

Multidisciplinary Approach to Paediatric Pain Management

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Abstract—Paediatric pain management necessitates a comprehensive approach that integrates both pharmacological and non-pharmacological strategies to address the complex pain experiences of children. The continued reliance on opioids highlights the importance of exploring opioid-sparing alternatives through multidisciplinary treatments. Nurses are integral to effective paediatric pain management, highlighting the necessity for rigorous training programs for student nurses. Efforts to improve pain management globally focus on enhancing the competencies of healthcare professionals through updated guidelines and continuous education. Cultural and contextual factors, exemplified by practices observed in hospitals, significantly influence pain management approaches. Despite advancements, persistent issues such as pain undertreatment indicate a need for greater knowledge among healthcare providers, including community pharmacists. Educational initiatives and innovative non-pharmacological interventions, such as virtual reality, have demonstrated potential in improving pain relief. However, the implementation of these strategies remains challenging, particularly in resource-constrained settings.

Index Terms—analgesic, chronic and acute, hyperalgesia, opioid, pain, tolerance.

I. INTRODUCTION

PAEDIATRIC pain management is a critical aspect of healthcare requiring a multidisciplinary approach to address both acute and chronic pain in children. The use of opioids in paediatric pain management remains a significant concern, emphasising the need to explore opioid-sparing effects of multidisciplinary treatments [1]. Nurses play a fundamental role in this field, necessitating that student nurses acquire competencies to effectively care for paediatric patients experiencing pain [2]. In countries around the world, enhancing the knowledge of paediatric professionals regarding pain assessment and management is recognised as essential, advocating for the establishment of guidelines and regular training programs [3].

Understanding cultural and contextual factors that influence paediatric pain management is crucial. For instance, a study conducted in Ghanaian hospitals revealed the predominant use of analgesics in paediatric pain management due to cultural dispositions [4]. Despite efforts to improve paediatric pain management, challenges such as the undertreatment of paediatric pain persist [5]. Healthcare professionals, including community pharmacists, must possess a strong knowledge base in paediatric pain management to ensure optimal treatment outcomes [6].

Education and training programs, such as advanced fellowships in paediatric pain medicine, are designed

to enhance clinical knowledge, skills, and judgment in paediatric pain management [7]. Research in procedural pain management within paediatric emergency departments has led to the development of guidelines for pain assessment, management, and sedation regimens for children [8]. However, barriers to effective pain management remain, as evidenced by studies highlighting nursing-related obstacles in managing children's pain [9].

Using appropriate tools for paediatric pain assessment and management is essential for optimal care delivery [4]. Quality improvement initiatives should prioritise enhancing pain assessment in infants, treating moderate to severe pain in children of all age groups, and educating healthcare providers on effective pain management strategies [10]. Despite the availability of guidelines, implementing accurate pain assessment and management continues to be a challenge in various clinical settings [11].

The knowledge and attitudes of paediatric clinicians regarding pain management play a significant role in applying effective pain management strategies across paediatric and neonatal settings [12]. Integrating complementary and alternative medical therapies into paediatric pain management programs is increasingly common, emphasising a holistic approach to pain management [13]. Studies also highlight the effectiveness of non-pharmacological pain management interventions in reducing postoperative pain in children [14].

In regions such as Nigeria, South Africa, Uganda, and Zambia, there is a need for institutional paediatric pain management guidelines to standardise practices, even though pharmacological pain management practices aligned with WHO recommendations are reported to be good [15]. Understanding the pain experience in children with conditions like arthrogyposis multiplex congenita is crucial for effective pain management and preventing chronic pain [16].

II. TYPES AND CAUSES OF PAIN IN CHILDREN

Pain in children arises from various sources and manifests in different forms, affecting their physical, psychological, and social well-being. Common causes include conditions such as cerebral palsy (CP), complex regional pain syndrome, tension-type headaches, migraines, and abdominal pain. Children with CP frequently experience pain due to issues like hip displacement, muscle spasms, and medical procedures [17]. Additionally, headaches, neuropathic pain, visceral pain, and the differentiation between acute and chronic pain are highlighted as less studied but significant pain types in children with CP [17]. Chronic pain, lasting over three

months, is a prevalent issue among children and adolescents, impacting their daily lives and overall health [18].

Children with complex regional pain syndrome type 1 may experience chronic pain influenced by sensory function and psychological factors, similar to adults [19]. Furthermore, tension-type headaches in children can be associated with various symptoms such as phonophobia, abdominal pain, and neck pain, impacting their quality of life [20]. Migraines, a common cause of headache in children, can affect up to 19% of the paediatric population [21]. Furthermore, acute abdominal pain is a frequent complaint in childhood, arising from diverse surgical and non-surgical conditions [22]. Back pain is also prevalent among children, with over 50% experiencing it by the age of 15, and school bag carriage is suggested as a contributing factor to back, neck, and shoulder pain in children [23], [24].

