In the lungs, this condition manifests as chronic cough, dyspnea, and pleuritic pain, similar to interstitial lung disease.[1] WD-associated PAH is an infrequent finding. Its pathophysiology has not been established but a proinflammatory state has been proposed, mediated by cytokines, direct infiltration of TW into the pulmonary vessels, or embolisms of PAS-positive cells.[2] In our patient, PAH was initially classified as group 1,[6] the changes over time in the echocardiographic parameters of the disease after antibiotic therapy led to its reclassification in group 5, as PAH with unclear and/or multifactorial mechanisms. No evidence is available on the management of pulmonary vascular disease caused by WD. However, most published cases of PAH reported resolution of PAH after antibiotic therapy, similar to what occurred in our patient. This observation supports the hypothesis of direct injury to the pulmonary vessels by the microorganism.

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AUTHORS' CONTRIBUTIONS

I. Gallo Fernández is the main author of the article. M. Delgado Ortega supervised the manuscript and the patient diagnosis. J. Perea Armijo and J. Rodríguez Nieto collaborated on the manuscript drafting. D. Pastor Wulf and J. López Baizán collaborated on the echocardiographic follow-up studies and figure preparation.

CONFLICTS OF INTEREST

None.

DECLARATION

The present case was selected for publication in *Revista Española de Cardiología* among those submitted to the 2023 edition of the League of Clinical Cases of the Spanish Society of Cardiology.

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Performance of an artificial intelligence chatbot with web search capability in cardiology-related assistance: a simulation study

Rendimiento de un chatbot de inteligencia artificial con capacidad de búsqueda web en asistencia relacionada con la cardiología: un estudio de simulación

To the Editor,

Cardiovascular disease is the leading cause of mortality worldwide. Early recognition and management of symptoms are crucial for improving outcomes. Approximately 70% of patients seek health information from search engines before consulting medical professionals.[1] Chat generative pretrained transfomer (ChatGPT), a dialogue-based artificial intelligence (AI) language model, was launched in November 2022, attracting widespread attention in the scientific community.[2] Microsoft's Bing-Chat, an AI-based chatbot that provides conversational assistance based on GPT-4, with access to real-time web searches (WSa-GPT), was released on February 8, 2023.[3] WSa-GPT uses natural language and deep learning algorithms to provide responses in the form of natural conversations. Although chatbots like ChatGPT have been shown to provide mostly accurate answers to basic questions related to cardiovascular disease prevention[4] and patient queries, and is also able to write discharge reports,[5] there is a need to assess their safety in aiding patients who consult them. The aim of this simulation study was to qualitatively evaluate the feasibility and accuracy of a WSa-GPT chatbot in providing cardiology-related assistance for common and significant cardiovascular conditions.

This study was conducted during the week of February 13 to 17, shortly after the launch of this WSa-GPT chatbot. We tested various prompts until we found one that effectively served as a health assistant. One cardiologist simulated 14 patients, based on experiences using a freestyle-like conversation that covered common and significant cardiovascular symptoms as well as emergent or banal conditions (table 1). The conversations were recorded, and 2 independent cardiologists assessed (as "appropriate" or "inappropriate") whether the anamnesis was thorough and relevant (matching the symptoms and responses, collecting relevant health history, symptoms, and risk factors in line with clinical guidelines). The 2 independent cardiologists also assessed

Table 1
Patient characteristics, decision, and assessment.

Simulated disease	Age	Sex	Decision	Correct/ safe decision			Adequate anamnesis			Clarity	
				R1	R2	R3	R1	R2	R3	R1	R2
Syncope due to ventricular tachycardia in a patient with Brugada syndrome	36	M	Go to the ED	A	A	NA	A	A	NA	A	A
Paroxysmal supraventricular tachycardia with good drug tolerance	20	M	Go to the ED	A	A	NA	A	A	NA	A	A
Symptomatic severe aortic stenosis	67	M	Nonurgent evaluation	A	A	NA	I	I	NA	I	I
ST-elevation myocardial infarction	45	M	Call ED	A	A	NA	I	I	NA	A	A
Nonischemic chest pain	35	F	Primary care	A	A	NA	A	A	NA	A	A
Heart failure decompensation	82	M	Go to the ED	A	A	NA	I	I	NA	A	A
Stable angina	54	M	Preferential evaluation	A	A	NA	A	A	NA	A	A
Hypotension	104	F	Preferential evaluation	A	I	A	A	A	NA	A	A
Mild hypertension	62	F	Nonurgent evaluation	A	A	NA	A	A	NA	A	A
Neuromediated syncope	24	F	Nonemergency assessment	A	A	NA	A	I	A	A	A
Non–ST-elevation myocardial infarction	76	M	Go to the ED	A	A	NA	A	A	NA	A	A
Aortic dissection	56	M	Call ED	A	A	NA	I	I	NA	A	A
Prinzmetal angina	40	M	Call ED	A	A	NA	A	A	NA	A	A
Atrial flutter	83	F	Preferential evaluation	A	A	NA	A	A	NA	A	A

A, appropriate; ED, emergency department; F, female; I, inappropriate; M, male; NA, not available; R1, reviewer 1; R2, reviewer 2; R3, reviewer.

whether the final decision was safe for the patient, and whether the responses were clear and easy to understand. Discrepancies were resolved by the intervention of a third independent cardiologist. As no real patients were involved, there was no requirement for ethics approval.

