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Pain Management Strategies in Emergency Care: Paramedic vs. Nurse Approaches

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Abstract

Paramedics and nurses operate in a range of emergency care settings in which relieving pain and treating shock serve as the primary therapeutic aims. Both groups undertake comprehensive assessments to identify underlying causes and then administer appropriate interventions. Paramedics use cognitive behavioural techniques, such as distraction and imagery, to reduce pain perception and frequently apply physical approaches—immobilization, splinting, and therapeutic cold—when managing musculoskeletal injuries. Unless restricted by complex regional analgesia protocols, they administer both opioid analgesics—fentanyl and morphine—and non-opioids—paracetamol and NSAIDs—with dosages guided by physiological variables. Nurses, similarly, combine physical, cognitive, and pharmacological interventions—both opioids and non-opioids—to alleviate acute pain. Although many paramedics adopt oral, rectal, and inhalation routes, intravenous administration remains the preferred method. Both disciplines utilize numerical rating scales and categorical measurements to quantify pain; however, qualitative tools and age-specific charts are less prevalent among paramedics, who often rely on non-verbal manifestations, physiological signs, and clinical judgment (Koral & Szyller, 2022). Effective communication and clinical protocols facilitate interprofessional collaboration in optimizing patient comfort. Emergency nurses in prehospital environments share the responsibility of providing analgesia tailored to the individual's circumstances (Iqbal et al., 2013).

Keywords:

Emergency care, Pain management, Paramedics, Nurses, Pain assessment, Pharmacological methods, Non-pharmacological methods, Patient communication

1. Introduction to Pain Management

Pain is defined as an unpleasant, sensory and emotional experience associated with actual or potential tissue damage (C. French et al., 2013). The space around pain includes not only the physical sensation but also the associated cognitive and behavioural aspects. Pain management may therefore be viewed as the sum of the principles, processes, and techniques

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used to alleviate or reduce the level and perceptual impact of these unpleasant sensations and to enhance a person's quality of life (Iqbal et al., 2013). Pain management is available in every step of emergency care, both in prehospital and in hospital settings. Paramedics play a key role in managing pain during prehospital care through knowledge and observation, the use of effective communication, and by applying appropriate pharmacological and nonpharmacological techniques. Nurses are the predominant professionals working within hospital emergency settings and their approach to pain management is similarly based on observation, communication, and pharmacological and nonpharmacological techniques; a comparative overview of paramedic versus nurse approaches is therefore appropriate.

2. Overview of Emergency Care Settings

Emergency care settings are defined as environments where healthcare professionals are involved in the evaluation, stabilization, management, and disposition of patients who are acutely unwell or injured (C. French et al., 2013). Paramedics operate within local, regional, and state ambulance services, as well as aeromedical and retrieval services across urban, regional, and remote locations, and provide primary and secondary inter-hospital transfers, predominantly for emergency cases (Iqbal et al., 2013). Nurses work in hospital emergency departments, including various sub-specialties like major trauma, forensic medicine, and acute care services, assessing and managing a broad range of patients from minor injuries to those requiring immediate advanced trauma or cardiovascular intervention (Koral & Szyller, 2022). Each setting presents unique environmental and operational challenges and opportunities, influencing the specific pain management strategies employed. Given the broad influences on pain management practices across professions and settings, this report focuses on the paramedic and emergency nurse context.

3. Role of Paramedics in Pain Management

The initial assessment and management of pain must begin in the prehospital setting. Knowledge of pain assessment, documentation, and both pharmacologic and non-pharmacologic pain management is essential for paramedics (C. French et al., 2013). Pain is frequently encountered in this setting, and its treatment ranks among the paramedic's priorities (Koral & Szyller, 2022). Prehospital emergency clinicians are confronted with a diverse range of acute pain scenarios and must exercise considerable interpretive skill, clinical acumen, and diagnostic judgment (Iqbal et al., 2013).

Paramedics work in close conjunction with the emergency departments of hospitals and must apply a combination of pharmacological and non-pharmacological approaches to effectively relieve patients' pain and suffering and promote a swift and safe recovery. Frequent direct engagement with patients and family encourages the broader application of cognitive behavioural measures. Paramedics empower, encourage, attract, bolster, exploit, amplify,

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expand, and motivate confidence in the patient's intrinsic potential to manage pain autonomously and react more positively to medical interventions.

While paramedics possess a recognized set of cognitive behavioural methods, they apply a wider spectrum of strategies and have greater confrontational latitude compared to nurses. Pre-hospital pain management can be enhanced through increased drug options and development of multi-organizational pain management protocols with appropriate staff training in emergency medical services, ambulance, and emergency department. A 2001 quality improvement project demonstrated that educational intervention significantly improved paramedics' understanding of pain and their provision of both pharmacological and non-pharmacological field-management techniques; as a result, a local Standard Operating Procedure was adopted enabling paramedics to manage pain without prior medical control approval.

