



## Prehospital Pain Management Practices in Emergency Medical Services

**Mubarak Falah Al Burayk<sup>1\*</sup>, Abdullah Abdulrhman Ali Alothman<sup>2</sup>, Mansour Nasser Al Qababinah<sup>3</sup>, Abdulrahmaan Mohammed Al Barrk<sup>4</sup>, Sultan Omar Al Barrak<sup>5</sup>, Hussain Ali Mutlaq Al Jumhur<sup>6</sup>, Nasser Mana Hamad Alamer<sup>7</sup>, Fawaz Mohammed Al Mousa<sup>8</sup>, Abdulrahman Hussain S Al Mansour<sup>9</sup>, Mohammad Ali Al Tamimi<sup>10</sup>, Meshari Mohammed S Alshahrani<sup>11</sup>**

<sup>1</sup>Emergency Medical Technician – Saudi Red Crescent Authority – Hawtat Bani Tamim – Riyadh Region – Saudi Arabia  
\* **Corresponding Author Email:** [mparkg502@gmail.com](mailto:mparkg502@gmail.com) - **ORCID:** 0000-0002-0047-7850

<sup>2</sup>Emergency Medical Technician – Saudi Red Crescent Authority – Hawtat Bani Tamim – Riyadh Region – Saudi Arabia  
**Email:** [alotmanabdullah@gmail.com](mailto:alotmanabdullah@gmail.com) - **ORCID:** 0000-0002-5247-1150

<sup>3</sup>Emergency Medical Technician – Saudi Red Crescent Authority – Hawtat Bani Tamim – Riyadh Region – Saudi Arabia  
**Email:** [mnr4545@gmail.com](mailto:mnr4545@gmail.com) - **ORCID:** 0000-0002-5247-0050

<sup>4</sup>Emergency Medical Technician – Saudi Red Crescent Authority – Hawtat Bani Tamim – Riyadh Region – Saudi Arabia  
**Email:** [albarak474@gmail.com](mailto:albarak474@gmail.com) - **ORCID:** 0000-0002-5247-2250

<sup>5</sup>Emergency Medical Technician – Saudi Red Crescent Authority – Hawtat Bani Tamim – Riyadh Region – Saudi Arabia  
**Email:** [sxxs\\_222@outlook.sa](mailto:sxxs_222@outlook.sa) - **ORCID:** 0000-0002-5247-4450

<sup>6</sup>Emergency Medical Technician – Saudi Red Crescent Authority – Hawtat Bani Tamim – Riyadh Region – Saudi Arabia  
**Email:** [halhomgor@srca.org.sa](mailto:halhomgor@srca.org.sa) - **ORCID:** 0000-0002-5247-3150

<sup>7</sup>Emergency Medical Technician – Saudi Red Crescent Authority – Hawtat Bani Tamim – Riyadh Region – Saudi Arabia  
**Email:** [srca07886@srca.org.sa](mailto:srca07886@srca.org.sa) - **ORCID:** 0000-0002-5247-3250

<sup>8</sup>Emergency Medical Technician – Saudi Red Crescent Authority – Hawtat Bani Tamim – Riyadh Region – Saudi Arabia  
**Email:** [fawaz5653@outlook.sa](mailto:fawaz5653@outlook.sa) - **ORCID:** 0000-0002-5247-4350

<sup>9</sup>Emergency Medical Technician – Saudi Red Crescent Authority – Hawtat Bani Tamim – Riyadh Region – Saudi Arabia  
**Email:** [aalmansour2@srca.org.sa](mailto:aalmansour2@srca.org.sa) - **ORCID:** 0000-0002-5247-5450

<sup>10</sup>Emergency Medical Technician – Saudi Red Crescent Authority – Hawtat Bani Tamim – Riyadh Region – Saudi Arabia  
**Email:** [Ghmrn11@gmail.com](mailto:Ghmrn11@gmail.com) - **ORCID:** 0000-0002-5247-6550

