

Integrating Artificial Intelligence in Perioperative Pain Management: Towards an Innovative Acute Pain Service

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Abstract

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Abstract

Background: Pain is a phenomenon that is still too underestimated by healthcare professionals. The solution to the problem of inadequate pain treatment, particularly post-operative pain, is not only the development of new techniques, but also the development of an organization to use better the existing techniques. Postoperative pain control is one of the major medical challenges to face despite all the improvements in the knowledge of mechanisms of acute pain and in the development of new pain management methods. The adoption of artificial intelligence (AI) in the assessment and management of perioperative pain promises to revolutionize therapeutic approaches, offering personalized solutions and improving patient outcomes.

Aims: This study aims to create a diagnostic therapeutic assistance service that coordinates the various professional figures involved, such as anesthetists, radiologists, orthopedists and physiatrists, in order to guarantee the best perioperative management of surgical pain from admission to patient discharge. The service will be supported by a telemedicine system that will guarantee the monitoring of pain, intended as a vital parameter, even at the patient's home with the support of an artificial intelligence interface.

Methods: This study employs a mixed-methods approach to establish an Acute Pain Service (APS) enhanced by Artificial Intelligence (AI). Promoted at the Santa Chiara Hospital in Trento, the initial phase involves the development of a comprehensive database, aggregating patient data including demographics, anthropometrics, pain scores, analgesic use, and outcomes. Machine learning algorithms are then trained on this dataset to identify patterns and predict pain management needs. The AI component is integrated into the APS to provide real-time decision support for clinicians. Data integrity and privacy are maintained through robust encryption and access control measures. The effectiveness of the AI-enhanced APS is evaluated through a series of metrics, such as pain relief efficiency, patient satisfaction, and reduction in opioid use. This section outlines the methodological framework of the study, highlighting the innovative integration of AI with traditional pain management services.

Statistics: Data collection and data analysis are still ongoing. Preliminary results indicate that AI can provide objective and personalized pain assessments, enhancing the efficiency of pain management. Furthermore, AI has shown potential in assisting with the prevention of pain before it manifests, offering a proactive approach to patient care.

Conclusion: The integration of AI into APS has the potential to transform perioperative pain care, reducing morbidity and associated costs, improving patient satisfaction and expediting the healing process. Further research is necessary to validate these findings and to fully implement such systems in a real-world clinical context.

Bibliography:

1. Zhang, M., Zhu, Herr, Chi, C.-L., Demir, I., Dunn Lopez, & Chi, N.-C. (2023). Using artificial intelligence to improve pain assessment and pain management: a scoping review. *Journal of the American Medical Informatics Association*, 30(3), 570-587
2. Wang, D., Guo, Yin, Chen, X., Qian, & Zhang, J. (2023). Analgesia quality index improves the quality of postoperative pain management: a retrospective observational study of 14,747 patients between 2014 and 2021. *BMC Anesthesiology*, 23, Article 281