THE MEDICAL BULLETIN OF
SISLI ETFAL HOSPITAL

DOI: 10.14744/SEMB.2025.35493
Med Bull Sisli Etfal Hosp 2025;59(3):311-315

Original Research

ChatGPT's Role in Coronary Artery Bypass Graft Information: A Critical Assessment

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Abstract

Objectives: This research evaluates the accuracy and reliability of ChatGPT's responses to inquiries concerning coronary artery bypass graft (CABG) surgery.

Methods: Between December 1, 2024, and December 15, 2024, two sets of questions were used to assess ChatGPT's performance: (1) a list of frequently asked questions (FAQs) sourced from official cardiovascular surgery websites, professional healthcare platforms, and social media, and (2) a list of scientific questions derived from the 2021 American Association for Thoracic Surgery (AATS) Guidelines for CABG in patients with ischemic cardiomyopathy and heart failure. Responses were evaluated using the modified DISCERN scoring system. To test reproducibility, each question was asked twice on separate computers within the same day. Two experienced cardiovascular surgeons independently scored the responses, and any disagreements were resolved through discussion.

Results: A total of 107 FAQs were assessed, of which 88 met the inclusion criteria. Based on the modified DISCERN scale, 71 responses (80.7%) received a score of 5, while 9 responses (10.2%) were rated as 4. The highest accuracy was observed in the preoperative preparation category, where all responses achieved a perfect score. Regarding scientific questions derived from the AATS Guidelines, 15 out of 20 (75.0%) were answered thoroughly and satisfactorily. The reproducibility rate was 92.0% for FAQs and 90.0% for guideline-based questions.

Conclusion: This study is the first to demonstrate that ChatGPT provides highly accurate and dependable responses regarding CABG surgery, particularly for frequently asked questions. Although performance declines slightly when addressing scientific questions based on guidelines, the reproducibility rate remains high. These findings indicate that AI-driven tools like ChatGPT could play a valuable role in patient education and enhancing public awareness about CABG surgery.

Keywords: Artificial intelligence, CABG, ChatGPT, DISCERN score

Please cite this article as "Cetin HK, Demir HB, Demir T. ChatGPT's Role in Coronary Artery Bypass Graft Information: A Critical Assessment. Med Bull Sisli Etfal Hosp 2025;59(3):311-315".

Coronary artery bypass graft (CABG) surgery is one of the most commonly performed surgical procedures in cardiovascular medicine, primarily used to restore blood flow to the heart muscle in patients with severe coronary artery disease (CAD).[1] CABG involves using grafts, typically harvested from the saphenous vein or internal mammary artery, to bypass occluded coronary arteries, thereby improving myocardial perfusion and reducing ischemic symptoms. Despite its widespread application, the actual long-term outcomes and post-operative complications of

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Submitted Date: April 10, 2025 **Accepted Date:** May 02, 2025 **Available Online Date:** October 13, 2025

CABG vary among patients, influenced by factors such as comorbidities, graft patency, and adherence to secondary prevention measures.[2] Given the increasing burden of CAD worldwide, enhancing patient awareness and compliance with post-CABG management strategies is crucial in reducing morbidity, mortality, and healthcare costs.[3] In the age of communication, many people use internet resources to get information about their symptoms and diseases including YouTube, Instagram, and artificial intelligence (AI) applications.[4]

ChatGPT is an AI application developed by OpenAI (San Francisco, California, United States of America), which behaves as multi-language chatbot. ChatGPT has been introduced to every part of life and business, including professional health services.[5] However, the efficiency and safety of AI in professional healthcare services is still under debate, and numerous studies are being performed to understand the capability of ChatGPT in medicine. Cakır and colleagues evaluated the knowledge of ChatGPT about urinary system stone diseases. The authors found that ChatGPT fully and adequately answered 19 out of 20 questions.[6] In another study by Cinar which analyzed ChatGPT answers about scoliosis showed that ChatGPT provided satisfactory answers to questions asked by the public.[7]

Even though numerous studies were performed about the capacity and use of ChatGPT in the field of medicine, no study has evaluated the performance of ChatGPT in CABG. In this study, the aim was to analyze the accuracy and proficiency of ChatGPT answers about CABG.

