

# Intervention of the Out-Of-Hospital Emergency Nurse in Pain Management to the Person in a Critical Situation

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**Abstract:** *The present integrative literature review aims to review the guidelines for the intervention of nurses in pain management in an out-of-hospital context and to perform a critical analysis of the protocols of action in the pharmacological treatment of pain, in different contexts. A research of works in repositories and databases, with a total number of seventeen selected articles, with a chronological filtering of the last five years and compared ten guidelines on the pharmacological treatment of pain in out-of-hospital emergency. Addressed the conceptualization of out-of-hospital emergency pain, its undervaluation, barriers and guidelines for non-pharmacological treatment, all guidelines oriented to pharmacological treatment, pain in adults and nine guidelines for the treatment of pain in children. Paracetamol is recommended for mild pain in adults and children. In the treatment of moderate and severe pain, morphine and fentanyl are mostly indicated drugs, as well as the use of fentanyl in the treatment of severe pain in children. There is a need to improve pain management for the person in a critical situation. According to the best evidence, all guidelines guide the use of opioid as treatment of moderate to severe pain, where the most used drug is fentanyl, either in adults or children. In Portugal, fentanyl is not yet recommended in the guidelines applied.*

**Keywords:** Pain management; out-of-hospital emergency nurse; analgesia protocol, attitudes and practices.

## 1. Introduction

The pain, regardless of its anatomical location, is an unpleasant experience, which includes a sensory and emotional component. It must be understood in a biopsychosocial model, where subjectivity stands out, since for its quantification there are no biological markers.

Treating the suffering of patients quickly is an ethical issue, besides being a question of humanizing assistance.

Since 2003, the Directorate General for Health - Portugal, through the normative circular no. 9 of 14 June 2003 [1], considers pain as the fifth vital sign, where therapeutic effects should be routinely valued, evaluated and registered by health professionals, using internationally validated scales [1]. However, in 2001, through a partnership with the Portuguese Association for the Study of Pain resulted in the first strategic document, the National Plan for the Fight Against Pain, approved by ministerial order on 26 March of the same year. This was followed in 2008 by the National Program for the Control of Pain, in 2012, the National Strategic Plan for the Prevention and Control of Pain and in 2017 the National Program for the Prevention and Control of Pain that remains active [2].

In 2016, the European Pain Federation [3] defines pain as a perception that arises in the conscious brain, regularly in response to a harmful stimulus, but which may also appear in the absence of that stimulus. The perception of the stimulus varies from individual to individual, depending on the

beliefs, experiences and expectations of the individual, his or her cognitive and emotional state, and cannot be based solely on the nature of the stimulus itself. Williams and Craig [4] propose a definition of pain as an anguishing experience associated with real or potential injury to tissues, with sensory, emotional, cognitive and social components. In any of the definitions it is evident the need for nurses to guide an evaluation of symptoms in a comprehensive manner, which encompasses all aspects of the experience that is to experience pain [5].

The pain from the perspective of a biopsychosocial model is considered a complex and individual event, because there is not always a direct reason between the pain and its cause. It means that the same injury can cause a different pain in different people, or even the same person if they are in different contexts. [6] Pain is something that must be treated, without being measurable the way it is expressed, so if the person tells us he has pain, we must consider that pain. [7]

For Frink and Brant [5], the use of a consistent nomenclature is fundamental for a correct evaluation and treatment of pain, because the way pain is classified and described provides information about the causes, helping in the proper planning of its management.

Out-of-hospital emergency (OHE) nurses routinely treat patients with pain. According to Paris and Phrampus, [8] pain is one of the most frequent problems in an OHE situation. This will be the most common reason for the activation of OHE media. According to the same authors, nurses in OHE understand the physiological mechanism

which causes pain, the physiological response to pain and the methods with which they can control it, and are equipped with materials and equipment to do so.

Most studies on the subject still focus on the evaluation of pain in patients; when interventions are approached, they are mainly based on the administration of medications according to prescriptions or performance protocols and monitoring of this process is still incipient, pointing to vulnerabilities in pain management in OHE. [9]

The rationale for conducting this study is based on the reflection of the previous presuppositions and the need for nurses to update and improve pain assessment skills, implement relief strategies, and monitor the effectiveness of interventions.

To carry out this study, a research question was produced that guided the research, elaborated in the PICO format: Intervention of the out-of-hospital emergency nurse (I) in the management of pain (O) in the person in a critical situation (P). This study aims to review the guidelines for the intervention of nurses in pain management in an out-of-hospital context and make a critical analysis of the protocols for action in pain treatment in different countries, where teams are composed of nurses, but also paramedics.