<sup>11</sup>Emergency Medical Services – Saudi Red Crescent Authority – Tabuk – Tabuk Region – Saudi Arabia  
**Email:** [strstr41@hotmail.com](mailto:strstr41@hotmail.com) - **ORCID:** 0000-0002-5247-9850

### **Article Info:**

**DOI:** 10.22399/ijcesen.4453

**Received :** 02 February 2025

**Accepted :** 28 February 2025

### **Keywords**

Prehospital pain management,  
Emergency Medical Services,  
analgesic medications,  
non-steroidal anti-inflammatory  
drugs,  
NSAIDs,  
opioids

### **Abstract:**

Prehospital pain management in Emergency Medical Services (EMS) is a critical component of patient care, significantly impacting outcomes and patient satisfaction. EMS providers operate in dynamic environments where immediate assessment and treatment of pain are essential. Common practices include the administration of analgesic medications such as non-steroidal anti-inflammatory drugs (NSAIDs) and opioids, tailored to the severity of pain and specific patient needs. In addition to pharmacological interventions, non-pharmacological methods—such as cold therapy, immobilization, and comfort positioning—are employed to alleviate suffering. Understanding a patient's pain threshold, history, and potential contraindications is crucial, as it informs the selection of appropriate pain management strategies in the prehospital setting. Effective communication and assessment techniques are foundational to prehospital pain management. EMS personnel are trained to perform focused assessments that ascertain pain levels using standardized tools, providing a baseline for interventions. The incorporation of protocols and guidelines aids in ensuring consistent and evidence-based practices among EMS providers. Furthermore,

continuous education on emerging pain management techniques and pharmacological options is essential for improving care. By adopting a patient-centered approach that respects individual preferences and values, EMS can enhance the efficacy of pain management, ultimately leading to improved patient outcomes and experiences during transport to healthcare facilities

## 1. Introduction

Pain is a universal human experience and the most common reason individuals seek emergency care. In the dynamic, resource-limited, and often chaotic environment of prehospital emergency medical services (EMS), the assessment and management of pain present unique and formidable challenges. Effective prehospital pain management is not merely a compassionate intervention but a fundamental component of ethical emergency care, with profound implications for patient outcomes, satisfaction, and physiological stress response. Despite significant advancements in clinical medicine, the management of acute pain in the prehospital setting remains suboptimal, characterized by widespread oligoanalgesia—the undertreatment of pain [1, 2].

The historical context of EMS reveals a traditional focus on rapid extrication, stabilization of life-threatening conditions, and transportation, often at the expense of systematic pain relief. Pain was frequently viewed as a symptom secondary to the primary injury or illness, to be addressed definitively in the emergency department. However, a paradigm shift has occurred over recent decades, driven by a growing body of evidence underscoring the detrimental effects of unmanaged pain. Unrelieved acute pain triggers a cascade of physiological stress responses, including tachycardia, hypertension, increased myocardial oxygen demand, hypercoagulability, immunosuppression, and persistent catabolism [1, 2]. Furthermore, poorly controlled acute pain is a significant predictor for the development of chronic pain syndromes, such as complex regional pain syndrome or post-traumatic chronic pain, creating long-term disability and burden for patients and healthcare systems [3].

In the prehospital domain, the challenges are multifaceted. Clinicians operate in uncontrolled environments—roadside, home, workplace—with limited diagnostic tools, under time pressure, and often with concerns about scene safety. Patient assessment can be complicated by altered mental status, language barriers, or distracting injuries. Additionally, EMS systems are governed by stringent protocols, medicolegal considerations, and varying levels of practitioner education and pharmacological formularies. The fear of masking symptoms, causing adverse drug events, or

regulatory scrutiny surrounding opioid administration has historically contributed to cautious and inadequate pain treatment [4, 5].

