

# Evaluation of the use of analgesics for blunt thoracic trauma in the accident and emergency department

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## Abstract

Proper pain management is an essential process when dealing with a patient suffering from blunt thoracic trauma, because it blocks the vicious circle that leads to the development of trauma related complications. This retrospective study deals with the use of pain killers administered in the Accidents and Emergency Department (ED) and prescribed at discharge to patients suffering from blunt thoracic trauma. The analysis confirms the existence of oligoanalgesia, that is an inadequate pain treatment, in clinical practice. Out of 214 patients involved in the study, only 78 patients (36.4%) received at least one pain killing drug during their stay in the ED. More than half of the patients discharged within 24 hours of admittance to the ED received no detailed advice about pain relief therapy and 8% of them (11 out of 136) returned to the ED within 15 days for persisting symptoms. Four were eventually admitted to hospital due to deterioration in their clinical conditions.

## Introduction

Pain is one of the primary reasons for access to the Accidents and Emergency Department (ED).<sup>1</sup> Proper pain therapy at this

stage has direct implications on the outcome in patients with blunt thoracic trauma, since it reduces potential short-term and long-term complications. Adequate analgesia allows for a correct ventilatory performance with effective mechanics and coughing, which permit the removal of secretions and the reduction of dead space and consequently prevent infectious and inflammatory pulmonary situations that arise due to insufficient alveolar ventilation.

Pain management in the ED must be timely and multimodal. It can range from the use of analgesic drugs (nonsteroidal anti-inflammatory drugs, paracetamol, opiates) administered orally or parenterally, to local pain control techniques, such as nerve blocks or epidural analgesia. The aim of this retrospective study is to analyze pain management in patients suffering from blunt thoracic trauma of any severity or type that were referred to a second level emergency department in Italy. Pain relief therapies administered upon entrance in the ED and those prescribed to patients discharged within 24 hours of acceptance were analyzed. Any re-admittance to the ED within 15 days due to a failure of the prescribed therapy was monitored.

## Materials and Methods

The study was conducted at the ED of Sant'Anna Hospital in San Fermo della Battaglia (CO), a second level ED with a charge of about 70.000 patients per year.

All patients registered between 1<sup>st</sup> March and 31<sup>th</sup> July 2017, aged over 18 years, who suffered from blunt thoracic trauma, regardless of severity, type of trauma and association with other lesions, were identified in the ED database.

In the analysis, only patients who had at least one thoracic lesion were considered. Lesions included rib, sternal, clavicular or scapular fracture, pneumothorax, hemothorax, pulmonary contusion, and pleural or pericardial effusion. Patients who had only non-complicated thoracic contusions were excluded.

Since our ED runs a triage nurse's analgesia protocol (APT), patients receiving a pain killer by a nurse at their arrival were studied along with those that were prescribed pain relief therapy by a physician during clinical evaluation. Pain relief therapy prescribed for patients who were discharged within 24 hours of admittance was also analyzed. Patients who returned to the ED within 15 days due to persisting symptoms were identified through the hospital database and re-evaluated as to the appropriateness of work-out and treatment.

## Results

Within the 5-month duration of our study, 579 patients were admitted for blunt thoracic trauma. Of these, 214 were enrolled because of the presence of at least one thoracic lesion (Figure 1). Average age was 59 with a prevalence of men. The characteristics of the selected population are shown in Table 1.

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Rib fractures were the most frequent lesions and were found in 155 patients, with an average of 3 rib fractures. Thirty-nine cases of blunt thoracic trauma were classified as a major trauma according to impairment of one of the vital functions or an Injury Severity Score major of 15.

The APT protocol was followed by the triage nurse only in 27 cases (13%). Four patients refused the pain treatment offered by the nurse, preferring to wait for the medical examination.

Pain relief therapy by the ED physician was administered in 78 cases (36.4%). Specifically, 53 patients were treated with a single analgesic, 23 received more than one class of drugs, and 2 refused any therapy. In all cases, at least one among nonsteroidal anti-inflammatory drugs (NSAIDs), paracetamol and opioids was administered by the oral or parenteral route. No physician employed a loco-regional pain control technique (epidural analgesia or nerve block).

