

Emergency Department Pain Management and Its Impact On Patients' Short Term Outcome

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Abstract: *Background:* Although pain is the most common complaint in the Emergency Department (ED), there is still a lack of adequate pain treatment by Emergency Physicians. Aim of this study was to describe pain management in ED from triage to discharge and to verify the effect of pain treatment in ED on a short term follow-up after discharge in order to evaluate patient's outcome.

Methods: A prospective multicentric study was conducted over two consecutive one week period in 4 ED teaching hospitals in Italy. All patients presenting with an acute, painful condition were eligible to participate in the study. The complete ED pain treatment was recorded, we enrolled 582 consecutive patients. One week after ED discharge a follow up evaluation through a phone call on patient's pain clinical condition was also obtained.

Results: There was a statistical significant difference between nurse and Emergency Physicians pain judgement ($p < 0.001$). During ED visit: 54.2% received non steroid anti inflammatory drug (NSAID), 12.2% received paracetamol and 9.9% tramadol while morphine was used only in 5.6% of patients. Overall patient's satisfaction at one-week follow-up was as follows: in 63% of patients pain was completely absent, but on the other hand, 37% of patients had no pain relief, despite analgesic therapy prescription.

Conclusion: In our study we found differences between nurses and physicians judgments, they disagreed on the severity of pain. It was observed a low use of pain intensity scale with a formal measurement scales to assess pain. Our study demonstrates the importance of adequate ED and analgesic drug prescription for patients referring for pain in ED, and follow up assessment, many patients in follow up reported continued pain because of poor prescription of analgesic drug at discharge from ED. Improving analgesia in ED seems to be crucial for patients' quality of life and for preventing ED re-admission for relapse of pain.

Keywords: Pain assessment, Emergency department, Pain intensity scales, Analgesia follow -up.

INTRODUCTION

Pain is the most common presenting complaint in the Emergency Department (ED) [1]. Many retrospective and prospective studies demonstrated that pain as patient's symptom is underestimated [1-6]. In a recent study timely and adequate treatment of pain has been demonstrated to be suboptimal, as 30% of patients reporting the same or more pain at time of discharge, and just over half rated their pain at discharge as moderate or severe [5]. Bonica *et al.*, in a review of over 25,000 pages in 50 major textbooks covering

medicine, surgery, paediatrics, and emergency medicine, demonstrated that only 54 pages were addressed to the treatment of pain [7]. The lack of adequate pain treatment in ED has been well documented [8-13]. Inadequate research and options limitation for emergency physicians (EP) practice have been claimed as explanation [13]. Occasionally, a poor choice of analgesics, including a non-preferred route of administration, appears to alter the efficacy of acute pain treatment in the ED [9]. Gender, age, and ethnic biases have also been found to contribute to the lack of analgesic administration in the emergency setting [11], however undertreatment of pain was not confirmed to be associated with patient race or ethnicity [5]. Medical education has often been suggested as a mandatory way to improve the treatment of acute pain in ED [14]. This study was aimed to determine the management of pain from triage to discharge in patients referring to ED and to verify, by a short term follow up (1

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Table 1. Principal Diagnoses of Patients with Pain at ED Discharge

	Total (582)
DIAGNOSIS	N (%)
TRAUMA	259 (44.5%)
HEADACHE	27 (4.6%)
NEURALGIA	35 (6.0%)
OTORHINOLARYNGOLOGICAL	12 (2.0%)
OPHTHALMOLOGICAL	5 (0.8%)
ABDOMINAL	114 (19.5%)
THORACIC	56 (9.6%)
GYNECOLOGICAL	14 (2.4%)
VASCULAR	8 (1.3%)
NEPHRO-UROLOGICAL	35 (6.0%)
NOT PERFORMED	17 (2.9%)

week), the efficacy of pain treatment in ED. A secondary objective has been to describe the current pain approach and treatment in four Italian teaching EDs, from triage to discharge, and to quantify the effective use of intensity pain scales.