3.1. Assessment Techniques

The assessment of pain is an essential function common to the work of both paramedics and nurses. As is to be expected, there is considerable overlap between how these groups undertake this activity, but also important differences. For paramedics, a primary focus of assessment is the mechanism of the injury and the anticipated sources of pain. Chief complaints are recorded and a thorough history is taken.

A structured approach to pain assessment helps to identify the sources of the pain, its nature and severity, and the repercussions of the case on the patient's quality of life (C. French et al., 2013). Both paramedics and nurses see the use of a numerical rating tool as the primary method for defining the severity of the pain; additional instruments are available that are tailored to the circumstances of the patient, with descriptors of the pain capable of providing a more nuanced outline, especially where implications for diagnosis may arise (Varndell et al., 2017).

The nurse's approach also emphasises the elements of mechanism of injury and a detailed description of the symptoms and characteristics of the pain episode. Rating methods are an integral part of the process and feature numerical and descriptive scales. Just as an understanding of the pattern of pain can assist paramedics in further defining the choices available for treatment and assessing the efficacy of the solution, nurses use information about intensity to formulate an effective strategy for the delivery of adequate care. When the patient serves as a reliable source of information and the nurse is able to observe the effects on the patient's functioning, a more effective classification of the pain is possible, which in turn supports the overall pain management plan.

The assessment protocols adopted by paramedics, for whom immediate on-scene treatment is often necessary, allow for a fuller consideration of the origins and nature of the pain. For

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nurses, especially those engaged in the care of critically ill patients, the emphasis is on agencies of pain management, which may be immediately pharmacological or non-pharmacological, supported by longitudinal monitoring of the patient's condition.

3.2. Pharmacological Interventions

Pharmacological approaches to pain management constitute the principal treatment modality for individuals experiencing pain (Scharonow et al., 2017). Paramedic practice encompasses the administration of opioids, ketamine, and adjunct medications across a spectrum of pain severities, while non-opioid formulations dominate nursing protocols (O'Connor et al., 2020). Dosage parameters are extensively delineated on the Nursing Interventions Classification (NIC) platform, informing clinical application.

Paramedic analgesic agents encompass morphine, fentanyl, paracetamol, ibuprofen, ketorolac, metamizole, aspirin, and ketamine (Koral & Szyller, 2022). Morphine functions as a morphinan class opioid targeting undisclosed acute or chronic pathologies. Fentanyl represents a synthetic opioid utilized for trauma-associated pain and, at elevated doses, therapeutic sedation. The preparation of fentanyl for intravenous administration involves dilution of the concentrate to a 10 micrograms/ml solution. Paracetamol, a nonspecific cyclooxygenase inhibitor, serves non-specific pain control and antipyretic functions. The nonsteroidal anti-inflammatory drugs (NSAIDs) — ibuprofen, ketorolac, aspirin, and metamizole — provide analgesic, anti-inflammatory, and antipyretic effects through the inhibition of the cyclooxygenase pathway. Ketamine, classified as an N-methyl-D-aspartate antagonist, facilitates rapid analgesia and anaesthesia alongside inducing amnesia.

Nursing pharmacological interventions predominantly involve paracetamol, NSAIDs (such as ibuprofen and diclofenac), nitrous oxide, opioids including morphine, oxycodone, and fentanyl, adjuvants like low-dose ketamine and subcutaneous lidocaine, and oral non-opioids.

3.3. Non-Pharmacological Approaches

Non-pharmacological approaches to pain management are fundamental aspects of patient care for both paramedics and nurses and involve therapeutic methods not reliant upon the administration of drugs or medication. Often termed physical or psychological approaches, these may include cognitive behavioural techniques and assistance with patient positioning. Non-pharmacological pain relief assists patients in coping with or alleviating their pain and sedation experience; such methods can be used independently or in conjunction with pharmacological strategies.

Psychosocial care falls within the remit of paramedics, who employ their communication expertise to manage pain and sedation-related patient distress, anxiety, and fear. Skills such as guided imagery and distraction also help to control nerves and anxiety. Procedures like splinting, non-invasive ventilation implemented by paramedics, and patient collaboration

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with breathing techniques enhance oxygen delivery and may improve pain and sedation levels.

4. Role of Nurses in Pain Management

Pain management covers healthcare techniques to relieve pain, whether chronic or acute, with the minimal effective pharmaceutical dose. Effective management, whether implemented by nurses or paramedics, can prevent adverse physical, emotional, and psychological effects and reduce long-term implications. Both paramedics and nurses operate in a range of environments; paramedics soon after injury and later within the emergency department, while nurses are principally emergency department practitioners.

