Impact of Utilizing Machine Learning for Bedsore Management in Patients Admitted to Critical and Intensive Care Units: A Systematic Review

Matineh Sadat Tabatabaei[1], Amirreza Keramati Asl[1*],
Fatemeh Zibaei[1], Fatemeh Bahramnezhad[2]

[1]Scientific Research Center, Tehran University of Medical Sciences, Tehran, Iran
[2]School of Nursing & Midwifery, Nursing and Midwifery Care Research Center, Tehran University of Medical Sciences, Tehran, Iran

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*Corresponding Author:
Scientific Research Center, Tehran University of Medical Sciences, Tehran, Iran

ABSTRACT

Introduction: Pressure injuries represent a significant challenge in the medical field, particularly within intensive care units (ICUs), where patients are frequently affected. These injuries impact patients' quality of life and contribute to increased healthcare costs. Machine learning (ML), a subset of artificial intelligence, is being increasingly integrated into nursing practice for various applications, including the prediction of hospital-acquired pressure injuries. This study employed an ML algorithm using the R programming language to assess the risk of pressure injuries in ICU patients. This study reviewed and compared various ML and artificial intelligence tools.

Search Strategy: A systematic search was conducted in electronic databases using keywords such as "bedsore", "outcome", "machine learning", "ICUs" to identify studies on the application of ML and AI for bedsore management in ICU settings. The electronic databases searched included PubMed, Medline, Embase and Scopus, covering the period from 2020 to 2024. After reviewing 63 articles, about 40 were included in the article, and 16 were utilized in this abstract.

Results: Results showed the promising effects of ML tools in preventing and treating patient bedsores. Pressure mapping systems and wearable devices effectively prevented bedsores by monitoring pressure points and patient movement, alerting caregivers to potential risks. Conversely, computer vision systems, predictive analytics, and natural language processing have facilitated more accurate diagnosis, personalized care plans, and informed decision-making for treating existing bedsores. These ML tools have the potential to significantly enhance patient outcomes and reduce the incidence of bedsores in healthcare settings.

Conclusion and Discussion: This review highlights the potential of ML in managing bedsores in ICUs. Studies have shown that ML models can accurately predict patients at high risk of developing bedsores. Additionally, AI tools can assist in customizing preventive measures and monitoring patients for early signs of pressure injury. However, there are limitations, such as small sample sizes in many studies, and further research is needed to assess the generalizability of the findings. Integrating ML into clinical workflows and addressing concerns regarding the interpretability and bias of these models remain ongoing areas of exploration.

Keywords: Artificial intelligence, Intensive care units, Machine learning