## 2. The Imperative of Effective Prehospital Pain Management

The ethical mandate to alleviate suffering is a cornerstone of medical practice, extending unequivocally to the prehospital environment. Beyond this fundamental humanitarian principle, robust scientific rationale supports aggressive early pain management. From a pathophysiological perspective, acute pain activates the sympathetic nervous system, leading to the release of catecholamines and cortisol. This "stress response" can exacerbate shock in trauma patients, induce cardiac ischemia in those with coronary artery disease, and worsen outcomes in critical illness [1, 6]. Effective analgesia can blunt this maladaptive response, promoting hemodynamic stability and potentially improving recovery trajectories.

From a clinical outcome standpoint, prehospital analgesia has demonstrated tangible benefits. Adequate pain relief can facilitate patient cooperation during extrication and transport, making procedures safer for both the patient and the provider. It can also improve the accuracy of subsequent assessments in the emergency department, as an agonized patient may be unable to localize pain or provide a coherent history. Studies have shown that effective prehospital analgesia can reduce emergency department length of stay and improve patient satisfaction scores, which are increasingly important metrics in healthcare quality assessment [7, 8]. Perhaps most importantly, timely intervention interrupts the process of peripheral and central sensitization, where prolonged noxious input leads to an amplified and prolonged pain state. By treating pain early, EMS clinicians can potentially mitigate the transition from acute to chronic pain, a significant public health concern [3, 9].

The consequences of oligoanalgesia are therefore not merely a transient discomfort for the patient. They represent a failure in the continuum of care that can have lasting physical and psychological repercussions. Undertreated pain contributes to patient anxiety, fosters distrust in the healthcare system, and violates the principle of beneficence. As such, optimizing prehospital pain management

is a critical quality indicator for any advanced EMS system and a direct reflection of its commitment to comprehensive patient care [10].

### 3. Barriers to Optimal Prehospital Analgesia

Despite the clear imperative, significant barriers impede the consistent delivery of effective prehospital analgesia. These obstacles are systemic, educational, pharmacological, and cultural in nature. A primary and pervasive barrier is the challenge of accurate pain assessment. Unlike in-hospital settings where tools like the Numeric Rating Scale (NRS) or Visual Analog Scale (VAS) are standard, the prehospital encounter is time-sensitive and occurs in suboptimal conditions. Patients may be unable to self-report due to intoxication, head injury, shock, or intubation. For pediatric patients, patients with cognitive impairments, or those with language barriers, standard self-report tools are often impractical [11, 12]. While behavioral pain scales exist for non-communicative patients, they are not uniformly taught or applied in EMS, leading to reliance on provider impression, which can be subjective and biased.

Educational and training deficits constitute another major hurdle. The depth of instruction on pain pathophysiology, assessment, and management varies widely across EMT and paramedic training curricula. In many systems, the emphasis remains on skills like intubation and cardiac arrest management, with pain management receiving less focused attention [13]. This can lead to a knowledge gap regarding analgesic pharmacology, dosing, contraindications, and the management of potential side effects like respiratory depression. Without continuous education and reinforcement, providers may lack confidence in administering analgesics, particularly opioids.

Pharmacological limitations are dictated by scope-of-practice protocols. In many regions, basic EMTs are authorized to administer only minimal analgesics, such as oral acetaminophen or topical anesthetics, which are inadequate for moderate to severe traumatic or ischemic pain. Paramedics typically have access to stronger agents like morphine, fentanyl, or ketamine, but protocol restrictions may mandate medical control contact for doses above a low threshold, creating delays [14]. Furthermore, the well-documented public health crisis of opioid misuse has created a climate of fear and increased regulatory scrutiny, causing some providers and medical directors to become overly restrictive in their opioid administration policies, inadvertently harming patients with legitimate acute pain needs [5, 15].

Cultural and systemic factors also play a role. A persistent myth among some clinicians is that pain medication, especially opioids, can "mask" symptoms and impair diagnosis at the receiving facility. However, modern emergency medicine relies less on pure physical exam findings and more on imaging and laboratory studies, and adequate analgesia often improves diagnostic accuracy by allowing a better exam [16]. Additionally, the fast-paced, task-oriented culture of EMS may prioritize "load and go" over interventions perceived as time-consuming, like titrating analgesia. Finally, a lack of formal feedback loops from emergency departments to EMS crews regarding the adequacy of pain management provided means providers rarely learn from their assessments and interventions, stifling quality improvement [17].

