PAIN MANAGEMENT STRATEGIES IN EMERGENCY CARE SETTINGS: SIMPLE REVIEW

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Abstract:

Background: Effective pain management in emergency departments is crucial for ensuring patient comfort and satisfaction. However, assessing and treating pain in this setting can be complex due to the multidimensional nature of pain and the need for standardized measurement tools. Various pharmacological and non-pharmacological interventions are available for acute pain relief, but their efficacy and impact on patient outcomes need to be evaluated. **Objective:** This review aims to assess current pain management practices in emergency departments, identify effective interventions for acute pain relief, evaluate their impact on patient outcomes and satisfaction levels, and provide recommendations for improving pain management strategies based on research findings. **Conclusion:** The review highlights the importance of standardized pain assessment tools in emergency care settings and the use of appropriate pharmacological interventions such as morphine, fentanyl, ketorolac, ibuprofen, and paracetamol. Regional blocks like femoral, hematoma, Beir, axillary, and occipital blocks are also discussed as effective pain management strategies. Inadequately managed acute pain can lead to various consequences, emphasizing the need for safe, timely, and effective trauma pain management protocols in emergency settings. Addressing barriers to pain management, such as delayed assessments and hesitancy in opioid use, is crucial for improving patient care in emergency departments.

Keywords: Pain management, Emergency care, emergency, analgesia, anesthesia, health administration

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Introduction:

Pain represents a predominant concern among patients seeking medical attention at hospitals, constituting nearly 80% of the reasons for referrals to the emergency department (ED) [1]. Effective pain management in the ED serves as a crucial quality-of-care metric and can serve as an indicator of the standard of care provided in such settings [2]. Various factors, including but not limited to ethnicity, age, gender, communication abilities, underlying health conditions, physician awareness, and concerns about potential complications, can impede the adequate control of pain in patients. It is imperative that pain relief measures are promptly initiated without undue delays while awaiting diagnostic test results and other clinical investigations. The primary approach to alleviating pain involves the administration of systemic analgesic medications like opioids or nonsteroidal anti-inflammatory drugs (NSAIDs) [3]. The selection and delivery of pain management regimens should aim not only to address different types of pain experienced by the patient but also to minimize adverse effects and avoid interactions with other medications [4].

Research indicates that patients whose primary pain is effectively managed and treated in the ED tend to report higher levels of satisfaction with the healthcare services provided by the hospital [5]. However, there exists a widespread consensus regarding the inadequate treatment of pain in ED settings [6]. Consequently, familiarizing emergency medicine physicians (EMPs) with diverse analgesic methods and pain management strategies enables them to offer a range of pain relief options to alleviate discomfort and enhance the quality of care delivered [7].

Current guidelines emphasize the necessity of ensuring appropriate and efficient pain management for all individuals experiencing pain, beginning from prehospital emergency care; the primary goal is to alleviate pain, preserve functionality, and minimize adverse effects [8]. The adoption of standardized protocols is encouraged, with each protocol in emergency settings encompassing: an initial evaluation of pain presence and intensity using validated assessment tools, both pharmacological and non-pharmacological interventions for pain relief along with their respective indications and contraindications, routine monitoring and reassessment of pain following analgesic administration, and the transmission of pertinent information to hospital staff. Furthermore, patients should receive additional doses of analgesics if pain persists. The criteria for administering analgesic therapy are contingent on various factors, primarily the operational structure of the emergency care service [9].

Objectives:

The main objectives of this review are:

1. To evaluate the current practices and protocols for pain management in emergency departments.
2. To identify the most effective pharmacological and non-pharmacological interventions for acute pain relief.
3. To assess the impact of pain management strategies on patient outcomes and satisfaction levels.
4. To provide recommendations for improving pain management practices in emergency care settings based on the findings of the research.

Pain Assessment:

Assessment of pain can be a complex procedure due to its multidimensional nature, making it challenging to accurately capture using a one-dimensional measurement scale. However, having a standardized measurement system is crucial for evaluating the efficacy of treatments and determining the need for additional medication without altering the original scale used for pain assessment. The scientific community advocates for the use of one-dimensional measurement scales that correlate pain intensity with appropriate treatment strategies.