Pain management is a major part of patient care for emergency practitioners. Low levels of patient satisfaction in this area indicate current management methods need altering. Paramedic and nurse capabilities to manage pain are similar, supported by guidelines aimed at optimal treatment. Adequate analgesia delivery directly correlates with patient satisfaction and pain management quality. Common deficits identified in both paramedics and nurses include pain assessment, communication, and cultural understanding. Proper pain evaluation demands basic training to ensure accurate diagnoses and treatment selection. A patient-centered approach supported by cultural awareness enhances management quality, limiting inter- and intraprofessional complaints and providing guidelines that reduce physical, emotional, and psychological pain. Evidence-based guidelines further assist healthcare practitioners in delivering appropriate care.

4.1. Assessment Techniques

Paramedics and nurses sometimes employ different approaches and often place a different emphasis on these techniques when assessing patients for pain. The procedure for assessment begins with determining an established rate of patient interaction. The more often paramedics or nurses have interacted with the patient previously, the greater the likelihood of observing related problems. Emergency Medical Dispatch Personnel use this procedure when answered by emergency responders and consistency is maintained throughout the emergency call. More approaches are of importance during this first step, such as the analysis of the current complaint in relation to past medical problems and the potential diagnosis of new problems caused by current complaints.

Further factors for assessment include evaluating the patient's capability to tolerate continuous treatment and the response of the patient towards pain management in recent events. This enables paramedics or nurses to determine the required level of care or requirement for admission to hospital when necessary. The limitations for assessment take into account a number of inadequate improvements in symptoms experienced by openly communicating patients. These limitations include difficulties where responses are evaluated

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but extended observation periods are not possible, leading to speculative determinations of responsiveness to care; failures to consider injuries indicating a physical cause of symptoms; and the potential for inaccurate assessments of sleeping patients where the standard procedure of waking the patient is not applied. The degree to which these limitations are considered is commonly an indication of professional capability held by the paramedic or nurse concerned (C. French et al., 2013) (Varndell et al., 2017).

4.2. Pharmacological Interventions

Paramedics and emergency nurses commonly use drugs such as oxygen, opioids, and simple analgesics to treat pain. National guidelines advise that only personnel trained in invasive techniques may administer ketamine; however, in regions with extended emergency medical technician-to-paramedic clearance times, paramedics often provide injections through intramuscular or subcutaneous routes (Scharonow et al., 2017). Simple analgesics and non-steroidal anti-inflammatory drugs are typically reserved for hospital settings due to concerns regarding unrecognized internal injuries and operative management, despite reports of patient requests for options beyond opioids (O'Connor et al., 2020). Both groups extensively incorporate non-pharmacological strategies, including relaxation methods, breathing control, reassurance, distraction, hypnotherapy, and psychological support, employing techniques such as cognitive behavioral therapy and physical modalities like cold application and transcutaneous electrical nerve stimulation to augment pain relief (Iqbal et al., 2013).

4.3. Non-Pharmacological Approaches

Non-pharmacological treatments are typically implemented in conjunction with drug therapy in both nursing and paramedic protocols to enhance pain relief and minimize opiate dosage (C. French et al., 2013). Prominent management strategies include cognitive behavioral techniques—distraction, relaxation, guided imagery—and physical modalities such as ice packs or cold therapy.

In prehospital settings, paramedics focus on mitigating pain related to extrication and transit, often prioritizing opioid administration for analgesia (O'Connor et al., 2020). Non-pharmacological adjuncts complement these interventions but are less extensively described. Concurrently, upon hospital arrival, nurses address transition-associated pain requiring rapid and routine management, with frequent recourse to narcotic medications. Similar non-pharmacological strategies augment nurses' pharmacotherapy, particularly when opiate-related adverse effects or contraindications preclude narcotic use (Iqbal et al., 2013).

Minimizing pain intensity through combined approaches offers the additional benefit of reducing the doses necessary to achieve analgesia. Both professions endeavour to balance effective relief with the attendant risks of addiction and side effects that accompany opioid therapy. An inter-professional perspective underscores a shared commitment to tailored

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analgesia, with paramedics managing both acute transport-associated and interfacility-transfer pain, while nursing maintains vigilance over onset, duration, and fluctuations that influence patient comfort and require dynamic adjustment of therapy.

5. Comparative Analysis of Pain Assessment Tools

Epidemiological data show that inadequate pain management is one of the main causes of patient dissatisfaction with the nursing care provided in the Emergency Department (ED) (Domenico Giusti et al., 2018). Nurses and paramedics are involved in the assessment of patient pain and play a key role in its management. Effective management of pain in the emergency setting can positively influence the prevention of trauma-related complications, limit the onset of anxiety and fear, and generally improve patient satisfaction.

Pain is a subjective experience related to the person and cannot be measured objectively; therefore, interpretation of the phenomenon involves both dimensions of the phenomenon, interpretation and action. Ultimately, the understanding and management of pain are complex processes and can be highly susceptible to bias.

