Leveraging ChatGPT in cardiogeriatrics

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ABSTRACT

The integration of artificial intelligence (AI) into healthcare is transforming medical practice, and this holds true also for the prevention, diagnosis and treatment of cardiovascular disease in older patients. Large language models (LLMs) like ChatGPT (OpenAI, San Francisco, CA, USA) represent cutting edge AI tools which may offer significant potential to enhance patient care by improving communication, aiding in diagnosis, and assisting in treatment planning. In elderly patients, who often present with complex health profiles and multiple comorbidities, AI can prove particularly beneficial, and it can analyze extensive data to provide personalized, evidence-based recommendations. For instance, ChatGPT can support clinicians in managing polypharmacy by identifying potential drug interactions and suggesting optimal medication regimens, thereby reducing adverse effects. Additionally, AI tools can help overcome therapeutic inertia by prompting timely treatment adjustments, ensuring that elderly patients receive appropriate interventions. However, the successful implementation of AI in cardiogeriatrics requires robust technological infrastructures, seamless integration with electronic health records, and careful consideration of ethical and privacy concerns. Ongoing collaboration between technologists and healthcare professionals is essential to address these challenges and fully realize the benefits of AI in enhancing cardiovascular care for the elderly.

Key-words

Artificial intelligence; Cardiovascular disease; ChatGPT; Elderly; Geriatrics; Large language model

CORE TIP

The integration of ChatGPT and similar AI tools in cardiogeriatrics has the potential to enhance patient care by improving communication, aiding diagnosis, and supporting treatment planning. For elderly patients, often presenting with complex health profiles and multiple comorbidities, AI-driven tools provide personalized recommendations, optimize medication regimens, and help address therapeutic inertia. While promising, successful adoption in clinical settings demands robust infrastructure, seamless electronic health record integration, and rigorous attention to ethical considerations, underscoring the need for close collaboration between technologists and healthcare professionals.

The only constant in life is change

Heraclitus

Introduction

Cardiovascular disease remains the leading cause of mortality among the elderly, presenting unique challenges due to the complex interplay of aging biology and chronic disease management.(1) The integration of artificial intelligence (AI) into healthcare offers promising avenues to enhance diagnostic accuracy, personalize treatment plans, and improve patient outcomes in this vulnerable population.(2-3) Large language models (LLMs) like ChatGPT (OpenAI, San Francisco, CA, USA) have demonstrated potential in processing vast amounts of medical data, facilitating communication between healthcare providers and patients, and supporting clinical decision-making.(3-6) We hereby explore the application of AI, particularly ChatGPT, in cardiogeriatrics, highlighting its benefits, current limitations, and future prospects.

Artificial intelligence tools: focus on ChatGPT

The integration of artificial intelligence (AI) in healthcare has revolutionized medical care, offering unprecedented advancements in efficiency, accuracy, and patient outcomes.(4-5) It is not surprising that the benefits of the systematic implementation of AI to clinical practice are expected to grow even further in the future. Indeed, AI applications range substantially, and vary from general-purpose tools embedded into electronic health records to versatile diagnostic algorithms and personalized treatment plans, significantly impacting how care is delivered, especially in complex fields like geriatrics and cardiology where in a traditional framework only multidisciplinary and team-based care can be successful.(7) Notably, even in the current era, cardiovascular disease

remains the leading cause of death among the elderly, presenting unique challenges due to the complex interplay of aging biology and chronic disease management.(8-10)

Large language models (LLMs) like ChatGPT, which are based on a deep learning framework, represent significant milestones in AI development, given their capability of processing and generating human-like text based on vast amounts of data, with potential applications in interpreting complex medical language and enhancing communication between healthcare providers and patients.(5) In particular, ChatGPT can significantly enhance cardiogeriatric care by improving communication and providing continuous health monitoring.(11) Notably, by facilitating personalized conversations and managing daily health queries, ChatGPT helps bridge the communication gap between elderly patients and healthcare systems, ensuring a higher standard of care and adherence to treatment protocols tailored to individual needs.(12) In addition to supporting communication, AI tools can directly assist in continuous health monitoring and early detection of changes in health status, a critical component of effective elderly care. For instance, ChatGPT-based applications can provide regular check-ins to monitor symptoms and alert healthcare providers to potential complications, thereby reducing emergency visits and hospital readmissions for elderly patients.(13) Moreover, AI can assist with assessing cognitive functioning, a vital aspect when considering complex cardiovascular interventions for older adults. AI's adaptive feedback capabilities enable personalized recommendations that align with the specific health challenges often faced by this population.