In pediatric pain management, guidelines recommend employing specific algometric scales such as FLACC [10], Wong-Baker [11], and NRS [12], tailored to the child's age based on available literature. Treatment decisions, including the administration of analgesics, are typically guided by team protocols and triggered when the pain score exceeds 4. Evaluating acute trauma pain in patients can be challenging, considering factors like age, emotional state (e.g., anxiety, psychomotor discomfort), and changes in consciousness level.

For instance, in trauma cases, pain severity is categorized as mild to moderate if the NRS score falls between 1 and 3, and the patient responds well to paracetamol and/or NSAIDs. If the NRS score ranges from 4 to 6, the pain is considered moderate to severe, and treatment may involve mild opioids in addition to NSAIDs and paracetamol. Severe pain, with an NRS score of 7 to 10, typically necessitates treatment with strong opioids and NSAIDs [13].

Methods of pain control in emergency care sittings

Parenteral agents:

- **Morphine**

Morphine, being a prominent opioid agent, is widely utilized in hospital settings for managing extremity trauma and moderate to severe pain [14]. In the emergency department (ED), the current standard recommendation for acute pain management involves initiating treatment with a bolus dose of morphine, followed by gradual titration to achieve the desired level of analgesia. However, the use of morphine is associated with certain adverse effects such as sedation, nausea, hypothermia, and respiratory depression [15]. Due to these side effects, many emergency medical professionals (EMPs) tend to avoid administering high initial bolus doses of 7 to 10 mg of morphine, as evidenced by studies indicating that even 0.1 mg/kg of intravenous morphine may be insufficient for effective pain relief [16].

Nevertheless, research has demonstrated that morphine can be safely used at standard doses over extended periods in patients without severe complications. To prevent misuse and abuse, the preparation and administration of morphine in hospital settings are strictly regulated, potentially leading to delays in its utilization. Elsner et al. [17] found that while subcutaneous administration of morphine may take up to 24 minutes longer to achieve optimal analgesia compared to intravenous (IV) administration, there is no significant variance in the analgesic efficacy between these two methods. However, the advantage of not requiring IV access with subcutaneous administration makes this approach beneficial in certain scenarios [18].

- **Meperidine (Pethidine)**

In comparison to meperidine, another commonly used opioid in pain management for hospitalized patients, specialists generally recommend the use of morphine due to its lower toxicity and superior effectiveness [19]. Morphine is known to induce less nausea when administered parenterally than meperidine. Furthermore, reports have highlighted various complications associated with meperidine, particularly in young patients with normal renal function, even with cumulative dosing [20]. Although there is a belief that morphine may exacerbate spasticity in the Oddi sphincter compared to meperidine, there is no concrete evidence to contraindicate the use of morphine in conditions like acute pancreatitis and gallbladder disease. In fact, some experts, such as Thompson, propose that morphine could offer more advantages than meperidine, citing its prolonged analgesic effects and lower risk of seizures [21].

- **Fentanyl**

Fentanyl opioids, which are synthetic fat-soluble substances, have the capacity to persist in the body for up to 72 hours, contingent upon the method of administration [22]. Fentanyl, an opioid commonly utilized in the Emergency Department (ED), possesses an analgesic potency approximately 100 times greater than morphine. Intravenous (IV) fentanyl exhibits a quicker onset of action in comparison to IV morphine, although its half-life is shorter, lasting only around 30–60 minutes, necessitating repeated dosages for extended pain control [23]. Research by Parental et al. indicated that IV fentanyl did not significantly differ in its ability to alleviate pain and side effects when compared to IV morphine. Investigations have revealed that employing fentanyl-based titration protocols in the ED can enhance pain relief without escalating adverse reactions, making it a viable substitute for IV morphine. Furthermore, studies have demonstrated that most patients prefer fentanyl over morphine due to its lower incidence of gastrointestinal issues, particularly constipation [24].