Paramedics working on the scene or during transport of the patient can only estimate the patient's pain intensity. They generally use the Verbal Numerical Rating Scale (VNRS) or Face, Legs, Activity, Cry, and Consolability (FLACC) scale; the former can be used only if the patient is conscious, and the latter can also be used with uncooperative or unconscious patients. Nurses working in Emergency Departments may have the better opportunity to assess patient's pain intensity, using both numerical and non-numerical assessment tools. The Visual Analogue Scale (VAS), VNRS, and Faces Pain Scale (FPS) are the most commonly used in practice; the Behavioral Pain Scale (BPS) and Critical Care Pain Observation Tool (CPOT) may be used also with uncooperative patients.

6. Pharmacological Approaches: A Comparative Study

Emergency care often involves paramedics and nurses, among others, who play a vital role in managing acute and chronic pain associated with accidental trauma, physical injuries, cancer, chronic infections, chronic conditions, and other causes. Strategies for pain management optimize the patient's comfort and ensure maximal functioning through the prevention, diagnosis, treatment, or relief of a painful condition. Both paramedics and nurses have devoted considerable attention to pain management (O'Connor et al., 2020) (Iqbal et al., 2013). The two groups emphasize pharmacological approaches to pain management – including the use of analgesics and maintenance of the analgesic at regular intervals – as well as non-pharmacological techniques such as cognitive behavioural methods. Here we examine the pharmacological approaches preferred by paramedics and those favoured by nurses where the two groups work in comparable emergency care environments. We explore the types of

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medication used, the choice of drug for a given level or type of pain or underlying health condition, the amount administered, and the method of dispensing medication.

6.1. Common Medications Used

A study assessing Dutch EMS staff's use of analgesia protocols found that pain medications were applied in 42% of trauma cases, with opioids used in 3% (Iqbal et al., 2013). Patients reported varying pain levels, with 7% experiencing moderate to severe pain. Similar studies show that about 20% of EMS patients report moderate to severe pain, with 17% receiving opioids. In a French population, 48% reported acute pain, and 73% of these received analgesics, often a combination of drugs (O'Connor et al., 2020). Most common drugs included fentanyl, morphine, ketoprofen, metamizole, and paracetamol, with opioids prescribed more frequently for severe pain and cardiac conditions. The use of nonopioid drugs, especially fentanyl and morphine, aligns with good pain management practices. Analgesic agents are used appropriately based on pain severity and diagnosis, with combinations like fentanyl and metamizole being common and considered significant for synergistic effects (Koral & Szyller, 2022).

Some providers expressed concern over giving non-steroidal medications to patients who may require operative management or have internal hemorrhage. The concerns include the belief that non-opiates are less effective and take longer to work. Initiating non-opiate pain management immediately in EMS can lead to a shorter ED stay and allows patients to operate machinery and return to activity sooner. Patients who receive effective non-opiate pain relief in the field are less likely to expect opiates in the ED. Non-opiates also enable pain management for patients who cannot receive opiates.

Availability of analgesics depended on ambulance personnel's training and guidelines. Inhaled Entonox®, intravenous morphine, and oral drugs like acetaminophen were common. Paramedics found Entonox easy and quick to use, but ED clinicians preferred longer-acting drugs upon hospital arrival. Morphine was considered most effective for pain and anxiolytic use, often given preemptively during transport. Paramedics chose drugs based on the cause of pain—for example, Entonox® for fractures and morphine for cardiac pain—and adjusted for travel time and road conditions. Patients often self-medicated before ambulance arrival; ineffective self-treatment led to calling help. Non-analgesic medications like glyceryl trinitrate also helped with pain. Some paramedics believed patients were confused about morphine's effects, fearing addiction or severe reactions. There was frustration over limited drug options, forcing reliance on basic pain relief or waiting for specialized staff.

6.2. Dosage and Administration Differences

Paramedics often demonstrate proficiency in managing moderate to severe acute and chronic pain through intravenous titration, frequently employing morphine. They remain cautious

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about administering non-steroidal anti-inflammatory drugs (NSAIDs) to patients who may require surgical intervention or harbor internal hemorrhaging (Scharonow et al., 2017). Notwithstanding, the expedited initiation of non-opiate pain management potentially truncates the emergency department trajectory and facilitates more rapid patient mobilization. When patients achieve sufficient analgesia with non-opiates in the prehospital locale, their subsequent expectations for opioid therapy in the emergency department correspondingly diminish. Moreover, non-opiate regimens afford an analgesic avenue for those individuals who, by virtue of contraindications, cannot receive opioid medications (O'Connor et al., 2020).

7. Non-Pharmacological Approaches: Techniques and Efficacy

Paramedics and nurses frequently apply cognitive behavioural interventions—including reassurance, hypnosis, distraction, imagery, and breathing exercises—to assist patients in managing pain. Reassurance aims to alleviate the psychological distress induced by traumatic situations, whereas techniques such as distraction and imagery promote the disengagement of attention from nociceptive stimuli (O'Connor et al., 2020). Moreover, it is vital to support a patient's coping mechanisms and maintain their dignity during care. When a patient declines additional pharmacological treatment, such non-pharmacological measures provide valuable alternatives.