MATERIALS AND METHODOLOGY

This was a multicenter prospective observational clinical study conducted in the ED of four teaching hospitals in Italy (Sant'Andrea Hospital in Rome - coordinating center -, Agostino Gemelli Catholic University of the Sacred Heart Hospital in Rome, University Mayor of Charity Hospital of Novara and SS. Giovanni e Paolo Hospital in Venice) and in which 582 patients were enrolled. The protocol was approved by the ethical committee of each participating hospital. Written informed consent was obtained from each patient prior to enrolment.

Inclusion criteria: We enrolled all patients who arrived in the ED complaining pain in a free two week period in 2011 (first two weeks of June).

Exclusion criteria: age less than 18, and patients unable to fill the informed consent.

Triage urgency level was established by a trained triage nurse on a four point acuity scale on the basis of the global triage model proposed from the "Gruppo Formazione Triage" (GFT) [15]. Triage level acuity was classified into 3 groups: Level 1 or Red code (emergent/resuscitation), Level 2 or Yellow code (urgent), Level 3 or Green code (semi-urgent). In Level 1 patient has critical conditions with a compromise of a vital function; in Level 2 patient has conditions that are potentially life-threatening or alterations of limb or sense function without compromise of a vital function; in Level 3 patient has conditions that should be evaluated by a physician, and might deteriorate or benefit from medical intervention but without potential threats to life or

limb or sense function. On the basis of this classification Level 1 and 2 have rapid access in the ED emergency area and the physician's examination is immediate in the first case and into few minutes in the second one, while, for the Level 3, expected waiting times are more prolonged. The model proposed from the GFT has been adopted by each Italian region included Lazio, Piemonte, Veneto and has been imposed on every ED of the Italian regions on the basis of the Guidelines for the Organization of the Emergency Network in Italy created by the Act of Agreement Conference State-Regions/Ministry of Health (D.P.R. 27/03/92) [16].

Anamnestic data and demographic information were recorded. Data for each patient enrolled in the study were collected in Case Report Form (CRF). CRF contained all the information about pain: onset, duration, how the triage nurse judged it (absent, moderate, severe or more severe), priority code assigned, and, if any, pain intensity scale score, once EP assessed patient's pain (absent, moderate, severe or more severe), through two graduated pain intensity scales: the Visual Analogue Scale (VAS) and the verbal Numerical Rating Scale (NRS). The first, VAS, is a measurement instrument represented by a horizontal line, 100 mm in length, anchored by word descriptors at each end (absent and the worst pain). The patient marks on the line the point that he feels represents his perception of pain. The VAS score is determined by measuring in millimetres from the left hand end of the line to the point that the patient marks. The second scale, NRS, is a 11, 21 or 101 point scale where the end points are the extremes of no pain and worst pain. The NRS can be graphically or verbally delivered [17].

Data regarding pain localization (trauma, abdomen, chest, neurologic apparatus, gynaecologic apparatus, vessels, eye and otorhinolaryngeal) were also recorded. The pain was characterized by EP interview, with a specific question about the onset, localization, site, duration and the quality of pain. CRF contained also patient's final disposition (discharged, hospitalized, transferred in other hospitals, stay in short observation units) and analgesic therapy prescription (type of drug, dosage, way of administration). On the basis of anamnestic data and physical examination the EP decided to administrate analgesic therapy at different levels of dosage in consideration of the intensity of pain.

One week later discharge, a phone call follow-up was performed, by mean of a dedicated questionnaire aimed to know patient conditions, whether pain was present or absent, or the severity pain's degree, and analgesic therapy efficacy. Those patients admitted to hospital or in observation unit were not included in the phone call follow up. Residents performed phone call using standardized questions and they were not blinded to ED treatment.

