their treatment. Measuring the pain intensity should be regular and routine practice, the same as the measurement of other vital signs so that the pain could be visible enough. Recognising pain as the fifth vital sign will surely advance every patient's pain management.

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