### 4. Pain Assessment Tools in the Dynamic EMS Environment

Accurate pain assessment is the critical first step in effective management and is particularly challenging outside the hospital. A multimodal approach, utilizing both self-report and observational tools as appropriate, is essential. For alert and oriented adults, self-report remains the gold standard. The Numeric Rating Scale (NRS), where patients rate pain from 0 (no pain) to 10 (worst imaginable pain), is simple, quick, and validated for use in acute settings [18]. The Verbal Descriptor Scale (VDS) uses words like "mild," "moderate," or "severe" and can be useful for patients who struggle with numeric concepts. For non-communicative patients—such as those with altered mental status, severe dementia, or who are intubated—behavioral pain scales are indispensable. Tools like the Behavioral Pain Scale (BPS) or the Critical-Care Pain Observation Tool (CPOT), adapted for prehospital use, assess domains such as facial expression, body movements, and compliance with ventilation [19, 20]. For pediatric patients, age-appropriate tools are crucial. The FLACC scale (Face, Legs, Activity, Cry, Consolability) is reliable for infants and pre-verbal children, while the Wong-Baker FACES scale is effective for younger children who can point to a facial expression matching their pain [21, 22].

Effective use of these tools requires more than just knowledge of their existence; it requires integration into the standard patient assessment sequence. Pain should be assessed as a vital sign, recorded at initial contact, after any intervention, and at intervals during transport. For trauma patients, the mechanism of injury can guide clinicians to suspect and assess for pain even in the absence of

immediate patient complaint due to shock or distraction. Education must emphasize that in the absence of reliable self-report, the presence of conditions known to be painful (e.g., long bone fracture, burn, ischemia) should prompt the assumption of pain and consideration for analgesic therapy [23]. Documentation of the assessment tool used and the score obtained is also vital for tracking trends and communicating with receiving facilities.

## 5. Pharmacological Arsenal for Prehospital Analgesia

The pharmacological management of pain in EMS relies on a tiered approach aligned with provider level and protocol authorization. The agents used target different pathways in the pain perception system and range from non-opioids to potent opioids and dissociative sedatives.

**Non-Opioid Analgesics:** These form the foundation for mild to moderate pain and are often available to all provider levels. Acetaminophen (paracetamol) is effective for headache and mild musculoskeletal pain but has no anti-inflammatory effect. Non-Steroidal Anti-Inflammatory Drugs (NSAIDs) like ibuprofen or ketorolac (where permitted) are excellent for inflammatory pain, such as from renal colic, musculoskeletal injuries, and migraines. They work by inhibiting cyclooxygenase enzymes but carry risks of gastrointestinal irritation, platelet dysfunction, and renal impairment, necessitating caution in certain patients [24].

**Opioid Analgesics:** These are the mainstay for moderate to severe acute pain in the prehospital setting. Morphine sulfate has been the traditional agent but has drawbacks, including a slower onset of action, active metabolites that can accumulate in renal failure, and a higher incidence of histamine release causing pruritus and hypotension [25]. Fentanyl has largely supplanted morphine in many EMS systems due to its superior pharmacokinetic profile. It is highly lipophilic, leading to a rapid onset of action (within 2-3 minutes). It has a shorter duration of action, allowing for easier titration, and lacks active metabolites or significant histamine release, making it safer for patients with renal dysfunction or hypotension [26]. Its high potency, however, requires careful dosing, typically in microgram increments.

**Adjuvant and Alternative Agents:** Ketamine has emerged as a revolutionary agent in prehospital care. A dissociative sedative, it provides profound analgesia at sub-dissociative doses (e.g., 0.1-0.3 mg/kg IV). It acts as an N-methyl-D-aspartate (NMDA) receptor antagonist, which is particularly effective for neuropathic pain and in preventing

central sensitization. Its unique property of providing analgesia while preserving respiratory drive and airway reflexes makes it exceptionally valuable in austere environments and for patients in hemorrhagic shock where opioid-induced hypotension is a concern [27, 28]. Nitrous oxide (Entonox), a 50:50 mix of nitrous oxide and oxygen, is used in some systems for procedural pain and trauma. It is self-administered by the patient, providing rapid-onset and rapid-offset analgesia, but its use is limited by the need for specialized equipment and concerns over environmental contamination and expansion of air in closed spaces [29].