In theory, the administration of IV opioids as opposed to the intranasal (IN) route should result in a faster onset of action by approximately 5 minutes due to differences in drug absorption mechanisms. However, certain studies have shown that the analgesic efficacy of IV morphine does not significantly vary from that of IN fentanyl [25]. Owing to the unique bioavailability characteristics of IN fentanyl and its bypassing of the liver without undergoing first-pass metabolism, this medication can achieve therapeutic blood levels within 2 minutes. Moreover, as there is no requirement for IV access, the intranasal delivery of fentanyl may be a preferable choice over IV morphine in certain circumstances [26].

- **Hydromorphone**

In a study conducted by Chang et al., it was discovered that Ethyl Morphine Prodrug (EMPs), which is a semi-synthetic opioid closely resembling morphine in its chemical structure [27], exhibits a preference for hydromorphone over morphine for pain management. This preference is attributed to the heightened efficacy of hydromorphone, leading to its administration at lower doses, potentially creating a misconception among physicians regarding the quantity of opiate prescribed to the patient. Moreover, a recent Cochrane review highlighted the positive impact of hydromorphone on acute pain relief, with findings from 32 studies supporting its effectiveness [28].

• Ketorolac

Ketorolac injections are widely utilized as an injectable analgesic in the United States and Europe due to their potent pain-relieving properties [29]. When it comes to managing acute pain, ketorolac demonstrates a similar analgesic efficacy to injectable opioids like morphine and pethidine. Key advantages of ketorolac over opioids include the absence of respiratory depression, lack of dependence, and prolonged relief effects. Additionally, ketorolac and opioids exhibit synergistic effects when administered together, potentially reducing the required opioid dosage. Research suggests that while there may not be a significant difference in pain control between morphine and ketorolac individually, their concurrent use can decrease the need for additional therapy, with fewer complications observed in the ketorolac combined with morphine group [30]. Studies, such as the Victor study, have highlighted the significant pain relief provided by ketorolac and pethidine, with ketorolac demonstrating a shorter recovery time to normal activities post-administration.

• Ibuprofen

Many medical professionals consider ketorolac to possess greater analgesic efficacy among NSAIDs compared to oral ibuprofen [31]. However, a review of literature indicates that oral ibuprofen yields a similar analgesic effect to parenterally administered ketorolac. While ketorolac has been associated with increased bleeding following certain surgical procedures like post-tonsillectomy, a Cochrane review suggests that NSAIDs do not significantly contribute to bleeding incidence [32]. Research by Moss et al. has demonstrated that injected ibuprofen not only reduces the need for opioids but also minimizes complications such as nausea. Unlike opioids and paracetamol, ibuprofen exhibits anti-inflammatory properties that can help mitigate inflammatory processes and alleviate pain, particularly following invasive procedures. This makes ibuprofen a valuable analgesic option, especially in pediatric patients where opioid use may entail higher risks and complications [33].

• Paracetamol

Paracetamol is another viable option for pain management in emergency departments, offering fewer side effects compared to opioids and NSAIDs at therapeutic doses [34]. Studies have indicated that injectable paracetamol can deliver comparable analgesic effects to injectable NSAIDs in emergency settings, as well as to morphine in procedures like wisdom tooth extraction. It is commonly used post-orthopedic surgeries and has shown efficacy similar to injected morphine in treating renal colic. Paracetamol can also be beneficial in reducing pain post-heart surgery when compared to tramadol infusion. Its accessibility and cost-effectiveness make it a favorable alternative to opioids. Combining paracetamol with NSAIDs has been found to enhance analgesic effects compared to NSAIDs used alone [35,36].

Regional blocks:

• Femoral block

In the elderly population with femoral bone fractures, utilizing a nerve branch blockade for analgesia has been shown to significantly decrease the necessity for opioid consumption. This analgesic approach, particularly when performed under ultrasound guidance, is relatively straightforward and is associated with fewer complications. Moreover, this method of analgesia could be highly beneficial in challenging scenarios such as combat or disaster settings due to its requirement for a low medication dosage [37].