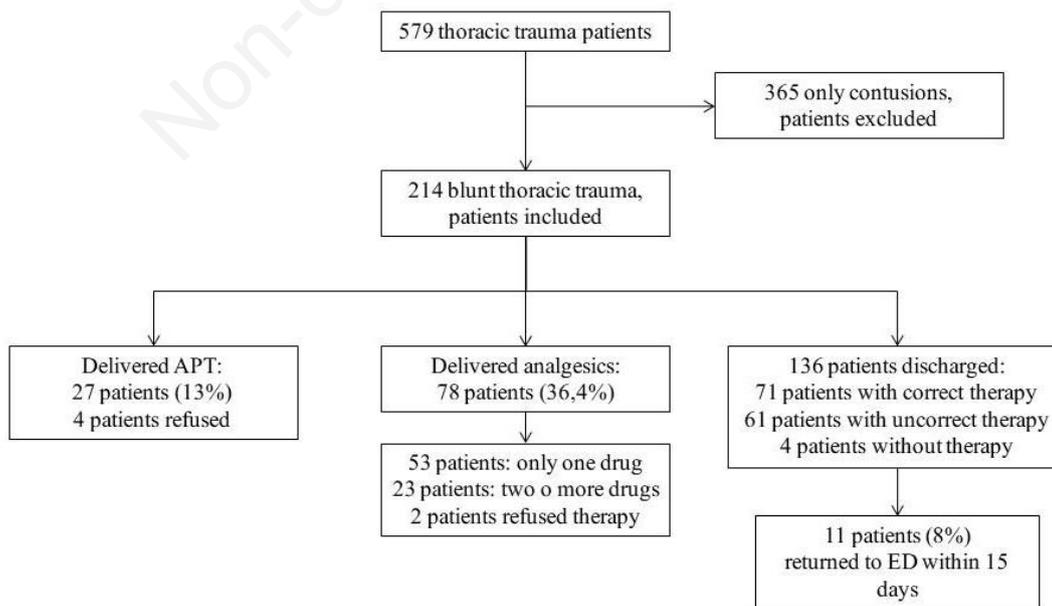
Ketorolac 30 mg i.m. was by far the most popular drug among the physicians, with 35 administrations, followed by paracetamol 1000 mg e.v. with 26 administrations and fentanyl i.m. or e.v. with 22 administrations (Figure 2).

136 patients were discharged within 24 hours of acceptance. Four of these were discharged without any home-based pain relief therapy. Type and dosage of the prescribed drug were detailed in 71 cases, while for the remaining prescriptions only a generic entry was used, such as *the usual analgesics* (32 cases), *NSAIDs* (4 cases) and *analgesics taken as needed* (61 cases).

Of the total patients discharged early, 11 (8%) returned to the ED within 15 days of discharge due to persisting symptoms. 5 of these patients had been discharged with a non-detailed pharmacological prescription. Most of the patients who returned were discharged again, with a new pain relief therapy; but in 4 cases admission was deemed necessary. Two patients were admitted for the development of pleural effusion, one for a severe respiratory insufficiency and one for a pleural effusion and a pneumothorax.

**Table 1. Characteristics of enrolled patients.**

Patients' characteristics		
Age (range)	59 years (19-96)	
Male/Female	137/77	
Thoracic injury	Number	Bilateral
Rib fracture	155	10
Sternum fracture	18	-
Clavicle fracture	46	-
Scapula fracture	24	-
Pneumothorax	28	3
Lung contusion	35	17
Pleural effusion	26	4
Pericardial effusion	1	-
Other injuries		
Traumatic brain injury	27	
Intracranial hemorrhage	12	
Concussion	3	
Vertebral fractures	18	
Hip fracture	5	
Femur fracture	7	
Upper limb fractures	14	
Abdominal trauma	8	
Major trauma		
	39	
Disposition		
Discharge	136 patients	
Observation unit	36 patients	
Intensive Care Unit	19 patients	
Other departments	23 patients	



**Figure 1. Flow chart of study patients. APT, triage nurse's analgesia protocol; ED, Accidents and Emergency Department.**

## Discussion

Blunt thoracic trauma is an important cause of morbidity in patients. Pain is recognized as an important element in the development of complications mainly respiratory failure and pneumonia. Optimal analgesia is essential in the management of these patients in association with early mobilization and respiratory physiotherapy. Correct pain control promotes effective coughing, deep inhalation and the possibility of following a physiotherapy program, counteracting the development of atelectasis, pneumonia and hypoxia.<sup>2,3</sup>

Despite these recommendations, our analysis showed that the phenomenon of oligoanalgesia is still frequent in medical practice. Only one patient in ten was treated by nurses at his/her arrival to the ED, notwithstanding a written protocol. Worse than that, no more than one third of patients received any analgesic drug during their entire stay in the ED.

Despite the fact that an Italian law (38/2010) expressly requires that pain intensity be one of the parameters reported in the medical chart,<sup>4</sup> the ED charts that we analyzed were void of any numerical or descriptive evaluation of the intensity of pain at the moment of patient's arrival. Likewise, with rare exceptions, we could find no re-evaluation of the pain intensity at the time of discharge or at the moment of admission to a hospital ward.

This study also confirmed that, in our hospital, pain from blunt thoracic trauma is treated only with drugs, while loco-regional pain control techniques (nerve block, epidural analgesia) are never used in the ED. It is clear that, at least in our context, this therapeutic approach is not yet a part of emergency physicians' technical competence, despite the fact that multimodal analgesia seems to be of greater efficacy when administered early in the course of disease.<sup>5,6</sup> Nevertheless, we must acknowledge that, according to the latest

recommendations of the Eastern Association for the Surgery of Trauma for the management of pain in patients with blunt thoracic trauma, there is yet a lack of solid scientific evidence that loco-regional analgesic techniques are more effective and have fewer side effect than analgesics.<sup>7</sup>

As to the selection of analgesic drugs, it should be noted that the principle most often used by the physicians of our ED was Ketorolac i.m., both as mono-therapy or in co-administration with other analgesics (Figure 2). The use of paracetamol and strong opioids, respectively recognized as first-line drugs for the treatment of mild-moderate and severe pain,<sup>5</sup> were also a frequent choice, with fentanyl ahead of morphine, notwithstanding its shorter half-life.

