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Enhancing Shared Decision-Making in Cardiology with Artificial Intelligence

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Shared decision-making (SDM) is a key approach to improving cardiovascular care by fostering patient participation in healthcare decisions, enhancing patient-clinician communication, and promoting patient-centered care. SDM is defined as a collaborative process in which patients and clinicians jointly determine appropriate tests, treatments, and care plans that align with the patient's individual preferences and values. Despite its well-documented benefits and endorsement in international cardiology guidelines, SDM remains underused in cardiology. Research indicates that only 10% of cardiology consultations incorporate the core components of SDM.[1] This limited adoption is largely due to barriers such as clinician's time constraints, differences in patients' decision-making capacities, and insufficient training or tools to facilitate the SDM process effectively. Efforts to strengthen SDM have been shown to reduce decisional conflict and enhance patient knowledge in cardiology.[1] Artificial intelligence (AI) tools hold considerable promise in advancing new medical interventions. Kökciyan et al.[2] developed an AI-driven SDM support system that combines data science, collaboration technologies, and a chatbot to assist in stroke management. Their study demonstrated its effectiveness in supporting both patients and healthcare professionals in making treatment decisions.[2] This letter aims to explore how AI tools and models can serve as interventions to improve the implementation of SDM.

Modern AI models, including deep learning and traditional machine learning techniques such as random forests, gradient boosting machines, and support vector machines, are extensively applied in cardiology for personalized risk predictions (PRPs). These approaches effectively analyze complex, non-linear relationships and integrate various clinical, demographic, and genetic factors to generate PRPs for outcomes such as stroke, myocardial infarction, and bleeding risks.[3] Incorporating PRPs into SDM has been linked to higher patient satisfaction, as it enhances patients' confidence and involvement in their care decisions. Studies have shown that utilizing a patient decision aid that includes a validated risk calculator improves patient knowledge and reduces decisional conflict among those making decisions about coronary artery disease management.[4]

Communicating complex medical information to patients, many of whom do not have a medical background, remains a major challenge. Research indicates that clinicians frequently use unexplained medical jargon, leading to misunderstandings and lower patient engagement.[5] Natural language processing models address this issue by simplifying medical language, making it more accessible for patients to comprehend their conditions and treatment options. Large language models (LLMs) are particularly valuable for enhancing patient education and engagement in SDM. By delivering clear, personalized explanations, LLMs help bridge the communication gap between clinicians and patients.[5] Boonstra et al.[6] demonstrated that LLMs can generate coherent text for summarizing, translating, answering questions, and offering guidance. These capabilities enable patients to make well-informed decisions about their cardiovascular health.[6]

Medication adherence remains a major challenge in cardiology, as non-adherence significantly diminishes the effectiveness of prescribed treatments.[7,8] Despite strong evidence supporting the benefits of cardiovascular medications, adherence rates among patients with cardiovascular diseases remain low. A meta-analysis found that only 57% of patients follow their prescribed treatment regimens.[9]

AI-driven tools, such as smartphone applications and automated reminder systems, have shown promise in improving medication adherence, enhancing patient knowledge, and reducing decisional conflict in cardiology. Babel et al.[10] evaluated an AI-powered smartphone application designed to track medication intake in stroke patients. The findings revealed a notable increase in adherence rates among users of the AI application compared to the control group.[10]

Patient-specific factors, such as digital literacy and willingness to trust AI tools, play a significant role in the adoption of AI in SDM. Surveys indicate that while many patients recognize AI's potential to improve clinical decisions, concerns about transparency, accuracy, and maintaining a human connection in care remain major barriers to trust.[11] Ensuring transparency in AI decision-making is essential

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for fostering trust, maintaining accountability, and upholding ethical standards among both clinicians and patients. Techniques such as Local Interpretable Model-Agnostic Explanations, Shapley Additive Explanations, and hybrid models, when combined with user-centric design and regulatory frameworks, can help develop effective and interpretable AI systems, supporting responsible AI implementation in healthcare. The successful integration of AI also depends on robust infrastructure, interdisciplinary collaboration, and continuous evaluation to assess its impact. Additionally, education and training for both clinicians and patients are crucial to optimizing AI's benefits and reducing resistance to new technologies. As AI continues to advance, balancing innovation with ethical and practical considerations will be essential for its sustained adoption in SDM.[12]

SDM is crucial for delivering high-quality, patient-centered cardiology care. However, despite its advantages, SDM remains underutilized due to challenges such as time constraints, communication barriers, and limited resources. AI presents innovative solutions to these issues by enhancing patient education, improving adherence, and supporting personalized risk assessments.

This letter highlights AI's potential in advancing SDM in cardiology, particularly in empowering patients and strengthening collaboration with clinicians. Bozyel et al.[13] demonstrated that AI-based clinical decision support systems can be effectively used due to the superior performance of AI-driven algorithms in cardiovascular risk factor screening, diagnosis, risk estimation, and disease management. However, the lack of studies specifically examining AI's role in SDM within cardiology highlights the need for further research. Future studies should focus on comparative analyses of AI tools versus traditional SDM approaches, evaluate their impact on long-term clinical outcomes, and assess patient satisfaction and engagement. These investigations will offer valuable insights into the effectiveness, usability, and acceptance of AI-enhanced SDM in improving cardiovascular care.

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