Medical applications of ChatGPT

Focusing explicitly on clinical settings, ChatGPT may assist with diagnosis and treatment planning by quickly processing patient data and suggesting evidence-based recommendations, performing often even if not always in a fashion that is similar or even better to that of experienced

pratitioners.(14-20) While consistency and confidentiality remain open issues, integrating ChatGPT into clinical workflows holds the promise of helping clinicians make informed decisions, thus optimizing treatment paths and potentially reducing the incidence of medical errors in elderly care. It should not surprise us therefore, that several real-world applications and case studies already showcase the practical benefits of using AI, in general, and ChatGPT, in particular, in cardiogeriatrics.(21)

For instance, ChatGPT could per se behave as an intelligent and interactive conversational chatbot suitable to improve wellbeing of older adults and inform them on best cardiovascular prevention practices.(12) In addition, ChatGPT could well appraise cognitive functioning and also pinpoint at a diagnosis of Alzheimer's disease in a simulated scenario, and such cognitive appraisal is a preliminary requisite whenever consider complex cardiovascular interventions in the elderly.(22) Another typical scenario of application is in guiding decision making in actual patient cases, such as those requiring cardiovascular consultation before undergoing non-cardiac surgery, in order to gauge risk and need for additional diagnostic tests. In such setting another LLM model, Google Bard (Google, Mountain View, CA, USA) has proven quite useful and accurate in low-risk cases, with improved performance when adopting Google Gemini (Google).(23) We can assume with reasonable certainty that similar results could be achieved by using ChatGPT, despite some remarkable difference in each LLM specifics.(24) The capability of LLM of handling in a flexible manner complex sets of apparently disparate information sets has been leveraged to guide and facilitate multidisciplinary heart team decisions, such as those for the optimal management of severe aortic stenosis in older patients.(25) can prove ChatGPT can be leveraged for complex polypharmacy regimens, which are very common in the elderly with cardiovascular disease, when finding the most appropriate combination of agents is important, as well as minimizing complications and being aware of potential interactions and adverse effects.(26) For instance, its

use can facilitate medication reconciliation, ensuring the safety and effectiveness of prescribed regimens by continuously analyzing patient data to suggest optimal adjustments or highlight potential adverse interactions. This personalized approach not only mitigates medication-related risks but also enhances patient adherence by simplifying complex regimens. Furthermore, AI tools can address therapeutic inertia—a common issue in elderly care—by prompting timely medication adjustments and identifying opportunities to escalate or de-escalate therapies based on real-time health indicators. This proactive approach ensures that elderly patients receive the most effective care without delay, improving long-term health outcomes.

Reconciling promises and pitfalls

Despite such rosy premises, use of AI in healthcare, particularly among vulnerable populations like the elderly, raises significant ethical and privacy concerns, including data security, consent processes, and the need to maintain human oversight in AI-driven care, ensuring that patient dignity and privacy are prioritized. Other ongoing challenges include widespread technological integration issues, the digital divide among the elderly, reimbursement subtleties, and resistance from healthcare professionals and patients due to trust and understanding issues, providing a balanced view of the current landscape.(27-28)

Indeed, the future of AI in healthcare looks promising with ongoing advancements and innovations and this holds even truer for prevention and management of cardiovascular disease in the elderly (Table 1). The transformative potential of AI, particularly ChatGPT, in cardiogeriatrics is clearly enormous and could eventually prove greater than most optimistic expectations. Yet, collaboration between technologists and healthcare professionals remains paramount to ensure these tools are effectively integrated and will encourage ongoing research to address the existing challenges and maximize the benefits of AI in elderly care. For AI full potential use however, this would require a

functional and modern IT support network at healthcare settings, which is fast and fully incorporated electronic medical records. Indeed, hospitals which still use for example paper notes, are much less likely to benefit from the support LLM can provide.