Methods

The study was conducted between December 1, 2024 and December 15, 2024. Two question lists were created according to the study design. This study did not involve any human participants or patient data; therefore, ethical approval was not required. The study was conducted in accordance with the principles of the Declaration of Helsinki. First, a frequently asked questions (FAQs) list was created by researching internet resources (official websites of cardiovascular surgery departments, charities that provide information about cardiovascular diseases, and websites of healthcare professionals working in the field of cardiovascular surgery) frequently used by patients. Moreover, hashtags related to CABG were searched in popular social media applications including YouTube, Instagram, and Facebook, etc. and an attempt was made to identify the questions frequently asked by society about CABG. Questions based on scientific data were prepared according to 2021: The American Association for Thoracic Surgery Expert Consensus Document: Coronary artery bypass grafting in patients with ischemic cardiomyopathy and heart failure. Scientific questions were grouped in another file. When preparing questions, questions associated with personal health problems and requiring personal responses, questions that contain advertising or aim to direct patients to a specific person or healthcare institution, questions with unrealistic nature, repetitive inquiries, and grammatically incorrect questions were excluded. Questions (n=88) on the FAQ list was divided into subgroups as preoperative preparation (n=16), surgery process (n=18), postoperative period (n=18), risks and complications (n=20), and daily life - long term results (n=16). Inquiries based on 2021 AATS Guideline: Coronary artery bypass grafting in patients with ischemic cardiomyopathy and heart failure included 20 scientific questions.

All FAQs and scientific questions related with CABG were answered by the free version of ChatGPT on December 10, 2024. The ChatGPT responses were scored by two experienced cardiovascular surgeon with minimum ten-year experience. The modified DISCERN scoring system was used when assigning scores to ChatGPT answers. The modified DISCERN form was developed to analyze the accuracy and reliability of medical contents, especially videos and written content. Criteria in the modified DISCERN scale can be used for the evaluation of the accuracy and proficiency of written sources. The scale includes five questions and each question is answered with yes (one point) or no (zero point). Five points indicate highest quality of ChatGPT answers [8]. When assessing the accuracy and proficiency of ChatGPT answers to scientific questions, 2021 AATS Guideline were taken into account. Each ChatGPT answer was rated by the cardiovascular surgeon separately, and, if ChatGPT' responses scored differently, the response was re-assessed, and a new score was obtained by joint decision of the two cardiovascular surgeon.

The repeatability of ChatGPT answers was evaluated by asking the same question to ChatGPT twice, on the same day, using different computers. The reproducibility of answers was accepted as positive if ChatGPT answers had the same score twice. Two ChatGPT responses with different scores according to modified DISCERN score were considered negative with regard to reproducibility. Since no patient data was used, ethics committee approval was not obtained for the present study.

Statistical Analysis

Statistical analysis was done using Excel Version 17 (Microsoft Corporation, USA). The questions were assessed separately as FAQ and questions based on 2021 AATS Guideline. The modified DISCERN scores for the ChatGPT responses are presented as percentages.

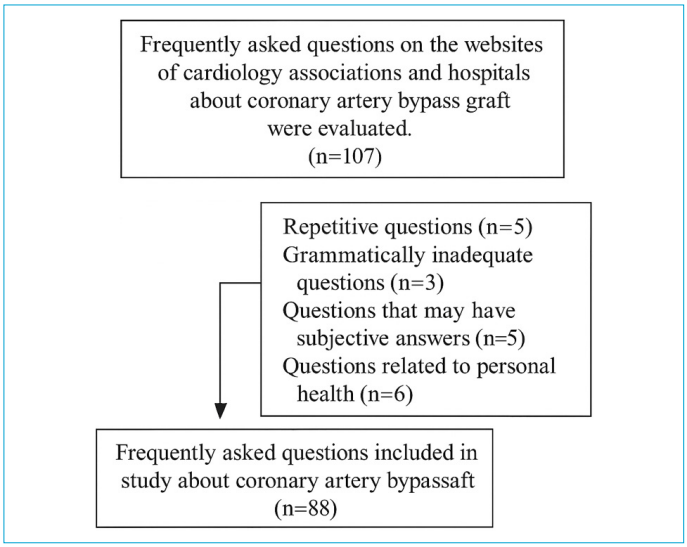

Figure 1. Flowchart of the selection process for frequently asked questions about coronary artery bypass graft (CABG) surgery.

