Can AI Improve Medication Reconciliation Processes?

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Abstract

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By Rasit Dinc

Medication reconciliation is a critical safety process in healthcare, designed to prevent adverse drug events by ensuring that a patient's medication list is accurate and complete. This process is especially vital during transitions of care, such as hospital admission, transfer, or discharge. However, the manual nature of medication reconciliation is often time-consuming, resource-intensive, and susceptible to human error, leading to medication discrepancies that can compromise patient safety. With the rapid advancement of artificial intelligence (AI), healthcare professionals are now exploring its potential to revolutionize this fundamental aspect of patient care.

The Challenge of Manual Reconciliation

The traditional medication reconciliation process involves a meticulous review of various records, including electronic health records (EHRs), pharmacy databases, and patient interviews, to compile a single, accurate list of all medications a patient is taking. This manual effort is not only a significant administrative burden on clinicians but is also fraught with challenges. Discrepancies can arise from incomplete records, patient recall errors, or miscommunication between providers. These errors can lead to serious consequences, including medication omissions, duplications, or incorrect dosages, ultimately jeopardizing patient outcomes.

How AI is Transforming Medication Reconciliation

Artificial intelligence, particularly through its subfields of machine learning and natural language processing (NLP), offers powerful tools to automate and enhance the accuracy of medication reconciliation. AI algorithms can rapidly analyze vast and disparate datasets, identify patterns, and extract relevant

information with a high degree of precision. This capability allows for a more streamlined and reliable reconciliation process.

Recent studies have provided compelling evidence of AI's effectiveness. For instance, a 2025 study introduced AMREC, a conversational AI agent designed specifically for medication reconciliation [1]. This innovative tool utilizes a fine-tuned large language model to standardize a patient's medication list by extracting 18 distinct elements from each prescription. The system then engages in a dialogue to confirm medications, correct discrepancies, and add any missing information. Remarkably, the extraction model achieved an accuracy rate of 98.3%, demonstrating the potential for conversational AI to significantly improve the quality and efficiency of medication data collection [1].

Furthermore, machine learning models are being developed to proactively identify patients who are at the highest risk of medication errors. A 2024 study in *Scientific Reports* detailed the creation of a clinical predictive tool that prioritizes patients for pharmacist-led medication reconciliation upon hospital admission. By analyzing 52 different variables, the model successfully identified high-risk individuals, demonstrating a 113% improvement in targeting at-risk patients compared to existing random-selection methods [2]. This proactive approach allows clinical resources to be allocated more effectively, focusing on the patients who need them most.

The Broader Impact on Patient Safety and Efficiency

The integration of AI into pharmacy operations extends beyond just identifying high-risk patients. A broader review of AI's clinical and operational applications highlights its capacity to enhance overall reconciliation accuracy by as much as 50% [3]. By automating the tedious tasks of data collection and comparison, AI frees up valuable time for pharmacists and other clinicians. This allows them to focus on more complex clinical activities, such as patient counseling and collaborative decision-making, which are essential for comprehensive medication management.

AI-driven tools can synthesize a patient's complete medication history from multiple sources—such as pharmacy databases, previous discharge summaries, and the EMR—into a single, unified view. This holistic perspective is crucial for preventing errors and ensuring that medication lists are both precise and current.

The Road Ahead: Challenges and Opportunities

Despite the promising advancements, the widespread adoption of AI in medication reconciliation is not without its challenges. Ensuring data privacy and security, validating the accuracy and fairness of algorithms, and seamlessly integrating these new technologies into existing clinical workflows are significant hurdles that must be addressed. Moreover, the importance of human oversight cannot be overstated. AI should be viewed as a powerful assistant that augments the expertise of healthcare professionals, rather than a replacement for their clinical judgment.

In conclusion, artificial intelligence holds immense promise for improving

medication reconciliation processes. By automating data extraction, identifying high-risk patients, and enhancing the accuracy of medication lists, AI technologies can significantly reduce the risk of medication errors and improve patient safety. As these tools continue to evolve and become more integrated into clinical practice, they will undoubtedly become an indispensable part of delivering high-quality, efficient, and safe patient care.
