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Artificial Intelligence in Clinical Prescribing: Decision Support, Drug Prediction, and Human: AI Collaboration

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ABSTRACT

Clinical prescribing remains a complex decision-making process influenced by patient heterogeneity, comorbidities, and polypharmacy. Artificial Intelligence (AI) is emerging as a clinical decision support tool capable of augmenting prescription accuracy through real-world data analytics. Machine learning (ML) models, including logistic regression, ensemble algorithms, and deep learning frameworks, leverage electronic health records (EHRs), laboratory parameters, demographic variables, medication histories, and adverse drug reaction (ADR) databases to predict therapeutic response and optimize drug selection. In neurological disorders such as epilepsy, predictive modeling has demonstrated utility in forecasting response to anti-epileptic drugs (AEDs), enabling more precise therapy selection. AI also strengthens pharmacovigilance by identifying high-risk drug combinations, predicting ADRs in polypharmacy, and supporting safer prescribing in patients with organ dysfunction. Continuous monitoring systems enhance early signal detection, reducing preventable harm associated with delayed ADR reporting. However, AI is not positioned to replace clinicians; rather, it functions as an assistive intelligence that enhances clinical reasoning, personalization, and prescribing safety. Challenges including algorithmic bias, data quality variability, interpretability, and ethical oversight must be addressed through rigorous validation and regulatory frameworks. When integrated responsibly, AI-driven prescribing systems have the potential to improve therapeutic precision, reduce medication errors, and strengthen patient-centered care.

Keywords: *Clinical decision support, Polypharmacy management, Predictive prescribing, Adverse drug reaction modeling, Real-world evidence*