Understanding and managing pain in children with cognitive impairments is crucial, as they may have difficulty communicating their discomfort. Parents of non-verbal children with learning disabilities often rely on vocalisations, social behaviour, and facial expressions to recognise their child's pain [25]. Children with severe cognitive impairments may exhibit more pain behaviour over time, potentially due to increased sensitivity to pain [26]. Pain assessment in children with disabilities should consider factors like age, cognitive level, and the type of pain experienced.

Intravenous bolus treatments can induce pain in children, necessitating the identification of causative factors to mitigate discomfort during such procedures [27]. Pain interference in children with conditions like Osteogenesis Imperfecta can significantly impact their daily activities and self-perceived health status [28]. Pain prevalence studies in children have shown that most experience acute pain, with headaches being a common complaint, affecting nearly 80% of children [29], [30]. Pain management in children is essential to prevent long-term physical and psychological consequences [31].

III. ASSESSING PAIN IN PAEDIATRIC PATIENTS

Assessing pain in paediatric patients is critical in various healthcare settings, including paediatric otolaryngology [32]. Effective pain management in paediatric burns, for example, requires a thorough understanding of the underlying science to ensure appropriate interventions [33]. Qualitative evaluation is significant in chronic pain contexts to accurately comprehend paediatric pain behaviour and intensity, essential for developing effective pain management strategies [34]. In paediatric emergency departments, standardised protocols and staff competency in pain assessment are vital [35].

A multidisciplinary approach that focuses on patient-centred care is essential for effective pain management in children, emphasising early pain assessment for timely and adequate analgesia [36]. Commonly used pain assessment tools in children, such as the Faces Pain Scale-Revised and the Wong-Baker Faces Scale, help evaluate pain intensity and quality [37]. Assessing pain in children with conditions like cystic fibrosis is crucial to prevent negative impacts on their well-being and quality of life [38].

Personalised pain scales and assessment instruments personalised to specific age groups and pain types ensure accurate pain evaluation in paediatric patients [39]. For instance, the Parents' Postoperative Pain Rating Scale is validated for assessing pain in young children undergoing surgical procedures [40]. Specialised tools like the Questionnaire on Pain caused by Spasticity are necessary for assessing pain in children with cognitive impairments such as cerebral palsy [41].

Parental involvement in understanding children's pain is vital, as parental pain catastrophising can influence pain perception and management in early childhood [42]. Using multidimensional pain assessment measures validated across different populations ensures reliable pain evaluations in children with various conditions [43]. Enhanced pain evaluation methods and improved communication about pain and its treatment lead to better pain management outcomes in paediatric oncology [44].

Innovative approaches like immersive virtual reality show promise in paediatric pain management, offering engaging interventions for acute and chronic pain in children [45]. Brief hypnotic-behavioural interventions have been studied for conditions like functional abdominal pain and irritable bowel syndrome in children, emphasising direct pain measurements from the children themselves [46]. The Pain Catastrophising Scale-Children aids in assessing psychological correlates of paediatric acute post-surgical pain, contributing to a comprehensive understanding of pain experiences in children [47].

IV. PHARMACOLOGICAL AND NON-PHARMACOLOGICAL TREATMENTS

Paediatric patients pose a unique challenge in pain management, necessitating a comprehensive approach that combines both pharmacological and non-pharmacological interventions. Research by Wren et al. highlights the effectiveness of multidisciplinary pain management strategies that integrate both pharmacological and non-pharmacological therapies in treating acute and chronic pain in paediatric populations [1]. This approach acknowledges the significance of combining different modalities to achieve optimal pain relief while minimising the side effects associated with pharmacological treatments, such as drowsiness [48]. Pain assessment is a critical aspect of paediatric care, as emphasised by, underlining the importance of regular use of pain measurement scales to identify and guide the treatment of pain in paediatric patients [49].

In paediatric pain management, both pharmacological and non-pharmacological strategies are integral. A broad spectrum of these approaches is available for managing pain in paediatric patients, highlighting the necessity of a diverse toolkit for effective pain treatment [50]. The multidimensional nature of paediatric pain, with a particularly pronounced emotional component in children, necessitates a comprehensive approach incorporating both pharmacological and non-pharmacological interventions [14]. This perspective is further supported by research highlighting the importance

of employing both methods to achieve effective pain control in paediatric patients [51].

Non-pharmacological interventions have gained recognition for their efficacy in paediatric pain management. Exploring the use of virtual reality combined with binaural beats as a novel cognitive pain management approach in children showcases the potential of innovative techniques to enhance pain relief [48]. Similarly, intensive interdisciplinary pain treatment programs for paediatric chronic idiopathic pain have been highlighted for their benefits to both patients and their families [52]. These studies emphasise the growing need of non-pharmacological interventions, providing alternative avenues for pain relief.

For procedural pain in paediatric patients, non-pharmacological approaches have shown promise. A systematic review of randomised controlled trials focused on non-pharmacologic management of procedural pain in paediatric burn patients indicates the effectiveness of these therapies as adjuncts to traditional pharmacological treatments [53]. Developmental considerations in non-pharmacologic pain management, particularly the use of distraction techniques personalised to different age groups, effectively manage procedural pain in children [54].