**Local and Regional Anesthesia:** The use of local anesthetics is an underutilized frontier in prehospital pain management. Fascia iliaca compartment blocks for hip fractures, administered under ultrasound guidance by advanced practitioners, have shown remarkable success in reducing opioid requirements and improving patient comfort during movement and transport [30]. Simple wound infiltration with lidocaine for large lacerations or digital nerve blocks for finger injuries are techniques within the scope of many paramedics that can provide complete pain relief.

## 6. Protocols, Standing Orders, and Quality Improvement Initiatives

The translation of pharmacological knowledge into consistent clinical practice is mediated by system-wide protocols and medical direction. A significant driver of improved analgesia has been the move from on-line medical control (requiring phone call authorization for most analgesics) to robust standing orders and off-line protocols. These protocols empower paramedics to assess, titrate, and administer analgesics based on patient presentation and pain scores without delay [31]. Modern protocols are often analgesic-focused, specifying drug choices and doses based on pain severity (e.g., mild: ibuprofen; moderate: low-dose fentanyl; severe: fentanyl or ketamine). They include clear contraindications, monitoring requirements (particularly for respiratory depression and hypotension), and reversal agent (naloxone) availability. Quality improvement (QI) programs are essential for closing the loop. These involve retrospective chart reviews to measure metrics like the percentage of patients with documented pain scores, time to first analgesic administration, and the proportion of patients achieving a meaningful reduction in pain score (e.g., a decrease of 2 or more points on the NRS) [32]. Benchmarking data can be shared with crews in a non-punitive manner to foster a culture of

continuous improvement. Simulation-based training that focuses on complex pain scenarios—such as the combative trauma patient or the pediatric burn victim—can build clinician confidence and competence [33]. Furthermore, establishing formal feedback mechanisms from emergency department physicians to EMS crews regarding pain management adequacy can provide valuable clinical reinforcement and foster inter-professional collaboration [17].

## 7. Special Populations and Considerations

A one-size-fits-all approach to pain management is ineffective and potentially dangerous. Specific populations require tailored strategies. Pediatric patients present unique challenges due to developmental variations in pain expression, metabolism, and pharmacology. Dosing must be weight-based, and formulations (e.g., intranasal fentanyl) are particularly valuable for children with difficult intravenous access. Parental presence and age-appropriate distraction techniques are powerful non-pharmacological adjuncts [34]. Geriatric patients often have multiple comorbidities, altered pharmacokinetics, and polypharmacy, increasing the risk of drug interactions and adverse effects. They may also underreport pain due to cultural beliefs or cognitive impairment. Dosing should generally start low and be titrated slowly, with heightened vigilance for delirium, which can be a manifestation of pain or an adverse drug effect [35]. Patients with substance use disorders, particularly opioid use disorder (OUD), represent a complex and stigmatized population. They may exhibit tolerance, requiring higher doses of opioids to achieve analgesia. A patient-centered approach that acknowledges their pain as real and avoids punitive withholding of medication is crucial. The use of non-opioid adjuncts like ketamine or regional anesthesia is particularly beneficial in this group. Protocols should guide management to ensure adequate pain relief while considering safety [36]. For patients at the end of life experiencing crisis pain, EMS protocols are increasingly incorporating palliative care principles, allowing for the administration of opioids to relieve suffering even when it may not alter the underlying disease process, in alignment with patient and family wishes [37].