• Hematoma block

Distal radial fracture stands out as the most prevalent upper limb fracture among both children and adults. Experiencing substantial pain during manual reduction, alongside patient distress and discomfort, can diminish the success of the intervention [38]. Strategies involving drug administration to alleviate pain during reduction encompass the use of short-acting benzodiazepines or propofol with or without opioids. Nonetheless, each of these medications carries its own set of side effects and limitations. Recent controlled trials have demonstrated that direct injection of analgesics into the fracture site, known as hematoma block, can offer a quicker and relatively less complex method. These trials have indicated that hematoma blocks can significantly impact the manual reduction of distal radial fractures, presenting fewer risks compared to systemic analgesics, enhanced cost-effectiveness, and reduced time required to achieve analgesia for interventions [39].

• Beir block

The utilization of intravenous regional anesthesia (IVRA) represents a simple, dependable, and cost-effective approach for local anesthesia during short-term limb procedures. Chan et al. have noted that this method is more advantageous and cost-effective when contrasted with general anesthesia [40]. Nevertheless, certain studies have highlighted the drawbacks associated with IVRA's analgesic effects. These drawbacks include topical anesthetic

toxicity, delayed onset of sensory and motor block, inadequate muscle relaxation, tourniquet-related discomfort, short-lived analgesia post-procedure, as well as risks of arrhythmia, cardiac arrest in the event of human error, potential neurological damage, and compartment syndrome [41].

• Axillary block

To minimize opioid utilization, various peripheral nerve block techniques are employed during upper limb procedures. The Infraclavicular Brachial Plexus Block (ISB) emerges as the most prevalent method for this purpose, as it can yield effective analgesia lasting 6 to 12 hours [42]. However, this method is associated with a 100% risk of diaphragm paralysis and is therefore contraindicated in patients with underlying respiratory issues. Furthermore, this approach can lead to undesired unilateral numbness and motor weakness. Price suggested supra-scapular nerve blocks (SSNB) and axillary nerve blocks (ANB) as alternatives to ISB. Nevertheless, studies by Pitombo et al. and Dhir et al. have demonstrated the superior efficacy of the ISB method over SSNB. Checcucci et al. have indicated that ANB can be an effective means of achieving analgesia, but combining ANB with SSNB results in greater efficacy and patient satisfaction, with potentially fewer side effects than systemic analgesics when administered correctly [43].

• Occipital block

Research indicates that both large and small occipital nerve blocks can provide temporary relief from headaches [44]. Currently, the most effective treatment for cervicogenic headaches involves blocking pain transmission through the greater occipital nerve (GON) and lesser occipital nerves (LON). A study by Naja et al. revealed that analgesia via GON and LON blocks significantly reduced the need for medication usage and systemic complications like nausea, vomiting, decreased appetite, and recurring pain [45]. In a study by Ashkenazi and Young, GON block analgesia resulted in 89.5% migraine relief in patients, with a high reported efficacy in addressing allodynia at 100%. The success of this method in alleviating cluster headaches and drug-resistant cluster headaches has also been documented in various studies [46].

Consequences of inadequately managed pain:

The enduring repercussions of poorly managed acute pain are believed to be manifold and severe, both in the short and long term. These consequences encompass an elevated risk of infection, diminished comfort, and progression to chronic pain syndrome, a particularly debilitating condition with significant economic and social implications [47]. Inadequate pain management not only impacts the patient but also the entire Emergency Department (ED) environment, as healthcare providers are tasked with managing increasingly severe pain, leading to resource implications. There appears to be an unmet need for safe, timely, and effective trauma pain management in the emergency setting. However, barriers to effective pain management in the ED persist, largely due to the absence of comprehensive national guidelines for pain management, delayed or absent pain assessments, hesitancy in employing opioid analgesia, and delays in administering analgesics [48].

Conclusion:

In conclusion, this research article delves into the complexities of pain management in emergency departments, emphasizing the importance of standardized measurement scales for accurate assessment. Various pharmacological and non-pharmacological interventions, including parenteral agents like morphine, meperidine, fentanyl, hydromorphone, ketorolac, ibuprofen, and paracetamol, are discussed in detail. Regional blocks such as femoral block, hematoma block, Beir block, axillary block, and occipital block are also explored as effective pain control methods. The article highlights the need for improved pain management practices in emergency care settings to enhance patient outcomes and satisfaction levels. Addressing inadequately managed acute pain is crucial to prevent complications and ensure optimal patient care in emergency departments.

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