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Artificial Intelligence in Cancer Pain Management: A Promising Tool for Precision Supportive Care

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Letter to Editor

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To the Editor

Cancer pain remains one of the most distressing and prevalent symptoms experienced by patients with malignancies, affecting nearly half of all patients receiving active treatment and up to 70–80% of those with advanced disease. Despite well-established international guidelines and the availability of effective analgesic therapies, inadequate pain control continues to be a major challenge worldwide. Barriers such as delayed pain assessment, opioid hesitancy, limited access to specialist palliative care, and disparities in healthcare delivery contribute to unnecessary patient suffering and reduced quality of life.

Recent advances in artificial intelligence (AI) have created new opportunities to improve the assessment and management of cancer pain. AI-based clinical decision-support systems can analyse large volumes of patient data, including electronic health records, imaging findings, laboratory results, medication histories, and patient-reported outcomes, to identify individuals at high risk of uncontrolled pain. These predictive models may facilitate earlier intervention, optimize analgesic selection, and reduce treatment-related complications.

Digital health technologies further complement AI by enabling continuous remote monitoring of pain symptoms through smartphone applications, wearable devices, and telemedicine platforms. Such technologies allow clinicians to monitor symptom progression in real time, identify breakthrough pain episodes promptly, and adjust treatment without requiring frequent hospital visits. These innovations may be particularly beneficial for patients in rural or resource-limited settings where access to specialist pain services is restricted.

However, the incorporation of AI into routine cancer pain management requires careful consideration. Most existing predictive models have been developed using retrospective datasets and require prospective validation in diverse patient populations before widespread clinical implementation. Challenges related to algorithm transparency, patient privacy, cybersecurity, regulatory oversight, and equitable access must also be addressed to ensure that AI technologies improve healthcare without increasing existing disparities.

Importantly, AI should be viewed as a supportive clinical tool rather than a replacement for healthcare professionals. Effective cancer pain management requires individualized assessment, compassionate communication, and multidisciplinary collaboration among oncologists, palliative care specialists, pain physicians, nurses, pharmacists, psychologists, physiotherapists, and social workers. AI can strengthen this collaborative model by providing objective, data-driven insights that assist clinical decision-making while preserving the central role of patient-centred care.

As oncology increasingly embraces precision medicine, similar progress should be made in supportive care. Future research should focus on integrating AI with pharmacogenomics, digital symptom monitoring, wearable technologies, and patient-reported outcomes to develop personalized pain management strategies. Large multicentre prospective studies will be essential to establish the safety, effectiveness, and clinical utility of these emerging technologies.

In conclusion, artificial intelligence represents a promising adjunct in the management of cancer pain.

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When combined with evidence-based clinical practice, multidisciplinary care, and ethical implementation, AI has the potential to improve pain assessment, personalize analgesic therapy, enhance quality of life, and ultimately reduce the global burden of cancer-related pain.

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