developing therapeutic human antibodies, and financial interest in TenSixteen Bio, a company targeting somatic mosaicism and clonal hematopoiesis of indeterminate potential to discover and develop novel therapeutics to treat age-related diseases, and in Soley Therapeutics, a biotechnology company that is combining artificial intelligence with molecular and cellular response detection for discovering and developing new drugs, currently focusing on cancer therapeutics. Dr Bhatt reported receiving grants from Amarin, Amgen, Novartis, and Sanofi outside the submitted work; serving on an advisory board for Angiowave, Bayer, Boehringer Ingelheim, Cardax, CellProthera, Cereno Scientific, Elsevier Practice Update Cardiology, High Enroll, Janssen, Level Ex, McKinsey, Medscape Cardiology, Merck, MyoKardia, NirvaMed, Novo Nordisk, PhaseBio, PLx Pharma, Regado Biosciences, and Stasys; serving on a board of directors for Angiowave (stock options), Boston VA Research Institute, Bristol Myers Squibb (stock), DRS.LINQ (stock options), High Enroll (stock), Society of Cardiovascular Patient Care, and TobeSoft; being a chair member of American Heart Association Quality Oversight Committee; serving as a consultant for Broadview Ventures; serving on data monitoring committees for Acesion Pharma, Assistance Publique-Hôpitaux de Paris, Baim Institute for Clinical Research (formerly Harvard Clinical Research Institute, for the PORTICO trial, funded by St Jude Medical, now Abbott), Boston Scientific (chair, PEITHO trial), Cleveland Clinic (including for the ExCEED trial, funded by Edwards), Contego Medical (chair, PERFORMANCE 2), Duke Clinical Research Institute, Mayo Clinic, Mount Sinai School of Medicine (for the ENVISAGE trial, funded by Daiichi Sankyo; for the ABILITY-DM trial, funded by Concept Medical), Novartis, Population Health Research Institute, and Rutgers University (for the NIH-funded MINT Trial); receiving honoraria from the American College of Cardiology, Arnold and Porter law firm, Baim Institute for Clinical Research, Belvoir Publications, Canadian Medical and Surgical Knowledge Translation Research Group , Cowen and Company, Duke Clinical Research Institute, HMP Global, *Journal of the American College of Cardiology*, K2P, Level Ex, Medtelligence/ReachMD, MJH Life Sciences, Oakstone CME, Piper Sandler, Population Health Research Institute, Slack Publications, Society of Cardiovascular Patient Care, WebMD, Wiley; serving as deputy editor for Clinical Cardiology; being a chair member of NCDR-ACTION Registry Steering Committee and VA CART Research and Publications Committee; having a patent for sotagliflozin (named on a patent for sotagliflozin assigned to Brigham and Women's Hospital who assigned to Lexicon; neither I nor Brigham and Women's Hospital receive any income from this patent); receiving research funding from Abbott, Acesion Pharma, Afimmune, Aker Biomarine, Amarin, Amgen, AstraZeneca, Bayer, Beren, Boehringer Ingelheim, Boston Scientific, Bristol Myers Squibb, Cardax, CellProthera, Cereno Scientific, Chiesi, CinCor, Cleerly, CSL Behring, Eisai, Ethicon, Faraday Pharmaceuticals, Ferring Pharmaceuticals, Forest Laboratories, Fractyl, Garmin, HLS Therapeutics, Idorsia, Ironwood, Ischemix, Janssen, Javelin, Lexicon, Lilly, Medtronic, Merck, Moderna, MyoKardia, NirvaMed, Novartis, Novo Nordisk, Owkin, Pfizer, PhaseBio, PLx Pharma, Recardio, Regeneron, Reid Hoffman Foundation, Roche, Sanofi, Stasys, Synaptic, The Medicines Company, Youngene, and 89Bio; receiving royalties from Elsevier; being a site co-investigator for Abbott, Biotronik, Boston Scientific, CSI, Endotronix, St Jude Medical (now Abbott), Philips, SpectraWAVE, Svelte, and Vascular Solutions; being a trustee in the American College of Cardiology; and performing unfunded research for FlowCo and Takeda. No other disclosures were reported.

Data Sharing Statement: See the Supplement.

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COMMENT & RESPONSE

Cardiovascular Disease Prevention Recommendations From an Online Chat-Based AI Model

To the Editor A recent Research Letter[1] suggested that a research version of a dialogue-based artificial intelligence (AI) model (ChatGPT) can potentially assist clinical workflows by augmenting patient education and patient-clinician communication. Studies indicate that this dialogue-based AI model provides appropriate clinical responses and even passes parts of the US Medical Licensing Examination.[2,3] Language learning models may support patient education and, as they become more accurate, may perform at levels rendering them valid as clinical decision support tools.