STATISTICAL ANALISYS

Discrete variables were expressed in percentage; for normally distributed data, continuous variables were presented as mean \pm standard deviation (SD) and statistical significance was assessed by T test, otherwise, a non parametric test, the Wilcoxon rank sum test was employed if appropriate. The statistical significance of the association between dichotomous variables was assessed by the Fisher exact test

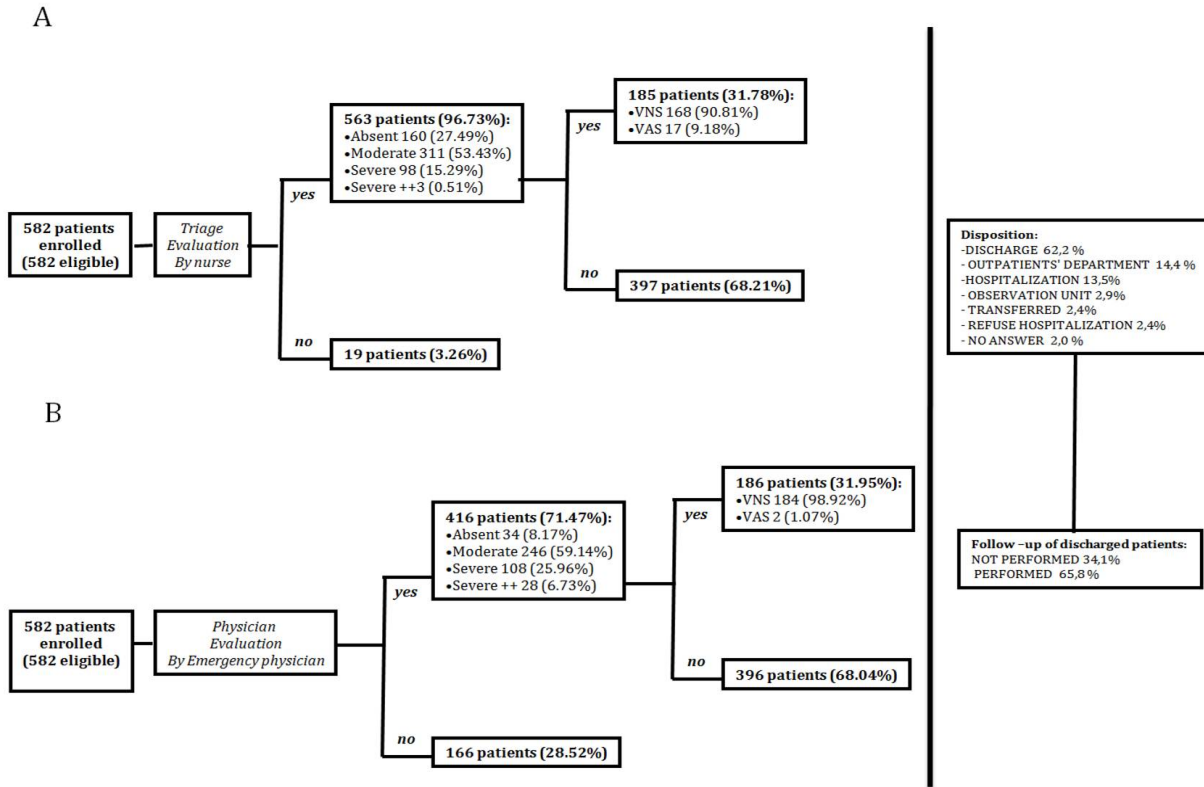


Fig. (1A-B). Study Algorithms.

Table 2. Nurse at Triage and Emergency Physician During ED Visit Pain Judgement and Follow Up

	Pain Judgement			
	Absent (%)	Moderate (%)	Severe (%)	Very Severe (%)
Nurse at triage	27.4 [*]	53.4	15.2 [#]	0.5 [§]
Physician at ED visit	8.7 [*]	61.5	25.9 [#]	6.7 [§]
Follow - up	62.6 [*]	30.2	6.2	0.7 [§]

*p<0.001, #p<0.007, §p<0.004

and significance of results was determined using χ^2 analysis. The threshold for statistical significance was $\alpha < 0.05$. We used Medcalc (Medcalc, Mariakerke, Belgium) software version 12.1.4.