The fact that the intensity of pain was seldom recorded in the charts makes it impossible to evaluate appropriateness in drug selection. For instance, we cannot say whether the scanty use of opioids was due to the fact that pain was on the average of only moderate intensity or to a reluctance by physicians to use major analgesics, as asserted by different authors.<sup>8</sup> However, it is surprising that ketorolac was chosen in the majority of cases, being an off-label drug, restricted in Italy to the treatment of severe postoperative pain and renal colic.<sup>9</sup>

When data concerning prescriptions at discharge is examined, it is notable that a precise therapeutic indication was not always provided. Very general statements were often used, like *take the usual analgesics* or *treatment with NSAIDs*. In half of cases dosages were not mentioned and therapy was advised to be taken *as needed*.

This study has many limitations. First of all it is a retrospective study. It is thus subject to possible under-reporting because of incomplete charts. Moreover, the medical records may oversimplify what is actually a more nuanced situation and the surface evidence of oligoanalgesia might be at times misleading.<sup>10,11</sup>

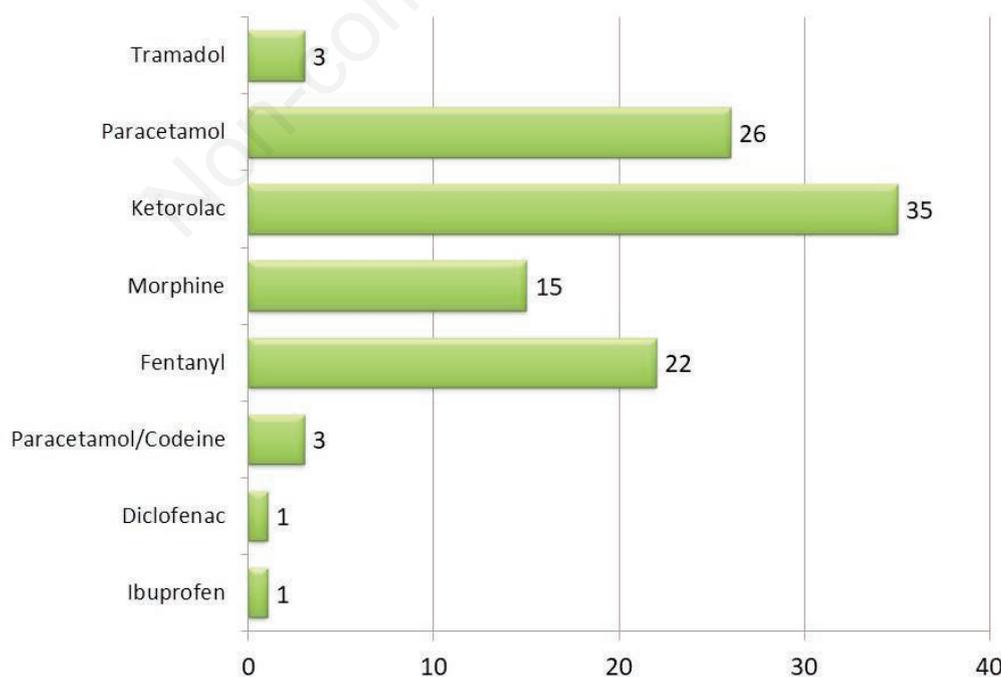


Figure 2. Type of analgesic drugs administered for the first aid pain relief therapy.

Second, it is a single center study. It is thus possible that under-treatment of pain in blunt thoracic trauma is peculiar to our hospital and ED. Indeed, confrontation with colleagues from other Italian hospitals and an informal overview of the literature,<sup>1,12,13</sup> make us believe that, with possible exceptions, the results of our study are representative of a situation which is quite common.

Third, we have not been able to gather good data on the intensity of pain, since pain scores were not regularly reported on ED charts. For this reason, it is difficult to evaluate the appropriateness in the choice of drugs. Yet, some choices appear at variance with international data, especially as regards the low use of opioids and the extensive off-label use of ketorolac.

## Conclusions

This retrospective analysis, even with its limitations, shows that inadequate recognition and treatment of pain is still a problem in the ED of a large secondary level Hospital in Italy. In particular, with regard to the treatment of patients suffering from blunt thoracic trauma, drugs that were probably inappropriate or not proportional to the intensity of the patient's pain were used. No loco-regional therapy was ever performed and, even in the discharge phase, there were problems in terms of non-prescriptions or incomplete therapeutic advice. In consideration of the fact that inadequate pain treatment may favor the insurgence of complications of blunt thoracic trauma, it is necessary to increase our efforts to improve the quality and timeliness of pain therapy in the ED.

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