Notably, AI can enhance various aspects of elderly cardiovascular care by addressing complex needs in a targeted manner.(29) For instance, AI can impact significantly on diagnosis and prognostication, as AI-driven tools, including ChatGPT, can support clinicians by quickly analyzing patient data to assess cardiovascular risk factors and suggest differential diagnoses. For example, AI models could evaluate electrocardiograms, echocardiograms, and other imaging data to identify potential heart conditions early, thereby enabling timely intervention.(30) In addition, AI can be leveraged to tackle the issue of polypharmacy. Indeed, in elderly patients with multiple comorbidities, ChatGPT could streamline medication management, aiding in reviewing medication lists to identify interactions and suggest safer alternatives.(31) By optimizing polypharmacy regimens, such novel AI tool could reduce the risk of adverse drug events and supports the individualization of therapy, which is crucial in older adults. In terms of personalization of management plans, ChatGPT can suggest adjustments to cardiovascular medications or lifestyle recommendations based on the latest evidence and patient-specific factors. Chatbots such as ChatGPT and similar LLMs can also serve as accessible, round-the-clock tools for patient engagement, answering questions, and providing health education.(32) This ongoing support may encourage adherence to treatment protocols and can play a pivotal role in reducing hospital readmissions for elderly patients with cardiovascular disease. Finally, ChatGPT could assist in overcoming therapeutic inertia by prompting healthcare providers with timely reminders or recommendations to escalate care when necessary.(33) For instance, AI tools can help track clinical parameters and suggest when interventions are needed to optimize patient outcomes. The adoption of AI can help mitigate these challenges by serving as a supportive tool for elderly

patients who may struggle with accessing traditional healthcare resources. AI applications, tailored specifically for geriatric care, can simplify complex medical language, help navigate healthcare processes, and foster a more approachable interaction between elderly patients and their providers, easing technology adoption.

Irrespective of these favorable premises, caution must be exercised in carefully supervising all AI-generated recommendations, and this holds even truer in the elderly, given the complex risk-benefit balance and their greater frailty burden.(34)

Conclusions

Incorporating AI into cardiogeriatric care holds significant promise for enhancing diagnostic precision and personalizing treatment strategies for elderly patients. ChatGPT and other breakthrough LLMs such as Gemini can timely process extensive medical data, facilitating improved communication between healthcare providers and patients, and supporting clinical decision-making. However, successful implementation requires robust IT infrastructure, seamless integration with electronic health records, and careful consideration of ethical and privacy concerns. Ongoing collaboration between technologists and healthcare professionals is essential to address these challenges and fully realize the benefits of AI in enhancing cardiovascular care for the elderly. By prioritizing the individual needs of elderly patients, AI has the potential to transform geriatric cardiovascular care, enhancing both the quality and accessibility of medical support. Through real-time data analysis, personalized care recommendations, and continuous monitoring, AI can empower healthcare providers to deliver tailored care that directly addresses the unique challenges of aging populations

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Table 1. Key current prospects and future avenues for exploiting ChatGPT in cardiogeriatrics, with accompanying real-world case studies.

Focus	**Elaboration**
Current prospects	ChatGPT may support cardiogeriatric care by improving communication and providing continuous health monitoring, bridging the gap between elderly patients and healthcare systems for personalized care.
	ChatGPT may assist with diagnosis and treatment planning by quickly processing patient data and suggesting evidence-based recommendations, optimizing elderly care.
	ChatGPT may support complex polypharmacy management in elderly patients with cardiovascular disease, finding appropriate medication combinations, minimizing complications, and addressing potential interactions and adverse effects.
Future avenues	Further research on ChatGPT's integration in multidisciplinary heart teams could optimize management strategies for complex conditions like severe mitral regurgitation in elderly patients.
	Investigating ChatGPT's potential in preclinical impairment detection could enhance preoperative cardiovascular risk assessments and interventions in elderly patients.
	Exploring ChatGPT's role in personalized medication management could refine polypharmacy regimens, improving safety and effectiveness in elderly cardiovascular care.

Figure 1. A graphical summary generated by ChatGPT (OpenAI, San Francisco, CA, USA) when prompted on the topic of the use of large language models such as ChatGPT for cardiogeriatric care.