## 2. Methods

To achieve the proposed objectives we opted for an integrative review of the literature, with the aim of reviewing guidelines in pain management in an out-of-hospital context, and perform a reflective critical analysis of the protocols of action in pain treatment in different countries, where teams are composed of nurses, but also paramedics.

The research question that guided the research, was elaborated in the PICO format: Intervention of the out-of-hospital emergency nurse (I) in the management of pain (O) in the person in a critical situation (P).

A research of works published in repositories and research of articles in the Scielo, Medline, Scopus PubMed, Web of Science, the Open Access Scientific Repository of Portugal and the Repository of the University of Minho was carried out. Taking into account the combination of all databases, research was restricted to scientific articles published in Portuguese, Spanish, French or English and with a publication date of 5 years or less, being carried out between 1 March and 30 April 2020.

The main criterion for privileged inclusion in the integrative review was the selection of articles whose qualitative and/or quantitative methodology clarified nursing interventions in OHE, in pain management to the person in a critical situation (PCS), with a total of seventeen articles selected (N = 17). The exclusion criteria were defined as: i) articles whose methodology was unclear; ii) repeated articles in the databases (N=12); iii) articles unrelated to the object of study; iv) editorials and comments/opinion.

After clarifying the inclusion and exclusion criteria, the following keywords were defined for a more effective database search: ["nursing" OR "nursing care" OR "nursing intervention"] AND ["pain" OR "pain management"] AND ["emergency department" OR "prehospital" OR "critical patient"].

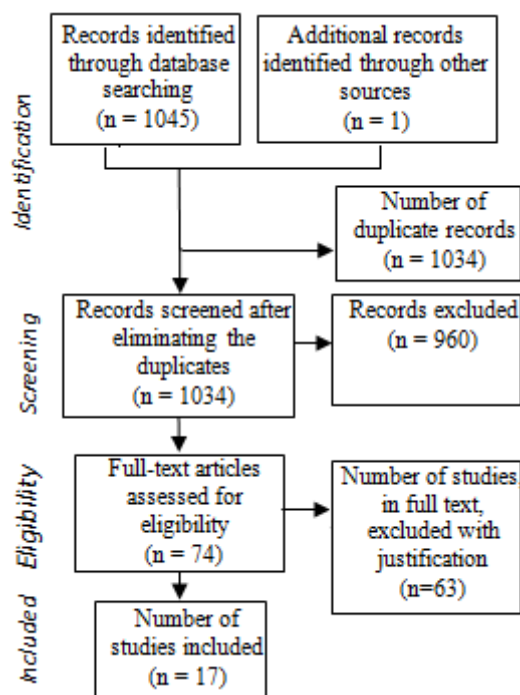


Diagram 1: Flow chart of this revision

This study included ten guidelines and protocols for the treatment of out-of-hospital pain, made available by the organizations that develop them, published in specialized journals or on websites of valid organizations. Five guidelines apply to the treatment of pain in OHE performed by nurses in mainland Portugal, the Azores, Cyprus, the Netherlands and Sweden. By way of comparison, five guidelines have been included where care is provided by paramedics, from different countries, selected at random. The time interval of the guidelines presented, was from 2012 to 2018.

TABLE 1 - Characteristics of the guidelines included in this review

Name of guidelines	Typology	Date of update	Victims and age groups.	Organization	Guideline
Procedimento Ambulância SIV (Sedação e Analgesia) V3.0	Ambulance manned by Nurse	2013	Adults and children with pain	Instituto Nacional de Emergência Médica (PORTUGAL)	1 [10]
Protocolo de Analgesia SIV Açores (versão 2.1)	Emergency car manned by Nurses	2012	Adults and children with pain	Serviço Regional de Proteção Civil e Bombeiros dos Açores (AÇORES - PORTUGAL)	2 [11]
Cyprus Ambulance Service	Ambulance manned by Nurse	2018	Adults and children with pain	Cyprus Ministry of Health (CYPRUS)	3 [12]

Netherlands Association for Emergency Nurses Guideline	Ambulance manned by Nurse	2015	Adults and children with pain	Netherlands Association for Emergency Nurses (NETHERLANDS)	4 [13]
Smärbehandling allmänt (v. 5)	Ambulance manned by Nurse	2018	Adults with pain	Ambulanss Jukvarden Västmanland (SWEDEN)	5 [14]
Ambulance Victoria Clinical Practice Guideline	Paramedics	2018	Adults and children with pain	Australia Ambulance Victoria (AUSTRALIA)	6 [15]
Clinical Practice Guideline of Pre-Hospital Emergency Care Council	Paramedics	2018	Adults and children with pain	Pre-Hospital Emergency Care Council (IRELAND)	7 [16]
Italian Intersociety Recommendations on pain management in the emergency setting	Paramedics	2015	Adults and children with pain	Italian Intersociety Recommendations on pain management (ITALY)	8 [17]
UK National Institute for Health and Care Excellence guideline	Paramedics	2016	Adults victims of trauma, with pain	UK National Institute for Health and Care Excellence (ENGLAND)	9 [18]
Douglas County Fire/EMS (Emergency Medical Services) Guideline	Paramedics	2017	Adults and children with pain	Douglas County Fire/EMS (Emergency Medical Services) (UNITED STATES OF AMERICA)	10 [19]