RESULTS

We enrolled 582 patients. 287 (49%) were men, with mean age of 49 ± 19 years. At nurse triage pain evaluation: 19 (3.2%) patients have not been judged at all while in the others (563) pain was judged as: absent in 160 (27.4%), moderate in 311 (53.4%), severe in 99 (15.2%), and very severe in 3 (0.5%). ED pain nurse scale assessment was performed in only 185/582 (31.7%) patients. VAS was performed in 17 (9.1%) and NRS in 168 (90.8%) of them, while in 397 (68.2%) patients the pain scale assessment was not performed (Fig. 1A).

During EP's visit pain was evaluated again in 416 patients (71.4% of total enrolled patients) and it was reassessed as: absent in 34 (8.1%) of patients, moderate in 246 (59.1%), severe in 108 (25.9%) and very severe in 28 (6.7%) of patients Table 2. Intensity pain scale scores were obtained in 186/582 (31.9%) patients: VAS has been used in 2 (1.0%) and NRS in 184 (98.9%)(Fig. 1B). 166 patients were not evaluated by the EP because of the severity of primary disease that was the cause of their access in ED and that did not allow to waste time in interviewing, in fact, in these cases the EP had to act immediately for life-threatening conditions of patients. There was a statistical significant difference between nurse and EP pain judgement, by using the pain score scales, in absent and very severe pain (respectively $p < 0.001$ and $p < 0.007$)(Table 2). During the EP visit analgesic drugs were administered in 212 patients (36.4%). In the patients' group who received a pain medication, 54.2% received a non steroidal anti-inflammatory drug (NSAID), 12.2% paraceta-

Table 3. A-B. Drug Administered During Emergency Physician Visit and Discharge

Drug Administered During Emergency Physician Visit	N	%
NSAID (IV)	115	54,2
PARACETAMOL (IV)	26	12,2
TRAMADOL (IV)	21	9,9
CODEINE+PARACETAMOL (PO)	6	2,8
MORPHINE (IV)	1	0,4
OTHER	29	13,6
NSAID+TRAMADOL (IV)	4	1,8
NSAID+PARACETAMOL (IV)	5	2,3
NSAID+MORPHINE (IV)	2	0,9
NSAID+TRAMADOL+MORPHINE (IV)	2	0,9
TRAMADOL+ MORPHINE (IV)	1	0,4
Drug Administered at Discharge	N	%
NSAID (PO)	140	47,4
PARACETAMOL (PO)	51	17,2
TRAMADOL (PO)	10	3,3
CODEINE+PARACETAMOL (PO)	52	17,6
MORPHINE (PO)	0	0
OTHER (PO)	32	10,8
NSAID+TRAMADOL (PO)	1	0,3
NSAID+PARACETAMOL (PO)	5	1,6
NSAID+MORPHINE (PO)	0	0
NSAID+TRAMADOL+MORPHINE (PO)	4	1,3
TRAMADOL+ MORPHINE (PO)	0	0

(PO): per oral, (IV): Intravenous

mol, 9.9% tramadol, 4.7% opioids and 0.9% opioids and NSAID (in each comparison of NSAID versus each of the other drugs there is a statistical difference, $p < 0.0001$). A parenteral medication was given to 80.6% of patients, and the most frequent administered drug was Ketorolac (41.3%)(Table 3A). After ED visit 458 (78.6%) patients were discharged at home, 107 (15.9%) hospitalized, 17 (2.9%) stayed in observation unit.

The reasons of pain are expressed in Table 1. The analgesic medications were prescribed in only 50.6% of discharged patients. Table 3A,B shows the percentage of drug prescribed at home for pain relief. All drugs prescribed were oral pills or tablets.

Follow-up: Of discharged patients 83.8% were followed up one week later, 16.2% of patients, that were hospitalized or did not answer to the phone call, did not participate to follow-up. No significant difference between patients who completed the follow up and those who did not, according to age, sex, pain at presentation or discharge was observed.