Physical modalities constitute another non-pharmacological strategy. Cooling methods, such as ice packs, are commonly employed, although care must be taken to avoid tissue damage; application intervals typically adhere to a 20-minute-on, 20-minute-off regime (C. French et al., 2013). Ice packs are particularly beneficial in addressing swelling originating from soft tissue injuries—such as sprains, strains, or insect bites—both within hospital settings and in ambulance environments. Similar cooling devices are routinely utilized by paramedics in prehospital contexts. Conversely, heating treatments frequently apply to conditions involving muscle pain or tightness; heating pads or warm towels may be prescribed by nurses or administered by paramedics under clinical direction.

7.1. Cognitive Behavioral Techniques

Psychological approaches have long been recognized in nursing and emergency medicine literature as viable options for pain management (C. French et al., 2013). One cognitive behavioural technique both Paramedics and Nurses use is distraction, which can help to divert attention away from an unpleasant stimulus and thus alleviate anxiety and stress.

The use of relaxation strategies by Paramedics to control pain is also common. Patients are shown to undertake deep-breathing and guided-relaxation exercises that prevent muscle tension, counteract sympathetic nervous system arousal, and promote more favourable cardiac functioning (E. MacLaren, 2006). Cognitive behavioural therapy can also be effective

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in treating acute pain, and one or more techniques may be taught to the patient depending on the nature of their difficulties and their willingness to actively engage with treatment.

In terms of non-pharmacological pain relief, Paramedics are also able to apply transcutaneous electrical nerve stimulation and enclose fractures in splints; both procedures are regularly practised and produced positive outcomes in a sample of hospital patients, who also received pharmacological intervention in parallel. Application of cold packs, gentle handling and mobilisation and the use of massage are further examples of accessible non-pharmacological options that are favoured by Paramedics and Nurses alike.

7.2. Physical Modalities

Physical modalities aim to reduce pain by targeting its source. The two major types are localized cooling and localized heating, and they work in very different ways. In practice, nurses and paramedics almost exclusively use localized cooling, rather than heating (C. French et al., 2013). Both paramedics and nurses place a strong emphasis on cervical collar use for trauma patients, though paramedics also prioritize rapid transport and EKG monitoring of cardiac patients. Policing the race to the hospital may be a little difficult for nurses, but paramedics at least have the opportunity to educate patients about non-drug techniques—as well as the legal ramifications of their behaviour— while they are treating them for pain.

8. Patient Communication Strategies

Communication is required for obtaining a reliable pain score when the patient is conscious; however, it is often difficult to obtain a reliable history as the use of an objective scale to quantify pain is limited (Iqbal et al., 2013). Unfortunately, approaches to pharmacological management tend to be somewhat similar, with paracetamol and morphine being the two most commonly used drugs among paramedics and nurses respectively. This chapter explores the various patient communication approaches utilized by paramedics and nurses in the context of pain management.

Patient communication differs considerably between paramedics and emergency department nurses, as the former has little choice but to rely predominantly on a subjective pain assessment tool, while the latter employs a broader range of assessments including physiological and behavioural indicators. Pain assessment should therefore not be restricted solely to the use of subjective scales, nor should an observer presume that the patient is malingering in the absence of an overt indicator. It is also vital to exercise caution in assigning greater weight to those with a vested interest, such as relatives or carers, as their perception of the patient's pain may be greatly exaggerated. This makes it clear that paramedics should not rely solely on assessment of pain symptoms through verbal

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communication and that all clinicians assessing pain must consider the dangers of inferring exaggerated or malingered symptoms (C. French et al., 2013).

Effective pain management may be enhanced significantly by inter-agency training and information sharing. Training to widen pain assessment strategies can include the use of physiological or behavioural observations in the absence of reliable verbal communication; alongside increases in the availability of drug options to allow treatment to be tailored effectively to the individual patient. Furthermore, enhancements in inter-agency communication and coordination can encourage an appropriate level of clarity and consistency in a patient's therapeutic pathway and ensure that the necessary comprehensive documentation of assessments, interventions and responses is available to all practitioners concerned with the patient's care.

9. Cultural Considerations in Pain Management

A patient's cultural and ethnic background strongly influences the perception, manifestation, and management of pain (Rogger et al., 2023). Global migration has increased the likelihood that paramedics and nurses will encounter a diverse, culturally divergent patient population. The meaning that pain holds within cultural contexts must be understood for optimal treatment and for the physician–patient relationship.

The expression of pain and the ability to communicate the experience of suffering is framed by a cultural community. At the same time, pain is often viewed as an individually experienced phenomenon. Cultural groups thereby construct and transfer a set of shared meanings on the individual member, gaining importance during critical events such as life-threatening diseases or injuries. The majority of acute pain patients seen by Emergency Medical Services (EMS) worldwide are severely injured and show acute pain from such injuries. Paramedics and nurses responsible for interfacing with the patient and initiating management must adapt to the cultural communications and also corresponding perceptions to attain efficient and comprehensive pain-relieving measures.

