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Accelerating Evidence Use in Clinical Practice

Delays in incorporating new medical evidence into clinical guidelines hinder the adoption of best practices in healthcare. Traditional manual processes, including exhaustive literature reviews and evidence synthesis, contribute to time lags averaging nine years between the start of clinical trials and the implementation of findings into clinical recommendations. In response, the Next Generation Evidence (NGE) system offers a novel approach to streamline guideline updates through high-precision information retrieval enabled by natural language processing (NLP). By automating the extraction, contextualisation and filtering of clinical trial data, the NGE system enhances the responsiveness of guideline development to emerging evidence.

Understanding the Challenge of Guideline Updating

The update process for clinical guidelines is inherently complex, typically involving the formulation of PICO questions, comprehensive literature searches, data extraction and consensus-driven decision-making frameworks like GRADE. Despite these rigorous processes, the sheer volume of clinical trial publications—averaging over 80 new articles daily in PUBMED—renders traditional evidence synthesis time-intensive and prone to delays. Boolean search strategies, commonly used by developers, often prioritise high recall at the expense of precision, resulting in thousands of irrelevant articles requiring manual screening. While some organisations have experimented with rapid update models and expert-driven targeted searches, these remain limited in scope and scalability. Thus, improving precision without compromising recall is critical to improving the timeliness of clinical guideline updates.

The NGE System: A Data-Driven Solution

The NGE system addresses these challenges by integrating structured and unstructured data from multiple sources, including PUBMED, ClinicalTrials.gov, CIVIC and German oncology guidelines. It applies advanced NLP tools to extract population and intervention concepts from natural language text and maps these to Unified Medical Language System (UMLS) identifiers for semantic interoperability. This harmonisation allows for context-sensitive retrieval of clinical trials based on their relevance to current guideline recommendations. The system includes filters for the trial phase, statistical significance, population characteristics and the presence of known or unknown interventions. These features enable users to prioritise signal publications likely to impact guideline recommendations, thereby reducing unnecessary screening workload while maintaining relevance.

Evaluating Impact Through Time Lag and Retrieval Analyses

The effectiveness of the NGE system was assessed through two key use cases: time lag analysis and targeted literature retrieval. Time lag evaluation, based on 22 new interventions included in German oncology guidelines from 2022 to 2024, revealed an average of nine years from the start of first-in-human trials to guideline inclusion. When broken down by trial phase, phase III trial results led to updates within 1.7 years, compared to three years for phase I/II trials. For literature retrieval, the system was benchmarked using updates to the oesophageal cancer and Hodgkin lymphoma guidelines. By applying increasingly strict filters, such as limiting results to phase III RCTs and excluding irrelevant populations, precision improved substantially without significantly compromising recall. Notably, the system retrieved several relevant articles overlooked by traditional search methods, underscoring its utility in enhancing the comprehensiveness of systematic reviews.

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The NGE system demonstrates that high-precision, NLP-enabled information retrieval can significantly reduce the time and effort required to update clinical guidelines. By harmonising diverse data sources and enabling targeted searches contextualised to existing recommendations, it offers a scalable solution to a long-standing bottleneck in evidence-based medicine. While additional work is needed to integrate more guideline sources and further evaluate usability in clinical settings, the initial results are promising. Continued refinement and broader adoption of such systems could shorten the evidence-to-practice cycle, ensuring that patients benefit more rapidly from the latest scientific advancements.

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