Results

In total, 107 FAQs were evaluated in the study, and 88 questions met the study inclusion criteria. Five repetitive inquiries, 3 questions with significant grammatical errors, 5 questions requiring subjective answers, and 6 questions associated with personal health condition(s) were excluded from the study. The flowchart of the present study is documented in Figure 1.

According to the modified DISCERN scale, 71 (80.7%) of ChatGPT answers to FAQs about CABG scored 5, and 9 (10.2%) ChatGPT answers had scores of 4. In addition, 7 (7.9%) and 1 (1.1%) ChatGPT answers to FAQs about CABG obtained score 3 and score 2, respectively. None of ChatGPT responses to FAQs about CABG had score 1. When ChatGPT answers to FAQs subgroups are evaluated, ChatGPT achieved the highest accuracy rates in the preoperative preparation subgroup, and all ChatGPT answers to preoperative preperation questions scored 5 according to the modified DISCERN scale. A total 14 of 18 (77.8%) ChatGPT answers to surgery process FAQs, 13 of 18 (72.2%) ChatGPT answers to postoperative period FAQs, and 16 of 20 (80.0%) ChatGPT answers to risks and complications FAQs scored 5. Moreover, 15 of 20 (75.0%) scientific questions according to 2021 AATS Guideline were completely and satisfactorily answered by ChatGPT (Score 5). The modified DISCERN scores for ChatGPT answers to FAQs are summarized in Table 1.

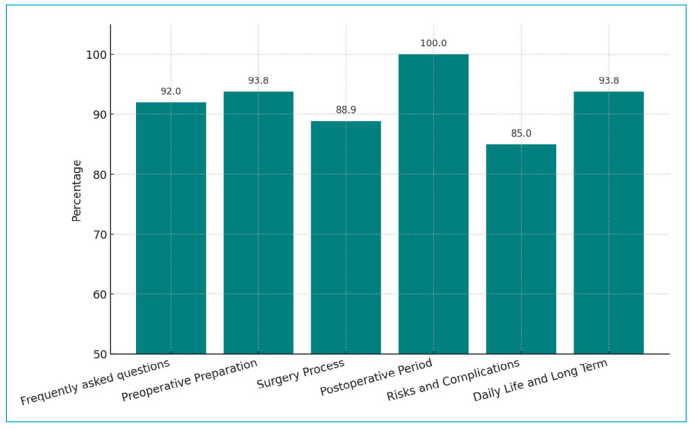

Figure 2. Distribution of selected CABG-related questions by category.

Reproducibility ratio was 92.0% for FAQs and 90.0% for 2021 AATS Guideline. Repeatability was highest (100%) for ChatGPT answers to postoperative period questions, and lowest (85.0%) for ChatGPT answers to risks and complications questions (Fig. 2).

Discussion

Due to the opportunities provided by AI, AI is increasingly used in our daily lives and professions. However, the effectiveness and reliability of AI, as well as its adequacy and impact on human life, are among frequently discussed topics.[9] Some professional health providers suggest that the introduction of AI in the medical field has increased the success of screening tests, enabled earlier disease diagnosis, reduced unnecessary blood test analysis and imaging modalities, and ensured more adequate follow-up schemes. However, the capability of ChatGPT has not been analyzed in many medical disciplines. Thus, our aim was to assess the performance of ChatGPT about CABG, which

Table 1. Modified DISCERN scores for responses by ChatGPT to questions related to coronary artery bypass graft

	Score 5, n (%)	Score 4, n (%)	Score 3, n (%)	Score 2, n (%)	Score 1, n (%)
Frequently asked questions (n=88)	71 (80.7)	9 (10.2)	7 (7.9)	1 (1.1)	-
Preoperative Preparation (n=16)	16 (100)	-	-	-	-
Surgery Process (n=18)	14 (77.8)	2 (11.1)	2 (11.1)	-	-
Postoperative Period (n=18)	13 (72.2)	3 (16.7)	1 (5.5)	1 (5.5)	-
Risks and Complications (n=20)	16 (80.0)	2 (10.0)	2 (10.0)	-	-
Daily Life and Long Term (n=16)	12 (75.0)	2 (12.5)	2 (12.5)	-	-
Guideline (n=20)	15 (75.0)	2 (10.0)	1 (5.0)	1 (5.0)	1 (5.0)

is one of the most important surgeries in cardiovascular surgery practice. This study revealed that ChatGPT gave completely accurate and satisfactory answers for 80.7% of FAQs about CABG. Though the quality of ChatGPT answers decreased, ChatGPT correctly answered 75.0% of scientific questions based on 2021 AATS Guideline. Moreover, ChatGPT achieved satisfactory reproducibility rates in answers for both FAQs and guideline questions.