10. Legal and Ethical Implications

Paramedics and nurses operate under distinct regulatory frameworks that profoundly impact their approaches to pain assessment, medication administration, and documentation requirements. Paramedics primarily follow state regulations, while nurses must comply with both state and institutional policies. These legal distinctions can influence the choice and dosing of pharmacological analgesics as well as the documentation processes for both paramedics and nurses (C. French et al., 2013). Understanding the specific legal and ethical underpinnings for each profession can enhance collaborative efforts and optimize pain management outcomes for emergency patients.

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11. Interprofessional Collaboration in Pain Management

Emergency care is stressful to both patients and clinicians due to injuries and illnesses that often cause pain, fear, anxiety, and emotional upset. Effective assessment and ongoing management of pain depend on the development of trusting professional partnerships. The different philosophies of care, therefore, held by various clinicians, such as paramedics and emergency nurses, have a clear impact on how that trust develops and the outcome of pain management therapy. Paramedics often work independently, with limited treatment options governed by strict protocols; clinical decision-making focuses on effectiveness in relieving pain as quickly as possible and maintaining patient safety until transfer (C. French et al., 2013). Nurses provide care in a setting that promotes multidisciplinary interaction with openly negotiated, discretionary treatment options; clinical decision-making is based on providing holistic care, including assessment and management of psychological and social factors.

These approaches influence pain assessment and clinical communication with the patient and affect the choice of pharmacological and non-pharmacological interventions. Relationship-centered care, whereby individuals work cooperatively to agree on acceptable care that meets mutual concerns, represents a way in which collaboration between clinicians using different approaches can optimize pain management outcomes, focusing on the patient's agenda rather than the professional's perspective (Iqbal et al., 2013).

12. Case Studies: Paramedic and Nurse Interventions

Low levels of acute pain are associated with reduced complications and length of hospital stay (C. French et al., 2013). Effective pain management begins in the emergency department (ED) and continues throughout the patient's hospital stay.

Paramedics and emergency nurses assess and manage pain throughout the patient's emergency care journey, a large proportion of which takes place in or near the ED. Early assessment and management of pain must therefore begin in the prehospital (i.e., ambulance and paramedic) setting. Comprehensive knowledge of the principles of pain, together with methods of assessment and documentation, and the pharmacologic and non-pharmacologic management of pain, must be included in paramedic education and training curricula. Application of a comprehensive programme, combining education with repeated assessment, targeted intervention and ongoing quality improvement ensures effective patient care. Patients and emergency clinicians perceive that shared protocols and training involving both ambulance and ED personnel facilitate the flow of prehospital pain management, and avoid unnecessary duplication or delay. Emergency department (ED) staff sometimes consider that morphine is not indicated or should be delayed until ED arrival. Improvement in urgent pain management in any clinical setting therefore requires consideration of the expectations and

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beliefs of patients and staff, a widening of pain assessment strategies, an optimisation of non-drug treatment options for pain, a selective implementation and increase of drug treatment options for pain, and an enhancement in communication and coordination along the entire prehospital pain pathway (Iqbal et al., 2013).

13. Barriers to Effective Pain Management

18. Barriers to Effective Pain Management

Patient pain relief cannot be optimised without inter-professional collaboration and teamwork (Iqbal et al., 2013).

An efficiently working multi-disciplinary team with a shared vision and working protocols ensures that pain relief is delivered in a timely and effective manner. Paramedics work in a constantly changing and challenging environment, balancing competing clinical requirements and often considering the emotional and psychological needs of patients (C. French et al., 2013). To optimise pain relief paramedics must be supported in their endeavours by a wider team.

13.1. Systemic Barriers

Systemic Barriers Prehospital pain assessment and management is influenced by multiple factors, including clinical conditions, communication difficulties, and environmental issues. However, their relative importance and specific contribution to analgesic use have not been formally explored. There appear to be differences in prehospital pain management between male and female patients. The management of acute pain and the identification, assessment, and control of pain are integral parts of high-quality healthcare. Paramedics can complete all of these tasks during initial care and transfer of a patient. However, there are systemic barriers which prevent this from happening, including organisational obstacles, the level of education and experience, disjointed ED and ambulance documentation, and problems with access to pain medication (Iqbal et al., 2013). The clinical role of paramedics continues to evolve, with education and training developments raising expectations about the quality of care that can be delivered in the field. Well-educated paramedics can support more complex clinical decisions, which may result in better discharge rates and a reduction in ED overcrowding. Systems where the paramedic is considered a ‘front line clinician’ (CBD, 2017) have highlighted the potential for paramedics to climb the clinical ladder to advanced practice. Establishing barriers and facilitators to the progression of paramedics into advanced clinical roles may support workforce development, while addressing ongoing problems such as overcrowding (C. French et al., 2013).