All the guidelines mentioned in Table 1 share the same standard method of pain assessment. The tools suggested in these guidelines include the numerical scale (NRS), the visual analog scale (EVA), Wong Baker face scale, and in some guidelines, the face, legs, activity, crying, consolation (FLACC) scale for children.

### 3. Results

#### 3.1 Out-of-hospital emergency pain management

In the evaluation of pain to the PCS it is necessary to know/understand the meaning of this pain for the victim, using this knowledge to choose the best procedure to adopt. Knowing the perception that the patient has about the pharmacological and non-pharmacological procedures, used for the relief of pain, can prove to be an important tool for the nurse in the planning and strategies of care. In this process it becomes necessary that the nurse understands the clinical manifestations of the patient with pain, acts in the control of the adverse effects of the use of medicines and evaluates the possible consequences. [20]

However, Rutkowska and Klonowicz [21] showed in their study that although the Polish OHE team was trained for correct pain management in children with burns and traumatic injuries of the osteoarticular system the supply of analgesia was inadequate.

In the Netherlands a study by Scholten, et al., [22] on the treatment of pain in traumatized patients with pain by nurses in OHE concluded that of 1066 patients in the sample only 52% received pain treatment. Also Michael Parker and Antony Rodgers [23] concluded that oligoanalgesia was present in 10% of patients in need of analgesic control.

Studies developed in the United States show that analgesic treatment of patients with injuries in the context of OHE is mediocre. [24]

In South Africa, Andrit Lourens, Peter Hodgkinson and Romy Parker [25] report that professionals in OHE have sub-optimal knowledge and procedures.

The pain can be classified as acute or chronic in terms of temporal duration. [6] Acute pain works as a signaling

mechanism of injury, being limited in terms of duration. Once the signaling effect is overcome, it no longer has an advantage and should be controlled to avoid unnecessary discomfort and reduce the risk of complications and perpetuation. [6, 26] Pain has impacts on physical and mental health of the person, causes discomfort and has a destructive function. It is considered chronic if it persists for three or more months beyond the injury that caused it and may even not be associated with any injury. [6]

When considering pain control, the first step that many nurses think about is medication. However, in OHE many of the techniques taught during the specialized training for the work practice of the nurse in OHE, show how to relieve/control pain through non-pharmacological techniques. [8] Thus, pain management involves not only evaluation and monitoring, but also interdependent and autonomous pharmacological and non-pharmacological interventions.

Where feasible, pain intensity should be assessed by the patient himself, using pain assessment scales. Due to the complexity of this assessment, numerous scales have been developed and validated. According to the Order of Nurses (ON) [27] the Evaluation Scales allow: standardizing evaluation criteria, minimizing subjectivity, defining and deciding attitudes and evaluating the efficacy of pharmacological and non-pharmacological methods. The ON [27] in Portugal, reminds nurses that good nursing practice requires the evaluation of pain as the 5th vital sign, and that i) collaborate with the other members of the multiprofessional team in establishing a pharmacological and non-pharmacological intervention plan for pain control; ii) respect the autonomy of the person in pain control, involving him/her and his/her family; iii) ensure continuity of care by documenting the history of pain, its assessment and the interventions performed; iv) update and provide the acquisition of pain control skills; v) promote and support organizational policies conducive to pain control; vi) promote and support research into new ways to improve pain control.

PCS pain assessment is essential for your approach effectively at any stage of care. Acute pain can be reliably assessed with one-dimensional tools such as numerical rating scales. At OHE the proper approach to pain is essential to

avoid the negative effects it has on the PCS. In this approach it is also essential to perform an initial assessment of the pain, using valid tools that allow to target this subjective manifestation. The patient with intense pain expects the pain to be relieved still in the context of OHE. This can be mitigated by using protocols and flow charts based on government public health programs that allow nurses to perform analgesic treatments from the beginning of the approach to PCS. [9] Pain assessment scales are tools that must be adapted to different pain expressions, provide an objective measure of pain intensity, but not characteristics, and can be used by nurses and patients. In addition, the use of pain scales makes it possible to know the situation of each patient by minimizing its consequences. In the daily practice of nurses, the use of pain scales is not frequent, although they help to prioritize patient care. It can be seen that the use of scales reduces the time of analgesia administration, as well as a considerable increase in its use. [28]

In 2020, Shoqirat, Mahasneh, Khresheh, et al., [29] in their study of factors influencing patients' experiences in the treatment of pain in OHE, concluded that effective communication associated with respect for the spirituality and socioeconomic concerns of patients is essential for the treatment of pain. To improve the experience of patients in pain control, OHE systems should shift to a patient-centered model.

