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Ethical AI for Predictive Risk Mapping in Aged Care: Integrating Occupational Hazards and Resident Safety

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Abstract

Artificial Intelligence (AI) implementation in aged care settings could transform resident safety protocols and occupational health management through early risk and hazard prediction. The study evaluates the moral considerations of applying AI for predictive risk mapping in aged care settings while addressing the need to maintain technology-driven solutions alongside human-focused care practices. The research draws from occupational health and safety studies, AI applications and quality healthcare approaches to highlight ethical requirements during AI deployment.

Keywords: Artificial Intelligence, Risk Mapping, Occupational Hazard, Resident Safety

Introduction

Resident safety and caregiver occupational health introduce exclusive challenges in aged care facilities. Risk assessment methods based on historical data and human expertise face potential biases and inefficiencies. A data-driven strategy developed through AI-powered predictive risk mapping identifies potential hazards and enables proactive intervention (Juba et al., 2024a). The use of AI requires careful examination of ethical concerns such as data privacy issues and algorithmic bias together with the threat of human worker displacement (Henry et al., 2022).

AI functions as a critical component of predictive risk mapping.

Predictive analytics powered by AI improves aged care safety through real-time analysis of patient health status alongside environmental risks and caregiver workloads. AI systems have the capability to detect patterns which indicate higher risks for staff-related falls and medication mistakes along

with workplace injuries (Phiri et al., 2024). These analysis results enable early interventions through additional staff deployment during peak-risk times and medication schedule adjustments to avoid harmful drug reactions (Juba et al., 2023a).

Ethical Considerations in AI Implementation

The numerous benefits of AI require ethical considerations for responsible implementation. The primary ethical issues include:

Data Privacy and Security: AI systems need extensive personal and medical data which creates confidentiality risks and potential misuse concerns according to Olajide et al. (2024). Protective measures for data must be robust enough to ensure sensitive information remains secure.

Bias and Fairness: Aged care AI models developed using historical data may continue existing biases resulting in unequal risk prediction and intervention strategies according to Oluwafunmise & Olajide (2024). The creation of transparent algorithms alongside ongoing impact assessments helps to reduce bias.

Human Oversight and Decision-Making: Human judgment must remain central in aged care settings while AI provides supportive functions. AI-generated recommendations must be interpreted by caregivers who remain active participants in making informed decisions (Juba et al., 2022).

Workforce Adaptation: Caregivers will experience changes in their traditional roles when AI is adopted because they will need training to understand AI technology (Olajide, 2024). The quality of care depends on AI systems that support human caregiving instead of replacing it.

AI-driven risk mapping enables health care facilities to enhance caregiver safety and resident well-being through occupational safety integration.

Caregiver burnout prevention and error reduction are achievable through monitoring caregiver workload and stress levels (Juba & Ochieng, 2024). Through AI technology it becomes possible to identify ergonomic risks within caregiving tasks which reduces musculoskeletal injury occurrences (Juba et al., 2024b).

Predictive risk mapping has been effectively implemented through AI in multiple aged care facilities. AI-powered fall detection systems implemented in care facilities resulted in substantial decreases in fall-related injuries among residents according to Juba et al. (2024a). AI-driven workforce management tools have refined staff scheduling to prevent caregiver overload while preserving high-quality care according to Oluwafunmise (2024).

AI technology offers significant potential benefits for improving safety in aged care facilities and occupational health standards. The ethical application of AI demands a comprehensive approach that gives priority to protecting data privacy while ensuring fairness and human supervision and adapting workforce needs.

Research going forward needs to center on the creation of AI models designed to combine ethical standards with improved risk prediction and prevention techniques. Policymakers together with industry stakeholders need to work jointly to create frameworks that guarantee AI systems provide benefits for every participant in the aged care ecosystem (Juba et al., 2023b).

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