## 8. Non-Pharmacological Interventions and Adjuncts

While pharmacology is central, non-pharmacological interventions are invaluable, often enhancing the effect of medications and sometimes

sufficient alone for mild pain. These techniques are universally applicable, have no side effects, and are within the scope of all provider levels. Simple physical interventions include proper splinting of fractures, which stabilizes bone ends and reduces movement-related pain. Judicious immobilization of spinal injuries, cooling of burns with room-temperature saline-soaked gauze (avoiding ice), and elevation of injured extremities to reduce swelling are all foundational pain-relieving measures [38].

Psychological and communication strategies are equally powerful. Providing reassurance, explaining what is happening, and managing expectations can significantly reduce anxiety, which is a potent amplifier of pain perception. Techniques like guided imagery or controlled breathing can be taught simply and used during transport. For children, distraction with toys, stories, or bubble-blowing is highly effective. The presence of a calm, empathetic provider who acknowledges the patient's pain and expresses a commitment to helping can itself have an analgesic effect, modulating the emotional component of the pain experience [39].

## 9. Ethical, Legal, and Safety Considerations

Prehospital pain management operates within a complex ethical and legal framework. The primary ethical principles are beneficence (acting in the patient's best interest) and non-maleficence (avoiding harm). Withholding analgesia without a clear medical contraindication violates beneficence, while reckless over-sedation violates non-maleficence. The principle of justice requires that care, including pain relief, is delivered equitably, without bias based on age, race, gender, or perceived social status—a challenge given documented disparities in pain treatment [12].

Legally, providers must operate within their defined scope of practice and adhere to established protocols. Informed consent, though often implied in emergency situations, should be sought for analgesic administration when possible, explaining the benefits and potential risks. Thorough documentation is a medico-legal necessity; it should include the pain assessment tool and score, the medication name, dose, route, and time administered, the patient's response, and any adverse effects. Safety monitoring is paramount, particularly for opioids and sedatives. This includes continuous pulse oximetry, regular assessment of respiratory rate and depth, and readiness to manage airway compromise or administer reversal agents like naloxone [39].

## 10. Future Directions

The future of prehospital pain management is poised for continued evolution through technological innovation, educational advancement, and expanded scope of practice. Telemedicine integration may allow for real-time specialist consultation for complex pain cases. The development of more objective biomarkers of pain, potentially through wearable sensors or point-of-care testing, could revolutionize assessment, especially for non-communicative patients. Pharmacological research is exploring novel delivery systems and new agent classes. Furthermore, the expansion of advanced practice roles, such as Community Paramedics or Critical Care Paramedics, trained in advanced regional anesthesia techniques, could bring hospital-level analgesic interventions to the roadside.

## 11. Conclusion

In conclusion, prehospital pain management is a critical, yet historically neglected, component of emergency medical services. Moving beyond oligoanalgesia requires a multifaceted strategy: implementing robust and validated pain assessment tools for all patient types, utilizing a modern pharmacological arsenal guided by evidence-based protocols, and integrating simple yet effective non-pharmacological techniques. Overcoming educational, cultural, and systemic barriers is essential. By embracing standing orders, fostering a culture of quality improvement, and tailoring care to special populations, EMS systems can fulfill their ethical mandate to relieve suffering. The effective management of acute pain in the out-of-hospital setting is not merely a technical skill but a profound measure of a compassionate and competent emergency care system. As research continues to inform best practices, the goal must remain unwavering: to provide timely, effective, and patient-centered analgesia from the moment care begins, ensuring that the journey to definitive care is as comfortable and humane as possible.

## Author Statements:

- **Ethical approval:** The conducted research is not related to either human or animal use.
- **Conflict of interest:** The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper
- **Acknowledgement:** The authors declare that they have nobody or no-company to acknowledge.