Parker, [23] in his study on pain management at OHE, concluded that pain management is a fundamental part of PCS care and is directly linked to pain satisfaction. However, he notes that pain management is often inadequate. The classic definition of pain where the person experiencing it says he has it, seems to be undervalued by many OHE professionals. The author states that the evaluation, control and treatment of pain tends to be effective in the hospital, but due to the growing number of patients and increased waiting times, with low rates of patient satisfaction, it becomes a priority to improve pain management in OHE environment. Thus, regarding pain, it is imperative to maintain an attitude of reflection, research and deepening on its management in order to improve the quality of care provided to PCS.

### 3.2 Barriers to out-of-hospital emergency pain management

Oliveira, et al., [9] point to the existence of barriers in effective pain management, both for the professionals themselves (fear, unreliability, frustration, lack of empathy with the patients) and for the patients (difficulty in understanding the scales used, clinical instability, reluctance to accept opioids). The authors point out that deficits in continuing education programs on the subject, conflicts between professionals and managers, and lack of conditions in the organizational infrastructure for training practice are barriers that influence the effectiveness of pain management in OHE. Kahsay and Pitkajarvi [30] revealed that the lack of protocols for pain assessment, the workload at the time of approaching PCS, the lack of regulation for the use of opioids and unavailability of painkillers, are barriers for correct pain management, by nurses in OHE, to PCS. Shoqirat, Mahasneh, Singh, AL-Sagarat, et al., [31] report that when nurses are victims of external factors such as

violence and incorrect interpretation of their approach/practice, by patients and/or family members, generates a barrier that compromises individual and team work, impairing pain management. A study conducted in New Zealand by Pretorius, Searle and Marshall [32] mentions that the barriers to proper pain management by OHE team nurses are i) lack of time, ii) workload, iii) reluctance of other team members to prescribe analgesia, iv) lack of knowledge by nurses on opioid administration.

Regarding the approach to pediatric PCS pain, Mike Parker and Nicola Brown [33] conclude that one of the main reasons for inadequate pain assessment, with consequent under-administration of analgesia in children, is the lack of experience, confidence or competence in caring for sick and/or injured children, being a concern for nurses who care predominantly for adults. The authors defend as a potential solution the use of high fidelity simulation for the approach to pain, pediatric or adult, regarding its evaluation and administration of analgesia.

### 3.3 Non-pharmacological treatment of out-of-hospital emergency pain

Non-pharmacological treatment is a way to reduce pain without the use of drugs. Lourens, Hodkinson and Parker, [25] mention non-pharmacological actions for the adult, such as: i) dialogue with the patient, ii) offer orientation (presentation of the professional, orientation in time and space, description of the occurrence), iii) adequately position the patients on the transport stretchers, iv) offer thermal comfort, v) replace urine and feces containment diapers, vi) stimulate breathing exercises, vii) provide a comfortable environment, viii) relieve the pressure on the skin, ix) give emotional support with clarifications, x) perform relaxation and distraction teachings and techniques, xi) offer verbal comfort, answering your questions. These techniques, however, have been little used in OHE perhaps because of the urgency to relieve pain in these situations.

According to Silveira, et al., [20] the development and demonstration of these skills, leads the patient to feel that the nurse really knows how to understand his pain, thus contributing and promoting his well-being.

In addition to the intrinsic value of improving the comfort of PCS, pain relief brings with it a variety of physiological advantages. The body responds to pain through various physiological processes interconnected through the sympathetic nervous system, neuroendocrine and immune systems, but also through emotions. [34] Inadequate pain relief increases catecholamines causing tachycardia, besides increasing blood pressure and myocardial oxygen consumption. Consequently, ventricular dysfunction and myocardial ischemia may occur. Acute pain also induces the production of hormones such as cortisol and glucagon, which increase the risks of developing immune resistance to insulin with consequent hyperglycemia. These changes can worsen the clinical picture of PCS. [25]

### 3.4 Pharmacological treatment of pain in an out-of-hospital emergency adult

According to the selected guidelines, there are five guidelines that refer to the performance of the nurse, in the management of pain in an out-of-hospital emergency, since the existing means contemplate the presence of this professional in the emergency means. Note that five of the guidelines are applied by paramedics. Although they are different professional areas, both respect the legal guidelines that the countries of origin identify as necessary for the

correct approach to the victim in an out-of-hospital context, in the treatment of pain in an out-of-hospital emergency. There are several drugs that are in the out-of-hospital emergency settings, and in this assessment were taken into consideration the common drugs in all guidelines, such as: i) paracetamol, ii) tramadol, iii) morphine, iv) fentanyl, v) ketamine. Given the particularity of guideline 1, metoclopramide was also included. The protocols for therapeutic administration are modified in these guidelines based on the severity of the pain.