Simulated patients were predominantly male (64.3%) with a median age (percentile 25-75) of 54 [36-73] years. A decision was reached after a median of 23 [18-29] messages. WSa-GPT responses to all simulated cases (100%) were rated as "appropriate" for a correct and safe final decision. Additionally, 13 cases (93%) were deemed "appropriate" for clarity and ease of understanding, and 10 cases (71%) as "appropriate" for anamnesis (table 1). Two discrepancies were resolved as "appropriate" by the third cardiologist. Each simulated conversation can be found in videos 1 to 14 of the supplementary data.

This exploratory study found that the WSa-GPT chatbot provided clear and appropriate advice across a range of simulated cardiovascular-related health conditions. Although the anamnesis was deemed inappropriate in 5 cases (eg, in Cases 3 and 6, no questions were asked about nycturia, weight gain or paroxysmal nocturnal dyspnea), the final advice was appropriate. These findings provide further support for previous data suggesting the potential of AI-based interactive chatbots for cardiology-related assistance.[4] These chatbots can deliver prompt and accurate answers to health inquiries, thereby reducing the workload of health care providers.[5,6] For example, the conversation between the patient and chatbot could be transmitted as electronic messages, allowing physicians to conduct an initial clinical assessment before the patient reaches the emergency department. Implementation of such AI-based chatbots could potentially lead to cost savings in health care costs and provide support to patients in remote areas with limited access to primary care physicians.

Several limitations merit consideration. First, patient-chatbot interaction was simulated rather than using real patients seeking medical advice. However, it seems unethical to delay a patient's consultation with a health care provider simply to evaluate the safety of an AI-based chatbot. Moreover, the freestyle-like conversation used in the simulation could lead to a bias in the evaluation of the tool. Second, the sample size was small. The reason was that Microsoft's Bing chatbot was limited to 11 messages 1 week after its launch. Although we simulated the most common reasons for presenting to the emergency department with acute chest pain, other possible, less frequent, diseases were not simulated and evaluated (eg, myocarditis, pneumothorax, Boerhaave syndrome); thus the appropriateness of WSa-GPT cannot be extended to these scenarios. Third, when we used the same original prompt 3 months after conceiving the study, the conversations were no longer reproducible. Bing Chat underwent several changes, focusing more on assisted web searches. Future studies should not only concentrate on the qualitative feasibility and accuracy of AI-based chatbots but also on the reproducibility of results. Fourth, although the cardiologists simulating the patients and the cardiologists evaluating the answers differed, a small bias may have been introduced. Fourth, 64% of simulated patients were male and all were Caucasian. Further research is required to assess the safety and effectiveness of the WSa-GPT chatbot in different patients and chronic conditions, as well as its role in supporting providers with personalized care. Fifth, the length of the conversations was not measured, but they proceeded naturally with no significant delay that could influence the dialogue experience. Sixth, these promising results are limited by the use of a personalized chatbot prompt, which may not be replicable in other settings.

In conclusion, 2 independent cardiologists deemed that the WSa-GPT chatbot provided appropriate and clear advice on the urgency of requesting in-person medical evaluation in 14 simulated patient cases. However, the results were not reproducible at a later date due to several changes to the WSa-GPT chatbot engine, limiting the applicability of this tool. The reproducibility of results will be an essential criterion in assessments of future GPT4-based AI-based chatbots for their feasibility and implementation in the hospital and prehospital setting.

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AUTHORS' CONTRIBUTIONS

All authors have contributed significantly to the following: *a)* the conception and design, data acquisition, or its analysis and interpretation; *b)* drafting the article or critically revising its intellectual content; *c)* providing final approval to the version to be published; and *d)* agreeing to accept responsibility for all aspects of the article and to investigate and resolve any questions regarding the accuracy and veracity of any part of the work.

CONFLICTS OF INTEREST

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APPENDIX. SUPPLEMENTARY DATA

Supplementary data associated with this article can be found in the online version, at https://doi.org/10.1016/j.rec.2023.06.008

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Transseptal crossing with the AcQCross device for cryoballoon-based pulmonary vein isolation procedures

Acceso transeptal con AcQCross en procedimientos de crioablación de venas pulmonares

To the Editor,

Ablation strategies for pulmonary vein isolation in patients with atrial fibrillation have become both faster and safer in recent years. New devices have also been developed to facilitate a crucial step in the procedure: transseptal puncture for left atrial access.[1,2]

Our hospital was the first in Spain to use the AcQCross Qx device (Medtronic, USA) for left atrial access. This device has an integrated dilator and needle, which can be used for conventional mechanical puncture or radiofrequency puncture for difficult septa. Because the AcQCross Qx dilator is used to introduce the FlexCath Advance Steerable Sheath (Medtronic) to help position the cryoablation catheter, the system can be simultaneously used to perform transseptal puncture and advance the sheath into the left atrium, simplifying the overall procedure and removing the need for conventional transseptal puncture using a separate sheath and needle system. In the traditional approach, the sheath bearing the needle is exchanged for the deflectable cryoablation sheath-dilator assembly, which is then advanced over the guidewire into the left atrium. The single-step AcQCross Qx approach simplifies left atrial access, reducing both procedure time and the risks associated with sheath exchange. Regardless of the technique used to guide transseptal access (fluoroscopy or ultrasound), once the AcQCross Qx-FlexCath assembly is positioned in the fossa ovalis, the integrated needle is extended by sliding the button on the handle of the AcQCross Qx (figure 1). Because the needle has a more tapered end than a conventional transseptal needle, crossing is achieved without the need for force. The lumen is also sized to accommodate a high-support guidewire, enabling femoral access without predilation and