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13.2. Individual Barriers

Blamey (2013) identifies a range of system-level and operational barriers to effective pain management within emergency care alongside individual. The latter include inadequate education, misunderstanding and absence of standardised clinical tools (Tewelde Kahsay & Pitkäjärvi, 2019). Box 2 outlines some of the main individual barriers encountered by paramedics and emergency department nurses that can hinder effective pain management and have significant implications for the delivery of pre-hospital emergency care.

14. Future Directions in Pain Management Research

Identifying potential avenues for further research builds on discussions of obstacles limiting effective pain control in emergency settings. Patients often endure considerable distress before receiving relief, suggesting the need for additional analysis of situational factors and related impediments (Iqbal et al., 2013). Research might focus on socio-cultural variables, analytic methodologies in clinical this context, and the influence of communication patterns on analgesic administration. Understanding these dimensions could inform projects aimed at empowering emergency personnel and enhancing approaches to pain management in both prehospital and clinical phases of care (O'Connor et al., 2020).

15. Training and Education for Pain Management

Education provides an initial foundation from which paramedics and nurses build more advanced knowledge and clinical skills. Both disciplines receive instruction regarding pain management during pre-registration training. A study in Saudi Arabia measured the knowledge and attitude of 79 emergency medical services students and demonstrated a good understanding of pain problems and the pharmacological aspects of pain management (M. AlRazeeni, 2021). Another investigation assessed the long-term impact of an educational program concerning prehospital pain management. An intervention delivered in partnership with an American ambulance service yielded a positive effect for paramedics who had been allocated longer experience with the ambulance service. The follow-up research sought to identify responses 8 months after the intervention and provide the opportunity to assess attitudes and knowledge relating to pain management more broadly (C. French et al., 2013).

16. Technology in Pain Management

Technological innovation has transformed emergency medical training and practice. The introduction of portable ultrasound in prehospital care and simulation-based education has enhanced paramedic diagnostic and trauma management skills. Text messaging and social media facilitate rapid communication, boosting inter-organizational collaboration and resource sharing. Applications that incorporate real-time location data improve data capture and patient tracking during emergencies. Despite these advances, the integration of digital tools in pain management protocols remains limited.

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Research underscores the necessity of incorporating e-health applications, digital decision support, real-time communication, and distance learning into pain management strategies. Efficient technologies for data collection and analysis are critical for obtaining the large sample sizes needed to refine clinical methodologies. The development and widespread implementation of patient-centered applications present an opportunity to bridge current technological gaps. Such tools empower patients to actively participate in pain management and enable clinicians to utilize empirical data for informed decision-making (C. French et al., 2013) (Mohammad et al., 2010).

16.1. Telehealth Approaches

Telehealth describes the provision of healthcare services via telephone or videoconferencing technologies. The aims of telehealth in prehospital care are to reduce unnecessary emergency department (ED) attendances, provide specialist support and enhance clinical assessment, care and communication. Telehealth is increasingly promoted as a component of alternative models of care that reduce unnecessary transportation of patients and provide rapid access to specialist advice (C. French et al., 2013) , (O'Connor et al., 2020) , (Iqbal et al., 2013).

Telehealth can provide paramedics with access to a range of remote clinicians, encompassing different types and levels of expertise. The presence of a specialist supports paramedic confidence when choosing the options available. Telehealth also functions as a clinical decision support tool when the paramedic assessments and patient histories are interpreted by the remote expert. Depending on the available services in a given system, telehealth allows paramedics to discuss care and consider alternatives with a range of clinicians— such as nurses, emergency physicians and geriatricians,.

16.2. Pain Management Apps

This section examines the relevance of pain management apps in the context of paramedic and nurse strategies. These apps can support educational and clinical initiatives, particularly in light of the substantial overlap in pain management approaches. On one hand, paramedics and nurses employ similar pharmacological, non-pharmacological, and communication strategies. Moreover, both professions serve as the first point of contact with patients in pain. On the other hand, paramedics and nurses exhibit fundamental differences in training, scope of practice, legal requirements, and the environments in which they work. Additional sections elucidate these distinctions and their implications for pain management.

Pain is a pervasive problem within emergency and surgical care, with extensive research demonstrating that many patients endure severe postoperative pain (Shahmoradi et al., 2021). If not adequately managed, acute pain can provoke physiological responses such as alterations in heart rate and blood pressure, increased oxygen consumption, and elevated levels of lactic acid. Moreover, untreated pain may contribute to myocardial infarction,

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thromboembolism, infection, atelectasis, and delayed wound healing. Conversely, insufficiently controlled pain also exerts an indirect influence on vital parameters. Inadequate pain management can lead to drug overdose and related life-threatening consequences. Pain is the most frequent and distressing symptom reported by patients across clinical settings (Zhao et al., 2019).