**Table 2:** Recommendations for Treatment of Adult Pain in Out-of-hospital Emergencies

Guideline	Severity of pain	Paracetamol	Tramadol and metoclopramide	Morphine	Fentanyl	Ketamine
1 - Procedimento Ambulância SIV (Sedação e Analgesia) Versão 3.0 [10]	Light	1000mg oral				
	Moderate	1000 mg oral	Tramadol 50 mg + metoclopramide 0,2mg/kg (perfusion in 15 minutes) to NRS = 6			
	Severe		Tramadol 100 mg + metoclopramide 0,2mg/kg (perfusion in 15 minutes) to NRS = 7	0,05mg/Kg a 0,1mg/Kg EV every 3 minutes until NRS decrease 3 points		
2 – Protocolo de Analgesia SIV Açores (versão 2.1) [11]	Light	Non-pharmacological strategies + Paracetamol 1000mg oral.				
	Moderate	1000mg EV				
	Severe			2mg EV (Repeat every 5 minutes until NRS < 4) Administer metoclopramide 10mg EV, if nausea or vomit.		
3 – Cyprus Ambulance Service [12]	Light to Moderate	1000 mg oral or IV for moderate pain. (maximum dose of 4000mg in 24 hours).				
	Severe			<65 years - 5mg EV every 10 minutes (maximum dose 20mg) >= 65 years old - 2,5mg EV every 10 minutes (maximum dose of 10mg)		
4 - Netherlands Association for Emergency Nurses Guideline [13]	Light	1000 mg EV (Perfusion in 5 minutes) or 1000 mg oral				
	Moderated to Severe	1000 mg IV (perfusion in 5 minutes), titrated to NRS <4			1-2 µg/kg every 3 minutes (titrating the therapeutic effect)	In case of hypovolemia or shock 0.25 mg/kg IV + Midazolam 1 mg IV
5 - Smärtbehandling allmänt [14]	Moderated to Severe	1000 mg oral		2.5mg EV, every 5 minutes, up to EVA/NRS <3	(Alternative) 50 µg/ml, 2ml intranasal, half the dose may be repeated after 15 minutes	(Complement) 10mg/ml, 0.025ml/kg, EV - Has its own table.
6 - Ambulance Victoria Clinical Practice Guideline [15]	Light	1000 mg oral; 500 mg if weight is <60 kg or liver disease				
	Moderate			Up to 5 mg IV, titrated for pain relief every 5 minutes (re-evaluate after 20 mg).	Up to 50 µg EV, titrated for pain relief every 5 minutes.	
	Severe			Up to 5 mg IV, titrated	Up to 50 µg EV,	10-20 mg EV at

				for pain relief every 5 minutes (re-evaluate after 20 mg) <b>OR</b> 10 mg IM, (repeat 5 mg IM after 15 minutes).	titrated for pain relief every 5 minutes.	intervals of 5 to 10 minutes; For severe pain 20-30 mg IV at 2 minute intervals.
7 - Clinical Practice Guideline of Pre-Hospital Emergency Care Council [16]	Light	1000 mg oral				
	Moderate	1000 mg oral				
	Severe	1000 mg EV		4 mg IV, (repeat 2 mg for pain relief up to a maximum dose of 16 mg every 2 minutes)	100 µg intranasal or 50 µg EV (repeat intranasal only once after 10 minutes if necessary)	0.1 mg/kg EV (repeat only once after 10 minutes if necessary)
8 - Italian Intersociety Recommendations on pain management in the emergency setting [17]	Light	1000 mg oral				
	Moderate	1000 mg oral				
	Severe			4-6 mg IV; 2-3 mg IV for victims aged > 65 years and/or unstable victims	50-100 µg EV	
9 - UK National Institute for Health and Care Excellence guideline [18]	Moderated to Severe			1st line treatment (No reference to dosage)		2nd line treatment (No reference to dosage)
10 - Douglas County Fire/EMS (Emergency Medical Services) Guideline [19]	Moderated to Severe			2-4 mg EV/IM (titrated to a maximum dose of 10 mg every 10 minutes)	25 µg EV slowly <b>OR</b> 2 µg/kg. Intranasal, (titrated to relieve pain up to a maximum dose of 100 µg every 10 minutes)	