Furthermore, integrating pharmacological and non-pharmacological approaches is crucial in postoperative pain management for paediatric patients. The importance of a multidisciplinary and multimodal approach in planning postoperative pain treatment for children has been stressed, emphasising the need for a comprehensive strategy that combines different modalities for optimal pain control [55]. This sentiment is echoed by the inclusion of non-pharmacological approaches alongside pharmacological strategies in acute postoperative pain management for children [56]. By combining these approaches, healthcare providers can adapt pain management strategies to meet the unique needs of paediatric patients undergoing surgical procedures.

V. CHALLENGES AND FUTURE DIRECTIONS

Paediatric pain management is a complex field that requires a comprehensive understanding of pain mechanisms, personalised education and training strategies, and effective interventions to address acute and chronic pain in children. Significant progress has been made in paediatric pain research and technology, leading to improved insights into pain assessment and treatment approaches [33]. However, further research is needed to better understand the challenges in paediatric pain management and to enhance healthcare provision for children [2].

Psychological interventions have shown promise in managing paediatric chronic pain by focusing on specific skills and strategies for effective change [57]. There is a need to enhance the design and reporting of clinical trials related to paediatric pain conditions to improve the quality and impact of future research [58]. Barriers to optimal pain management, such as fear of opioid addiction and inadequate knowledge, must be addressed to develop effective strategies for paediatric pain management [59].

Assessing and managing paediatric pain in various settings, including self-care environments, demonstrates challenges in clinical practices and the need for personalised approaches to address unmet needs [60]. Innovative study designs and outcome measures specific to children are crucial for enhancing paediatric analgesic trials and improving pain management outcomes [61]. Effective pain management for common paediatric conditions requires consideration of developmental stages, individual differences, and emotional factors in treatment approaches [62].

Virtual medical education programs, like Paediatric Project ECHO[®], are essential for supporting interprofessional pain management in children and youth, highlighting the multidimensional approach needed for paediatric pain management [62]. Enhancing the knowledge of paediatric professionals in pain assessment and management through established guidelines and continuous training is vital for optimal care for paediatric patients [3]. Best practices in paediatric oncology pain management emphasise pain control, assessment, and family involvement in pain management processes [63].

Managing acute pain in children without opioids is challenging, requiring innovative approaches and comprehensive strategies for effective paediatric pain management [64]. Recommendations for clinical trial designs and models for analgesic medications in paediatric populations stress the need for validated methods to evaluate movement-related pain across different age groups [65]. The pathophysiology of paediatric musculoskeletal pain remains a challenge, contributing to ongoing pain and disability in affected individuals [66].

Parental involvement and education are crucial in paediatric pain management, with interventions like pain neuroscience education showing promise in improving outcomes for children with chronic pain [67]. Despite the prevalence of pain in children and adolescents, variations in pain management practices highlight the need for standardised approaches and guidelines to enhance care delivery [68]. The use of past pain experiences as a preparatory technique in paediatric pain management remains elusive, despite its potential impact on future pain experiences [69].

Improving paediatric pain management practices among nurses is essential for enhancing care quality and outcomes for paediatric patients [70]. Mind-body approaches offer additional avenues for managing paediatric pain, emphasising holistic strategies to improve pain management and overall quality of life [71]. The development of pain medications for children highlights the critical need for safe and effective pain treatment across all paediatric age groups [72].

The COVID-19 pandemic has emphasised the importance of adapting to virtual care delivery and addressing mental health challenges among paediatric patients with chronic pain [73]. Ethical considerations in paediatric sickle cell pain management within the context of the opioid epidemic emphasise the need for thoughtful and comprehensive decision-making in pain treatment [74]. Pain science education for children living with cancer presents opportunities to enhance understanding and coping mechanisms for paediatric

patients facing chronic pain challenges [75].

VI. CONCLUSION

Paediatric pain management demands a multifaceted approach encompassing both pharmacological and non-pharmacological strategies. The complexity of paediatric pain, influenced by various physical, psychological, and social factors, necessitates continuous education and competency development among healthcare providers, particularly nurses. Despite advancements, challenges such as the undertreatment of pain and barriers in clinical practice persist. Efforts to improve pain management must focus on enhancing guidelines, standardising practices across regions, and incorporating innovative techniques like virtual reality and psychological interventions. Additionally, understanding cultural and contextual factors and involving parents in the pain management process are critical for effective care. Future research should aim to address these challenges, refine assessment tools, and explore the integration of complementary therapies to ensure comprehensive and effective pain management for paediatric patients.

VII. CONFLICT OF INTEREST

The authors declare that there is no conflict of interest regarding the publication of this paper. We have no affiliations, financial involvement, or personal relationships with any organisations or individuals that could be perceived as influencing the content or conclusions of this manuscript.

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