Barriers and Facilitators to Adoption of Artificial Intelligence-Based Clinical Decision Support: Preliminary Findings of a Systematic Review

Sarah Wan1, Jackson McNabb2, Tiffani J. Bright, PhD3, Kim Unertl, PhD2, Dilhan Weeraratne, PhD3, Allison B. McCoy, PhD2

1Vanderbilt University, Nashville, TN, 2Duke University, Durham, NC, 3IBM Watson Health, Cambridge, MA

Introduction

Many clinical decision support (CDS) systems use a manually curated knowledge base of defined rules to provide recommendations to clinicians to facilitate decision-making tasks. However, with the use of artificial intelligence (AI), rather than depending on a knowledge base, CDS potentially could learn from medical records and datasets. Machine learning may find patterns humans cannot determine, leading to a more rigorous decision support system.

Although different types of AI-based CDS have been proposed, and extensive research has been done to develop AI algorithms to incorporate into CDS, much of this progress has not been actualized into practice, leaving a gap in knowledge on how AI-based CDS performs in a clinical setting. Our goal was to conduct a systematic review to determine to what extent AI-based CDS has already been incorporated into clinical practice, noting the percentage of user acceptance and other factors that may have facilitated or served as a barrier to adoption.

Methods

The published literature in the databases PubMed, IEEEExplore, the ACM Digital Library, and the Web of Science were scanned using the key terms “artificial intelligence”, “machine learning”, “clinical decision support systems”, “reminder systems”, and “implement*” and other similar phrases. Studies that included an AI-based CDS system that had been implemented into the health care delivery process were included; simulation studies, closed loop systems where a clinician was not involved in making the final decision, and studies describing tools not yet incorporated into CDS were excluded. Two reviewers (SW, JM) independently screened all abstracts, with disagreements being resolved through discussion or by seeking a third opinion.

Studies passing abstract review will proceed to full text review, where further exclusions will occur. Eligible studies will have data extracted about study context and size, clinician acceptance, and barriers or facilitators to adoption.

Results

The initial search identified 4456 studies from the four databases. After screening, 436 studies were included for a full text review. From the preliminary abstract review, most included studies were either small in scale or limited to a pilot study, potentially suggesting difficulty incorporating AI-based CDS into the clinical workflow. Many studies identified provider alert fatigue, interoperability with existing health information technology systems, and trust in CDS recommendations from AI as potential barriers.

Conclusion

Abstract screening from a systematic review of CDS studies did not reveal facilitators, but identified provider alert fatigue, interoperability of AI-tools with the EHR, interoperability between different health care systems, and trust as barriers to implementation of AI into CDS. A full review of identified studies will address the extent AI-based CDS has been incorporated into clinical practice. We expect to identify best practices in implementing AI-based CDS from the results of our full review.

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