Light pain is considered to be less than 4 on a pain scale of 0 to 10. From the analysis of table 2, seven guidelines have proposed protocols for the treatment of mild pain in out-of-hospital emergency. Based on the data paracetamol 1000mg orally, is the treatment for the patient with mild pain. One guideline recommends that if the weight is less than 60 kg and liver disease, the dose of paracetamol should be halved. Moderate pain is considered for a severity between 4 and 6 on a pain scale of 0 to 10. Ten guidelines have proposed protocols for the treatment of moderate pain in an out-of-hospital emergency. Based on the data, five guidelines guide the treatment of moderate pain mainly by administration of morphine and fentanyl. However, guideline 1 recommends that in addition to the administration of 1000mg of paracetamol orally, tramadol and metoclopramide should also be used in case of moderate pain in OHE. This is the only guideline that uses the tramadol associated with metoclopramide for the treatment of moderate pain. On the other hand, three guidelines (2, 7 and 8) recommend the administration of 1000mg of paracetamol, orally. Two others (4 and 5) complement the treatment with the administration of ketamine, where one of them justifies its use in case the patient is hypovolemic or in shock, complementing with midazolam (1mg) for pain relief (guideline 4).

Guideline 4 advises as first line the administration of paracetamol 1000mg EV, followed by fentanyl. In out-of-hospital emergency there is no use of morphine for the treatment of moderate pain. Guideline 9 advises the use of morphine as first line treatment and second line ketamine, with no reference to dosage and/or route of administration. Severe pain is considered for a severity higher than 6 on a pain scale of 0 to 10. Ten guidelines have proposed protocols for the treatment of severe pain in an out-of-hospital

emergency. Based on the data, morphine is the drug present in all guidelines for the treatment of out-of-hospital emergency pain. However, there is some controversy. A guideline (1) places morphine in the second treatment line, giving relevance to tramadol in association with metoclopramide, increased to tramadol dosage. Guidelines 1, 2, and 3 are the only guidelines that do not use fentanyl for the treatment of severe pain in an out-of-hospital emergency. Guideline 2 advises the use of morphine for the treatment of severe pain, making no mention of the maximum recommended dose, making reference only to the objective of achieving an NRS < 4. There is also indication, in case of vomiting nausea, to administer intravenous (IV) metoclopramide 10mg. Guideline 3 recommends the use of morphine for the treatment of severe pain, making reference to the dosage of administration and maximum dosage, according to the age of the patient.

Guideline 5 recommends the use of paracetamol 1000mg, orally, associated with morphine and fentanyl, complemented with ketamine. Five guidelines recommend the association of ketamine with established treatment. Guideline 4 suggests the use of ketamine, associated with midazolam (1mg, IV) and paracetamol (1000mg, IV). This guideline does not advise the use of morphine.

**3.5 Pharmacological treatment of pain in children in out-of-hospital emergency**

Analyzing table 3, pain management was taken into consideration in 9 of the 10 guidelines. In this evaluation the drugs were taken, which all guidelines had in common, being: i) paracetamol, ii) tramadol, iii) morphine, iv) fentanyl, v) ketamine. Given the particularity of guideline 1, metoclopramide was also included.

**Table 3:** Recommendations for Pain Treatment in Children in Out-of-Hospital Emergency

Guideline	Severity of pain	Paracetamol	Tramadol and metoclopramide	Morphine	Fentanyl	Ketamine
1 - Procedimento Ambulância SIV (Sedação e Analgesia) [10]	Light	125mg rectal for children 1-6 years. 250mg rectal for children 6-12 years. 500mg oral for children >= 12 years				
	Moderate	<1 anos – 125mg rectal	1-6 years - 1mg/Kg Tramadol EV in 15 minutes; 6-12 years - 1mg/Kg + Metoclopramide 0.2mg/Kg in 15 minutes; >= 12 years - Tramadol 50mg + metoclopramide 10mg EV in 15 minutes <b>OR</b> 1-12 years - Tramadol 1 mg/kg IM; >= 12 years - Tramadol 50mg IM	0.05mg/Kg EV slow (Re-evaluate every 5 minutes). While NRS does not decrease 3 points - 0.1mg/Kg or 5mg (If nausea or vomit - metoclopramide 0.2mg/Kg EV slow)		
	Severe	<1 ano – 125mg rectal	1-6 years - 2mg/Kg Tramadol EV in 15 minutes; 6-12 years - 2mg/Kg + Metoclopramide 0.2mg/Kg in 20 minutes; >= 12 years - Tramadol 100mg + metoclopramide 10mg EV in 20 minutes. <b>OR</b> 1-12 years - Tramadol 2 mg/kg IM; >= 12 years - Tramadol 100mg IM	0.05mg/Kg EV slow (Re-evaluate every 5 minutes). While NRS does not decrease 3 points - 0.1mg/Kg or 10mg (If nausea or vomit - metoclopramide 0.2mg/Kg EV slow)		
2 – Protocolo de Analgesia SIV Açores (versão 2.1) [11]	Light	< 1 year - 125mg rectal 1-5 years - 250mg rectal 6-12 years - 500mg orally				
	Moderate	6-12 anos – 500mg EV.				
3 - Cyprus Ambulance Service [12]	Light to Moderate	>= 1 month 15mg/kg (single dose) Repeat dose after 4 hours.				
	Severe			1-7 anos – 0,1mg/kg (Repetir dosagem a cada 5-10 minutos até diminuição da dor para nível tolerável – dose máxima total 0,2mg/kg)		
4 - Netherlands Association for Emergency Nurses Guideline [13]	Light	20mg/Kg EV up to 1000mg in 15 minutes. 4-6Kg - 120mg rectal; 6-12Kg - 240mg rectal; 12-25Kg - 500mg rectal/oral >25Kg - 1000mg rectal/oral				
	Moderated to Severe				50 µg/ml = 5 µg/0,1 ml intranasal 10Kg: 20 µg –0,4ml 15Kg: 30 µg –0,6ml	