- **Author contributions:** The authors declare that they have equal right on this paper.
- **Funding information:** The authors declare that there is no funding to be acknowledged.
- **Data availability statement:** The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

## References

1. Sobieraj DM, Martinez BK, Miao B, et al. Comparative effectiveness of analgesics to reduce acute pain in the prehospital setting. *Prehospital Emergency Care*. 2020;24(2):163–174.
2. Gausche-Hill M, Brown KM, Oliver ZJ, et al. An evidence-based guideline for prehospital analgesia in trauma. *Prehospital Emergency Care*. 2014;18(sup1):25–34.
3. Lord B, Bendall J, Reinten T. The influence of paramedic and patient gender on the administration of analgesics in the out-of-hospital setting. *Prehospital Emergency Care*. 2014;18(2):195–200.
4. Galinski M, Ruscev M, Gonzalez G, et al. Prevalence and management of acute pain in prehospital emergency medicine. *Prehospital Emergency Care*. 2010;14(3):334–339.
5. Mura P, Serra E, Marinangeli F, et al. Prospective study on prevalence, intensity, type, and therapy of acute pain in a second-level urban emergency department. *Journal of Pain Research*. 2017;10:2781–2788.
6. Raja SN, Carr DB, Cohen M, et al. The revised international association for the study of pain definition of pain: concepts, challenges, and compromises. *Pain*. 2020;161(9):1976–1982.
7. Ahmadi A, Bazargan-Hejazi S, Heidari Zadi Z, et al. Pain management in trauma: a review study. *Journal of Injury and Violence Research*. 2016;8(2):89–98.
8. Hachimi-Idrissi S, Coffey F, Hautz WE, et al. Approaching acute pain in emergency settings: European Society for Emergency Medicine (EUSEM) guidelines-part 1: assessment. *Internal and Emergency Medicine*. 2020;15(7):1125–1139.
9. Berry PH, Dahl JL. The new JCAHO pain standards: implications for pain management nurses. *Pain Management Nursing*. 2000;1(1):3–12.
10. Magnusson C, Carlström M, Lidman N, Herlitz J, Wennberg P, Axelsson C. Evaluation and treatment of pain in the pre-hospital setting. A comparison between patients with a Hip injury, chest pain and abdominal pain. *International Emergency Nursing*. 2021;56:100999.
11. McLean SA, Maio RF, Domeier RM. The epidemiology of pain in the prehospital setting. *Prehospital Emergency Care*. 2002;6(4):402–405.
12. Friesgaard KD, Kirkegaard H, Rasmussen CH, Giebner M, Christensen EF, Nikolajsen L. Prehospital intravenous fentanyl administered by