Internet sources are frequently used by patients and the public due to their easily accessible and free nature; however, numerous studies emphasized the insufficiency of web sources in medicine. Also, some authors demonstrated that countless sources contained misinformation about health. In a study by Alsyouf et al.,[10] which analyzed information quality about prostate cancer in social media, the ratio of misleading information was 30 times higher than accurate information about prostate cancer in social media. In another study, Sevgili and Baytaroglu investigated the quality of YouTube videos about CAD and COVID-19. They stated that despite high view ranking of YouTube videos, YouTube videos included false information about CAD and COVID-19.[11] Conversely, Caglar and colleagues used ChatGPT to answer questions related to pediatric urological disorders, and the authors concluded that ChatGPT gave completely accurate and satisfactory answers for more than nine of ten questions.[12] In another study by Bulck and Moons, they analyzed the performance of ChatGPT in answering questions related with CAD. The authors found that ChatGPT gave completely accurate and sufficient answers for more than 85% of questions.[13] In this study, the quality of ChatGPT answers to questions about CABG was analyzed according to the modified DISCERN scale for the first time. Our results demonstrated that more than eight out of ten FAQs related with CABG were answered completely accurately and sufficiently by ChatGPT. Accessing numerous sources and the ability to review these sources may result in this high accuracy and proficiency rate of ChatGPT in answering question about CABG.

Guidelines are scientific reports with the purpose of guiding decisions and defining criteria regarding diagnosis, treatment and follow-up for a specific disease. When preparing guidelines, authors use countless medical papers including reviews, original articles, meta-analysis, and case reports.[14] ChatGPT performance for questions involving intense medical information is a matter of curiosity. Antaki and colleagues analyzed the performance of ChatGPT in an ophthalmology resident exam, and ChatGPT received 55.8 points out of 100. Antaki and colleagues stated that ChatGPT exam points were comparable with mean exam scores of ophthalmology residents.[15] Similarly, Cinar demonstrated that the accuracy and sufficiency of ChatGPT answers significantly decreased when responding to scientific questions in comparison with answering FAQs about scoliosis.[7] In contrast, Caglar et al.[12] obtained excellent outcomes with ChatGPT while answering guideline-based inquiries about pediatric urological diseases. In our study, ChatGPT gave accurate and satisfactory answers for more than 15 of 20 questions based on 2021 AATS Guideline.

Although this is the first research to evaluate the capacity of ChatGPT answers about CABG, our study involves some limitations. In the present study, only the English language, which is the most common language on the web and in the academic field, was used. It was considered that evaluating more than one language would make the analysis difficult, and be confusing for readers. We believe that use of ChatGPT to answer questions about CABG in rarer languages could be discussed in further studies. Secondly, the present study was done in a certain time period, but information about CABG is continuously shared on the internet. Lastly, the quality of ChatGPT responses was analyzed by two cardiovascular surgeon, understandability of ChatGPT answers about CABG may be the subject of further studies.

Conclusion

In conclusion, for the first time, our findings revealed that ChatGPT accurately and satisfactorily answered both FAQs about CABG and questions based on 2021 AATS Guideline. In addition, the reproducibility rate of ChatGPT responses was sufficient for both FAQs and scientific questions about CABG. The findings of the present study suggest that introducing ChatGPT in cardiology practice will provide better information about CABG for patients and public.

Disclosures

Ethics Committee Approval: The authors declared that not necessary for this manuscript.

Funding: There was no external funding about this manuscript.

Peer-review: Externally peer-reviewed.

Conflict of Interest: All authors declared that they have no conflict of interest.

Authorship Contributions: Concept – H.K.C.; Design – T.D.; Supervision – T.D., H.B.D.; Fundings – H.K.C., H.B.D.; Materials – H.K.C.; Data collection &/or processing – T.D.; Analysis and/or interpretation –H.K.C., H.B.D.; Literature search – H.K.C., T.D.; Writing – T.D.; Critical review – H.B.D.

Use of AI for Writing Assistance: The authors declared that artificial intelligence-supported products were not used in the production of the study.

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