					20Kg: 40 µg -0,8ml 25Kg: 50 µg -1ml 30Kg: 60 µg -1,2ml 35Kg: 70 µg -1,4ml	
5 - Smärtbehandling allmänt [14]	Moderated to Severe	10-15 Kg - 125mg rectal; 15-25 Kg - 250mg rectal; 25-40 Kg - 250mg rectal; >40Kg - 1000mg rectal <b>OR</b> 15-25 Kg - 250mg oral; 25-40 Kg - 500mg oral; >40kg - 1000mg oral		1 mg/ml, EV/IO (holder at 5-minute intervals until patient has EVA / NRS ≤3) Maximum dose of 0,1 ml/kg 5kg - 0,5ml; 10Kg - 1ml; 15Kg - 1,5ml; 20Kg - 2ml; 25Kg - 2,5ml; 30Kg - 3ml; 40Kg - 4ml; ≥50Kg - 5ml.	50 µg / ml intranasally (Can be repeated in half of the dose after at least 15 minutes). 5Kg - 0,15ml 10Kg - 0,3 ml 20Kg - 0,6ml 30Kg - 0,9ml 40Kg - 1,2ml 50Kg - 1,5ml	(Complement) 0.25mg/Kg 10Kg - 0,25 ml 20Kg - 0,5ml 30Kg - 0,75ml 40Kg - 1ml 50Kg - 1,25ml (Midazolam can be associated)
6 - Ambulance Victoria Clinical Practice Guideline [15]	Light	15 mg/kg por via oral				
	Moderate	15 mg/kg oral			25 µg intranasal for children 10-24 kg. 25 to 50 µg intranasal for children from 18 to 39 kg. (Repeat 3 doses, if necessary - Re-evaluate after 3 doses)	
	Severe			0.05 to 0.1 mg / kg IV, titrate to relieve pain up to a maximum dose of 0.2 mg / kg every 5-10 minutes	25 µg intranasal for children 10-24 kg. 25 to 50 mg intranasal for child 18 to 39 kg. (Repeat 3 doses, if necessary - Re-evaluate after 3 doses)	If Traumatic Pain Persists 0.25 mg/kg EV at intervals of 5 to 10 minutes (maximum 0.5 mg/kg)
7 - Clinical Practice Guideline of Pre-Hospital Emergency Care Council [16]	Light	20 mg/kg oral				
	Moderate	20 mg/kg oral				
	Severe			0.3 mg/kg PO, for age ≥ 1 year (repeat 0.1 mg/kg to relieve pain up to a maximum dose of 0.1 mg/kg IV every 2 minutes)	1.5 µg/kg Intranasal, for age ≥ 1 year, (repeat Intranasal only once after 10 minutes, if necessary)	0.1 mg/kg EV, (repeat only once after 10 minutes if necessary)
8 - Italian Intersociety Recommendations on pain management in the emergency setting [17]	Light	10-15 mg/kg oral				
	Moderate	15 mg/kg IV				
	Severe			0,05-0,1 mg/kg	1-2 µg/kg	
10 - Douglas County Fire/EMS (Emergency Medical Services) Guideline [19]	Moderated to Severe				1-2 µg/kg EV / IO slowly or 1-2 µg/kg EN (Holder for pain relief up to a maximum dose of 100 µg every 10 minutes)	

Six guidelines suggest the use of fentanyl via IV, intranasal (IN) or intraosseous (IO). In addition, six guidelines proposed the use of paracetamol via the rectal or oral route. There are six guidelines that refer to morphine as a treatment option. Three guidelines recommend intranasal ketamine for moderate pain control.