However, current language models have limitations that make them ill-suited for clinical decision support without human supervision. Language learning models cannot cite reliable sources of information, making evaluation of the validity of the information they generate impossible. Because language learning models are pretrained using a vast amount of information that is not curated, they are prone to generate and amplify gender and racial biases. Language learning models do not provide reference to sources of medical information, which prevents validation of whether the knowledge is current, evidence-based, and unbiased. In contrast, symbolic AI, which simulates human brain learning, uses reliable sources of information and is created and validated by physicians using trusted, evidence-based sources.

Language learning models and AI will not replace physicians and are currently best used to fill communication gaps between physician and patients. Nonetheless, the emergence of telemedicine, virtual health, wearables, and remote monitoring, and their imminent integration with electronic health record AI, will ensure the centrality of information technology in US health care.

However, health information technology, AI, and informatics constitute a critically needed area of research that is currently underfunded. US investment in health informatics research on AI and digital transformation of health care are as important as supporting basic biomedical research and clinical trials. Because US health care–related errors are a leading cause of death[4,5] and are responsible for high levels of avoidable morbidity and care utilization, a major US national commitment to invest in advancing biomedical AI research, with public-private resourcing, is warranted. A multibillion-dollar fund should be developed, financed by the US health information technology industry and federal government, and deployed along with the institutional biomedical science and population/public health research capabilities and assets of the National Institutes of Health and Centers for Disease Control and Prevention. Collaborative, cross-sector research investment in biomedical AI could transform patient safety and yield health care value exceeding that of the personal computer, the

internet, and smartphones, constituent components enabling advanced biomedical AI.

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Conflict of Interest Disclosures: None reported.

1. Sarraju A, Bruemmer D, Van Iterson E, Cho L, Rodriguez F, Laffin L. Appropriateness of cardiovascular disease prevention recommendations obtained from a popular online chat-based artificial intelligence model. *JAMA*. 2023;329(10):842-844. doi:10.1001/jama.2023.1044

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In Reply In response to the Letter by Drs Gellert and Jaszczak about our Research Letter,[1] we agree that current application of language learning models in medicine will require close clinician and regulatory oversight. Indeed, our study findings highlight key limitations of language learning models. For example, we noted that the model provided inaccurate information about the availability of inclisiran for lipid lowering and inappropriate information about the interpretation of a low-density lipoprotein cholesterol level greater than 200 mg/dL. A false response, sometimes referred to as a "hallucination," is a potential limitation of current language learning models as well.[2] Such inaccuracies can have critical consequences in clinical settings, and our study points to the importance of strong guardrails for AI-assisted clinical workflows in medicine. Looking ahead to future developments beyond the current generation of language learning models, more sophisticated, theoretical, and multimodal AI models that are flexible across medical tasks have been proposed.[3]

We also concur with Gellert and Jaszczak regarding the need for an increased commitment to study and advance AI in medicine. Current language learning models seem well suited to be studied for administrative tasks, such as note transcription, but also demonstrate promise for certain clinical tasks, such as education and diagnostic support.[2] As AI models are developed for more health care use cases, there is a concurrent need to systematically evaluate whether they can meaningfully and safely improve current workflows. Evidence generation around clinical AI integration and implementation needs to be prioritized, particularly clinical trials, as demonstrated by a recent randomized trial of the use of AI in echocardiography.[4] Rigorous multidisciplinary efforts are warranted to understand AI model limitations, structural biases, and oversight needs. Furthermore, privacy concerns around multimodal patient health data, their exposure to tech and AI models, and the relevant medicolegal implications must be considered.[5] Although AI and language learning models demonstrate promise for application in clinical medicine, comprehensive efforts across stakeholders are warranted to evaluate and realize this promise in a safe and effective manner with the aim for improved—and potentially transformative—patient care.

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Greed in US Health Care

To the Editor I believe that the recent Viewpoint[1] pointing to greed as the root of the dysfunction in US health care was courageous but incomplete. The evidence Dr Berwick cited certainly documents an unchecked desire to profit from health care, but there is something else happening.

US health care is just one sector of a cultural system, late-stage capitalism, that has institutionalized greed as the dominant value in a market-based economy. What Dr Berwick calls "greed" is celebrated in other circles as "shareholder return." In 2023 in the US, shareholder return is a value prized above all other values—including equitable access to health care. The system is doing exactly what it was designed to do.

That fact that these returns go to an ever smaller number of shareholders is simply a feature of the current complex system, which has been controlled over the years by those in power to increase wealth for a very small segment of society at the expense of equality, higher quality of life, and longer length of life.