During phone call follow-up interview the patients' pain perception was described (Table 2). In 240 (49.2%) patients, one week later, there was a statistical difference for pain absent ($p < 0.001$), severe and very severe (respectively $p < 0.004$ and $p < 0.007$). The use of prescription did not provide pain relief when pain at follow-up was compared to pain at discharge. More importantly in 37% of patients pain was still present.

DISCUSSION

It is well known that pain evaluation at ED arrival is very important in order to allow priority code assessment, time to treatment and the right final diagnosis. Therefore, the intensity of pain should be considered as a vital sign as like Temperature, Blood Pressure, Heart Rate, Respiratory Rate and Oxygen Saturation. The pain assessment in the Triage should become the sixth vital sign, monitored and assessed from the triage to EP visit. In our study the pain scales were used both by nurses and physicians, in particular the results showed

that in most cases the NRS was used [18, 19]. The probability for the EP to prescribe medication for pain was directly related to increasing scores of pain scales, that is, the higher was the score of pain scales, and the more probably drugs were administered. Methods relying on the physician's assessment of pain are inadequate because patients are ultimately the only true experts in evaluating the intensity of their own pain. For this reason, in the recent years have been created several scales of pain in order to facilitate the understanding, by the physician, of the patient's pain intensity. The major global or one-dimensional scales used with adult patients are NRS and the VAS [20]. These scales have been evaluated for chronic and acute postoperative, obstetric, or dental pain [21]. Their simplicity and rapidity of use and their sensitivity in terms of discriminating the strength of pain intensity make them suitable tools for evaluating acute pain in ED patients [22, 23]. Their repeated use in successive tests may be indicative of the efficacy of analgesic treatment. No method has been proposed in the literature for use in routine clinical practice [22-24]. Our study demonstrates that there exists a discrepancy of scale pain assessment between nurses and ED physicians. In fact nurse judged pain as: "absent", was present in a higher percentage of patients in comparison to physician's evaluation (27.4% vs 8.1%). On the contrary in our study it occurred that nurse judged pain as "very severe", was present in a lower percentage of patients compared to EP (0.5% vs 6.7%).

Oral and parenteral medications were used in 36.4% of patients, of these 82.0% received oral medications, and 80.6% parenteral drugs. These percentages are justified by the fact that frequently, most patients receiving oral medications did not achieved a valuable analgesia, and an adjunctive parenteral drug could be necessary. The most commonly used intravenous drug was ketorolac, a NSAID (41.3%). Morphine-derived (codeine) drugs were used orally, and not intravenous even if it is well known that morphine is considered the best strategy of analgesia for severe pain [25]. The underuse of morphine in ED is known [26], and it is mainly due to the fear of side effects, different habits of EP regarding the use of opioids, the opioidphobia.

In Italy in March 15th 2010 the law number 38 that includes "Provisions to ensure access to palliative care and pain therapy" has been approved [27]. This law requires of reporting the detection of pain in the medical record, of training and refreshing of physicians and nurses and the simplification of procedure to access to analgesic drugs used for pain relief therapy [27].

Physician's perceptions regarding analgesic therapy, and lack of physician training from the recognition of inadequate pain management to the application of various available treatment modalities are factors that can contribute to inadequate pain management. In the past, medical schools and postgraduate training programs have not placed a substantial educational emphasis on pain management [28], and this has contributed to many physicians' negative attitudes about opioids and a reluctance to prescribe them [28, 29]. An high proportion of physicians expressed fear of drug addiction as a reason against the use of opioid analgesics—, approximately 28%, believed that patients receiving opioids for pain relief were at significant risk for addiction, and an even

greater proportion of physicians (39%) were concerned about addiction if a family member had to be prescribed morphine [29]. While opioids remain the foundation of pain management for moderate to severe pain, the use of multiple analgesics with different mechanisms of action has shown increasing promise in clinical practice. A multimodal approach could provide significant benefits including reduction in pain intensity, optimal opioid dose, and reduced opioid-related adverse events [30]. Several clinical studies documented not only the ability of this approach to provide better pain relief with a reduced consumption of opioids and/or superior tolerability/side effects profile, but also the potential to lower the incidence of chronic pain development [30]. A shift in the pain treatment paradigm is supported by practice guidelines from the American Society of Anesthesiologists Task Force on Acute Pain Management [31].