The protocols for therapeutic administration are modified in these guidelines based on the severity of the pain.

Seven guidelines have proposed instructions for the treatment of mild pain in children in an out-of-hospital emergency. In general, the administration of paracetamol

according to weight or age is unanimous in the management of pain in children with mild pain.

Nine guidelines proposed instructions for the treatment of moderate pain in children in out-of-hospital emergency. One of the guidelines (2) guides the treatment of moderate pain in children aged 6-12 years. For moderate pain in children aged 1-5 years or <1 year, no mention is made. Two guidelines suggest the use of morphine. Four guidelines suggest the use of fentanyl via IV, IN or IO. Seven guidelines proposed the use of paracetamol. One guideline (1) recommends the use of tramadol associated with metoclopramide according to age



for moderate pain control. On the other hand, guideline 5 proposes the use of ketamine as a complement.

Nine guidelines provide instructions for the treatment of severe pain in children in an out-of-hospital emergency. With the exception of guideline 1, which opts for first-line treatment of severe pain the use of paracetamol, associated with tramadol with metoclopramide, and guideline 3 which recommends the use of morphine as the only treatment, all the others opt for first-line treatment of morphine and fentanyl.

Six guidelines suggest morphine as a treatment option. Two guidelines recommend the use of fentanyl as first-line treatment, without mention of morphine. Six guidelines recommend the use of fentanyl, administered via IV, IN or IO. Three guidelines suggest the use of IV ketamine, as a complement and/or when there is associated trauma, which does not respond to opioids.

Guideline 2 does not specify whether the administration of morphine is applicable to the Adult or also to the child. Due to the absence of this information, without correspondence with age and weight, it was chosen to exclude this analysis in the aforementioned guideline, in the case of the treatment of severe pain in children.

#### 4. Discussion

This integrative review addressed the existing evidence on the conceptualization of pain in OHE, its underestimated and underanalyzed approach, the barriers in its evaluation, the guidelines for non-pharmacological treatment and, finally, evaluated guidelines and protocols for pharmacological treatment.

The selected guidelines provided data based on age groups (adults and children) and pain severity (mild, moderate and severe). Most of them recommend the use of paracetamol as the drug of choice for the treatment of mild pain in adults and children. In case of moderate to severe pain in an out-of-hospital emergency, the use of morphine and fentanyl is recommended as first-line treatment, with the exception of a guideline. Even for the treatment of pain in children fentanyl is the most recommended. However, there are three guidelines where fentanyl, unlike all other guidelines, is not part of the OHE pain treatment protocol, either in adults or children, and these guidelines are applied in OHE media provided by nurses.

Some guidelines mention ketamine as an alternative treatment, although it is not described as first-line. This drug is mentioned as an alternative to fentanyl in case of a hypovolemic patient. Ketamine is generally not recommended for use in the treatment of OHE pain.

Regarding levels of evidence, with the exception of three guidelines, the rest support the use of fentanyl and morphine in the treatment of pain. In the treatment of mild pain the use of opioids was not mentioned.

Most guidelines have provided specific protocols for the treatment of pain. Only in case of shock or hypovolemia is the association of other drugs suggested.

#### 5. Conclusion

The use of OHE teams activation is related to pain. Thus, the correct management of pain when approaching the victim has an impact on the levels of satisfaction and well-being of the victim.

Out-of-hospital emergency nurses need to assess victims for pain, using validated and appropriate tools. These professionals have pharmacological and non-pharmacological measures at their disposal to provide excellent care to the victim of pain. In this sense, it becomes essential to be familiar with the guidelines and protocols available, in order to intervene correctly according to the barriers to pain management at the time of approach and during the intervention, acting through the correct indications, taking into account contraindications, risk factors, dosages and potential reversal agents. Nurses in OHE should be sensitized to use non-pharmacological modalities for the treatment of pain. It was also identified that pain in OHE is undervalued in most cases, either by lack of knowledge of the teams regarding analgesic drugs, or by lack of knowledge of the action protocol and barriers in the process of pain management.

Given the pharmacological treatment, based on the results obtained, most guidelines recommend paracetamol for the treatment of mild pains in children and adults. For moderate and severe pain control, fentanyl and morphine are suggested drugs for adults and children. The use of fentanyl for the treatment of severe pain in children, with the exception of two guidelines, is the one chosen. Thus, the use of paracetamol for the treatment of mild pain and the use of opioids for the treatment of moderate to severe pain in an out-of-hospital emergency are considered according to the best evidence.

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