17. Patient-Centered Care in Pain Management

Patient-centred care involves providing care focussed on the needs of the patient. Throughout a patient's care pathway, patient-centred care can be achieved by involving the patient in decisions about their care, understanding their concerns and delivering care that is responsive to the patient's values and preferences. Emergency care provision in the United Kingdom is provided by paramedics and nurses in a range of controlled environments, including the ambulance, emergency department (ED) and minor wounds unit. The approach of each professional to patient-centred care influences how they assess, manage and treat pain. While the strategies for each profession overlap, the assessment of patients and the options available for treatment differ slightly (C. French et al., 2013).

Paramedics assess and manage pain in the controlled environment of the ambulance. The assessment of pain undertaken by a paramedic can be based on observations of the patient, the pattern of injury and a pain assessment tool. Pain assessment tools include the visual analogue scale (VAS), verbal rating scale (VRS), numerical rating scale (NRS) and the Faces Pain Scale—Revised (FPS-R). The patient's culture and first language influence the choice of pain scale. Pharmacological treatment options available to paramedics are limited. Where these treatments are unsuitable, non-pharmacological methods such as heat or cold therapy and cognitive behavioural techniques can be effective in addressing patients' pain needs. When nurses assess and treat pain, they operate in an ED or minor treatment setting as part of the healthcare team. Nurse assessment follows a process of observation that considers the patient's condition and what can be reasonably inferred from the mechanism of injury or morbidity. Pain assessment scales used by nurses are similar to those employed by paramedics, but choices may be influenced by patient expectations. Pharmacological approaches in these settings provide a wider selection of options that allow nurses to adopt a multimodal approach to pain relief. Non-pharmacological management may again include heat and cold therapy, distraction and cognitive behavioural techniques (Iqbal et al., 2013).

18. Evaluation of Pain Management Strategies

Pain management principles apply to the relief of most minor or moderate physical distress experienced by many patients treated and transported by ambulance personnel. Pain and discomfort are among the most common symptoms for which patients seek medical aid from a paramedic or for which they are admitted to a hospital (C. French et al., 2013). Emergency

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care personnel encounter patients with diseases and injuries of varying severity and competently manage their care throughout all aspects of the health-care delivery system. Both the paramedic and the emergency nurse have the authority and responsibility to manage a patient's pain and discomfort, often establishing a rapidly effective rapport through communication and professional attitudes (Butti et al., 2017). Clinical scenarios requiring the ability to gather essential information quickly and accurately are paramount to obtaining a history and rapidly assessing the severity of acute pain, including documenting the patient's response to therapeutic interventions.

Several pain assessment paradigms—with varying degrees of success—have been developed to assist both the paramedic and the nurse. Administration of analgesic agents by paramedics occurs only in relatively specific situations and mandates a deeper understanding of the pharmacology, patient response, and duration of effect of the agents used. Pharmacological agents commonly administered by paramedics include metoclopramide, aspirin, nonsteroidal anti-inflammatory drugs (NSAIDs), morphine, diamorphine, paracetamol, ibuprofen, and oral morphine solutions. Medical cages must clearly define analgesics and situations appropriate for administration and also provide precise dosing and contraindications. Emotional support and reassurance, warmth, cooling, splinting, immobilisation, positioning, massage, and cognitive behavioural therapy remain important aspects of a multimodal approach to pain management and often increase the patient's comfort level substantially. Pharmacological agents commonly administered by the emergency nurse include diamorphine and non-opioid agents, with all analgesic agents being reviewed regularly and evaluated for safety, efficacy, and emerging educational evidence.

19. Conclusion

Paramedics and nurses in emergency settings both shoulder responsibility for effective pain management, yet their approaches—assessments, pharmacological and non-pharmacological methods—differ in notable respects. The paramedic and nurse alike must continuously measure levels of pain, through varied scales (e.g., visual analogue scale, verbal numeric scale, and Wong-Baker Faces scale; (O'Connor et al., 2020)) to decide on an appropriate course of action.

Regarding pharmacological interventions, published guidelines acknowledge the skill paramedics have in the identification and treatment of pain. With suitable pharmacological knowledge and confidence in their clinical judgment, paramedics can provide pain relief that is safe, effective and accepted by patients (C. French et al., 2013). Scant emphasis is given to the administration of appropriate drugs, however. Nurses commonly use a diverse range of medications—including, for instance, paracetamol; ibuprofen; morphine; diamorphine; fentanyl; and, less commonly, oxycodone and codeine (Iqbal et al., 2013) —whereas paramedics deploy relatively few analgesics (again, oxycodone and fentanyl may be

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employed, along with various non-steroidal anti-inflammatory drugs and entonox). Updated educational programmes, therefore, could explore pharmacological differences and their clinical-medicinal rationales. Procedural training on appropriate equipment use—relevant to many analgesics—should also be factored in. With regard to dosage and administration, protocols remain relatively complex. Paramedics must make decisions "on-scene" in collaborative contexts, while within-hospital options broaden substantially: thereby, the nurse can select analgesia that is prescribed at the appropriate strength; and, subsequently, employ a variety of routes of administration accordingly.

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