In Unites States the prescription of opioids abuse has become, recently, a major public health problem, but this is not in Italy where there is still by the EP awe in pain control through the routine use of opioids. But EP must absolutely provide appropriate pain control for patients discharged from ED without contributing to the public health concerns associated with opioids prescription. It could be expectable that a closely integrated primary and specialty care, providing by the EP limited opioid analgesia, should be part of the discharge planning not only in Italy but in all the world.

In our study patients' characteristics were similar in consideration of age and sex, and this is relevant because there is a different sensation of pain in consideration of aging and of diseases. In the elderly there is an higher threshold of pain and it is well known in the diabetes the pain is altered by neuropathy [32]. This result is important because it permits to underline the relevance of assessing and of monitoring pain from the beginning of patient's ED stay. From our results it can be noted that in the consideration of severity levels of pain there is a difference between physician and nurse judgment. The difference is statistically significant for the absence of pain and, especially, of the very severe pain.

From our data the most frequent final disposition was discharge in 78.6% of cases, and only 15.9% of patients were hospitalized in relation to the cause of pain (mainly trauma). In those discharged, analgesic drugs were prescribed in almost 51% of patients.

At follow up evaluation the most relevant evidence was that only the 62.6% of patients described their pain as completely disappeared. This percentage reflects the difficulties to completely control pain at discharge, probably related, again, to the underestimation of pain by nurses and by ED physicians, but also to the inadequate pain management during the visits in ED probably due to the underuse of morphine. In our opinion the persistence of pain at follow up is probably linked to misuse of opioids. Our study underlines the importance of follow up that allows to point out still the presence of pain in almost 40% of patients.

This study highlights the issue of oligoanalgesia among ED patients presenting with pain-related complaints. Oligoanalgesia problem has two natures: one is due to the patients' refuse to receive analgesics. The second one is probably related to the physician's perceptions regarding analgesic

therapy and lack of physician's training in the specific area of the recognition of pain, and, subsequently, of inadequate pain management [33]. The patient's satisfaction about pain relief was influenced by effectiveness of medication, independently of pain intensity, and by communication with the physician and with nurses. No recent data in the literature were published about the importance of pain assessment in ED or describing the correct approach during EP visit and evaluating the follow up outcome. Implications for nursing practice include a need for assessment of patients' pain intensity, the development of pain management protocols, and increased emphasis on education in both undergraduate and postgraduate nursing curricula. Also there seems to be a need for continued clinical audit of pain management standards for EP and nurses.

The limitations of our study were a relatively low contact for follow-up, and consequently loss of information, lack of blinding for the treatment by the providers, lack of subgroup analysis (elderly), lack of uniform criteria for analgesic selection by EP due probably to personal practice and experience.

CONCLUSIONS

In summary, there is still a need for improving assessment on pain management in ED. Of great importance seems the need to perform a follow up for patients referring to the ED for pain. This should improve physicians' attitudes about opioids use and a less reluctance to prescribe them. Patients discharged from ED reported high satisfaction when an analgesic treatment was recommended at home. Our study demonstrates the importance of pain management in ED and after ED discharge since this can result in ameliorating patients' quality of life and to prevent consequentially pain relapse and ED readmissions with subsequent overcrowding in ED by patients who, in alternative, could be safely visited also in out clinics. This study also seems to underline the low use of opioids during ED stay and consequent persistency of pain.

LIST OF ABBREVIATIONS

ED	=	Emergency Department
EP	=	Emergency Physicians
GFT	=	Gruppo Formazione Triage
CRF	=	Case Report Form
VAS	=	Visual Analogue Scale
NRS	=	Numerical Rating Scale
SD	=	Standard Deviation
NSAID	=	Non Steroidal Anti Inflammatory Drug

CONFLICT OF INTEREST

No Grants and no sources of support have been received for the study. All authors have no conflicts to report.

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