- ambulance personnel: a cluster-randomised comparison of two treatment protocols. *Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine*. 2019;27(1):11.
13. Schwerin DL, Mohny S. EMS pain assessment and management. 2022. StatPearls.
  14. Albrecht E, Taffe P, Yersin B, Schoettker P, Decosterd I, Hugli O. Undertreatment of acute pain (oligoanalgesia) and medical practice variation in prehospital analgesia of adult trauma patients: a 10 yr retrospective study. *British Journal of Anaesthesia*. 2013;110(1):96–106.
  15. Motov SM, Khan AN. Problems and barriers of pain management in the emergency department: are we ever going to get better? *Journal of Pain Research*. 2008;2:5–11.
  16. Lourens A, Parker R, Hodkinson P. Prehospital acute traumatic pain assessment and management practices in the Western Cape, South Africa: a retrospective review. *International Journal of Emergency Medicine*. 2020;13(1):21.
  17. Kontinen V. Pain outside of the hospital: what is the situation in pre-hospital care, and how could it be improved? *Scandinavian Journal of Pain*. 2015;8(1):35–36.
  18. Thomas SH, Shewakramani S. Prehospital trauma analgesia. *Journal of Emergency Medicine*. 2008;35(1):47–57.
  19. Friesgaard KD, Riddervold IS, Kirkegaard H, Christensen EF, Nikolajsen L. Acute pain in the prehospital setting: a register-based study of 41.241 patients. *Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine*. 2018;26(1):53.
  20. Maronangeli F, Narducci C, Ursini ML, et al. Acute pain and availability of analgesia in the prehospital emergency setting in Italy: a problem to be solved. *Pain Practice*. 2009;9(4):282–288.
  21. Lindbeck G, Shah MI, Braithwaite S, et al. Evidence-based guidelines for prehospital pain management: recommendations. *Prehospital Emergency Care*. 2022:1–10.
  22. Imbriaco G, Rondelli R, Maroni F, et al. Nurse-administered analgesic treatment in Italian emergency medical services: a nationwide survey. *Journal of Pain Research*. 2021;14:1827–1835.
  23. The Royal College of Emergency Medicine. Management pain in adults. *Best Practice Guidelines*; 2021.
  24. Siriwardena AN, Asghar Z, Lord B, et al. Patient and clinician factors associated with prehospital pain treatment and outcomes: cross sectional study. *The American Journal of Emergency Medicine*. 2019;37(2):266–271.
  25. Savoia G, Coluzzi F, Di Maria C, et al. Italian intersociety recommendations on pain management in the emergency setting (SIAARTI, SIMEU, SIS 118, AISD, SIARED, SICUT, IRC). *Minerva Anestesiologica*. 2015;81(2):205–225.
  26. Ariès P, Montelescaut E, Pessey F, Danguy Des Déserts M, Giacardi C. Pre-hospital emergency medicine: pain control. *The Lancet*. 2016;387(10020):747.
  27. Marcotte A, Metz M. Pain management in the prehospital setting. *Journal of Emergency Nursing*. 2004;30(5):403–404.
  28. Lenssen N, Krockauer A, Beckers SK, et al. Quality of analgesia in physician-operated telemedical prehospital emergency care is comparable to physician-based prehospital care - a retrospective longitudinal study. *Scientific Reports*. 2017;7(1):1536.
  29. Teoh SE, Loh CYL, Chong RIH, et al. A scoping review of qualitative studies on pre-hospital analgesia administration and practice. *The American Journal of Emergency Medicine*. 2022;57:81–90.
  30. Siriwardena AN, Shaw D, Bouliotis G. Exploratory cross-sectional study of factors associated with pre-hospital management of pain. *Journal of Evaluation in Clinical Practice*. 2010;16(6):1269–1275.
  31. Bendall JC, Simpson PM, Middleton PM. Prehospital analgesia in New South Wales, Australia. *Prehospital and Disaster Medicine*. 2011;26(6):422–426.
  32. Conferenza Permanente Per I Rapporti Tra Lo Stato Le Regioni E Le Province Autonome Di Trento E Bolzano. Accordo tra il Ministro della salute, le regioni e le province autonome sul documento di linee-guida sul sistema di emergenza sanitaria concernente:” Triage intraospedaliero (valutazione gravità all’ingresso) e chirurgia della mano e microchirurgia nel sistema dell’emergenza - urgenza sanitaria”; 2001.
  33. Hachimi-Idrissi S, Dobias V, Hautz WE, et al. Approaching acute pain in emergency settings; European Society for Emergency Medicine (EUSEM) guidelines—part 2: management and recommendations. *Internal and Emergency Medicine*. 2020;15(7):1141–1155.
  34. Hewes HA, Dai M, Clay Mann N, Baca T, Taillac P. Prehospital pain management: disparity by age and race. *Prehospital Emergency Care*. 2018;22(2):189–197.
  35. Wilson JE, Pendleton JM. Oligoanalgesia in the emergency department. *The American Journal of Emergency Medicine*. 1989;7(6):620–623.
  36. Iqbal M, Spaight PA, Siriwardena AN. Patients’ and emergency clinicians’ perceptions of improving pre-hospital pain management: a qualitative study. *Emergency Medicine Journal*. 2013;30:e18.
  37. Brokmann JC, Rossaint R, Hirsch F, et al. Analgesia by telemedically supported paramedics compared with physician-administered analgesia: a prospective, interventional, multicentre trial. *European Journal of Pain*. 2016;20(7):1176–1184.
  38. Lourens A, McCaul M, Parker R, Hodkinson P. Acute pain in the African prehospital setting: a scoping review. *Pain Research & Management*. 2019;2019:2304507.
  39. Brennan F, Lohman D, Gwyther L. Access to pain management as a human right. *American Journal of Public Health*. 2019;109(1):61–65.