

The Use of AI in Diagnosing Diseases and Providing Management Plans: A Consultation on Cardiovascular Disorders With ChatGPT

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Abstract

Background: Cardiovascular diseases (CVDs) have remained the leading causes of death worldwide and substantially contribute to loss of health and excess health system costs. According to WHO, cardiovascular diseases (CVDs) take an estimated 17.9 million lives each year. One of the reasons for an immensely high fatality in CVDs is lack of efficient diagnosis and prompt treatment. Timely recognition and management are crucial to minimize mortality. In the advancing world, AI (artificial intelligence) and machine learning technologies continue to progress, this advancement has opened new avenues for innovative approaches in the field of medicine. Despite the rapid development in the field of AI, there is a limited understanding of the potential benefits among clinicians and medical practitioners.

Methods: In this study, we aimed to investigate the potential that the AI language model holds to assist health practitioners in the diagnosis and treatment of cardiovascular disorders. We asked Chat Generative Pre-trained Transformer (ChatGPT) 10 hypothetical questions simulating clinical consultation. The responses given by ChatGPT were accessed for its accuracy and accessibility by a team of medical specialists and cardiologists with extensive experience in managing cardiovascular disorders.

Result: Out of the 10 clinical scenarios inserted in ChatGPT, eight were perfectly diagnosed, however, the other two answers given by ChatGPT were not entirely incorrect since those conditions were associated with the actual diagnosis. Furthermore, the management plans and the treatment protocols that were given by ChatGPT were in line with the literature and current medical knowledge. The exact drug names and regimens were not provided but a general guideline that was given by this AI tool is definitely beneficial for junior doctors in getting an idea on how to proceed or refresh their previous knowledge.

Conclusion: ChatGPT is a valuable resource in the field of medicine. Its comprehensive and properly organized response in an understandable language has made it an effective and efficient tool to be used. However, it is crucial to note that its limitations, such as the need for all associated and typical signs, symptoms, and physical examination findings, and its inability to personalize treatments need to be acknowledged.

Categories: Cardiology, Public Health, Healthcare Technology

Keywords: ai consultation, cardiovascular disorders, diagnosis and management, artificial intelligence chatgpt-4, ai and robotics in healthcare

Introduction

Cardiovascular diseases (CVDs) have remained the leading causes of death worldwide and substantially contribute to loss of health and excess health system costs. Deaths from cardiovascular disease surged 60% globally over the last 30 years. According to a recent report from the World Heart Federation on 20 May 2023, deaths from cardiovascular disease (CVD) jumped globally from 12.1 million in 1990 to 20.5 million in 2021 [1]. According to WHO, CVDs take an estimated 17.9 million lives each year. One of the reasons for an immensely high fatality in CVDs is the lack of efficient diagnosis and prompt treatment [2]. Timely recognition and management are crucial to minimize mortality.

In the advancing world, artificial intelligence (AI) and machine learning technologies continue to progress, this advancement has opened new avenues for innovative approaches in the field of medicine. Despite the rapid development in the field of AI, there is a limited understanding of the potential benefits for clinicians and medical practitioners. AI language-generated tools such as Chat Generative Pre-trained Transformer (ChatGPT) possess remarkable capabilities to disseminate medical information [3]. This tool does not only generate human-like text but the answers provided are extracted from multiple sites and research papers comprehensively. ChatGPT has proven to be highly beneficial in writing literature reviews, essays, and research papers, and providing answers to academic questions, however, its potential in the field of medicine, medical consultation, and patient care is yet to be discovered [4]. To explore this potential, the

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authors have conducted a simulated cardiology consultation using ChatGPT to generate answers to 10 cardiology-based clinical scenarios, subsequently evaluating its response.

Materials And Methods

In this study, we aimed to investigate the potential that the AI language model holds to assist health practitioners in the diagnosis and treatment of cardiovascular disorders. For this purpose ChatGPT, which is one of the largest language models currently accessible to the public, was used and its capacity to provide medical consultation, accuracy, and effectiveness was evaluated.

Study design

We asked ChatGPT 10 hypothetical questions simulating clinical consultation. The questions were clinical scenarios typical of each of the 10 cardiovascular disorders consisting of the signs and symptoms commonly seen in clinical settings coherent with the research and literature present. The scenario objective was to cover a broad cross-section of information that is needed by caregivers in the field of medicine. The responses given by ChatGPT were accessed for its accuracy and accessibility by a team of medical specialists and cardiologists with extensive experience in managing cardiovascular disorders. By evaluating the responses provided we aimed to establish the authenticity of AI-generated models such as ChatGPT in simulating clinical consultation in the field of medicine.

Inclusion and exclusion criteria

ChatGPT employs a probabilistic algorithm generating a diverse array of responses. ChatGPT4 was chosen to be used in our research as it is a version widely available and freely accessible to the public. The initial responses provided were documented refraining from any further clarification or correction; furthermore, meticulous attention was given to ensure that all the scenarios inserted were free from grammatical or syntactical errors. All of the scenarios were inserted on the same day by one of the authors to ensure that it is devoid of any variation. Alternative chatbots were not considered for this study as they demonstrated inferior capabilities when compared to the version used.

The primary objective of this study was to assess the performance of ChatGPT4 as a representative of advanced AI-generated models within the specific context of consultation related to cardiovascular disorders.

Results

The first scenario generated was of infective endocarditis, which has an incidence rate of 3-10 cases in every 100,000 people. This condition is caused by bacterial infections commonly seen in IV drug abusers, dental infections, or patients with prosthetics [5]. The typical signs and symptoms of this condition such as pansystolic murmur Osler nodes, Janeway lesions, digital clubbing, and petechial rash were mentioned in the scenario typed in ChatGPT. The diagnosis made by ChatGPT was correct and the treatment plan provided was also coherent with the treatment guidelines, however, it is to note that the treatment as a whole, was general and can act as a guide in planning out a precise and comprehensive treatment plan. Rather than mentioning the names of drugs or the names of surgical interventions, a general treatment regimen in an appropriate sequence was given. Therefore, it has been observed that in the case scenario of infective endocarditis, the diagnosis made was correct and the treatment plan can be used for academic purposes rather than being dependent on clinical, however, it can assist junior doctors in mapping out the treatment plan (Figure 1).



A 30 year old male , presented to the medicine OPD with the past history of dental infection, has Pan systolic murmur, digital clubbing, Osler nodes , janeway lesions and petechial rash. What is the diagnosis and treatment .



Based on the symptoms described, the diagnosis for the 30-year-old male could be infective endocarditis. Infective endocarditis is an infection of the inner lining of the heart, including the heart valves. It can be caused by bacteria or, less commonly, fungi.

The presence of a pan-systolic murmur, digital clubbing, Osler nodes, Janeway lesions, and petechial rash are characteristic findings associated with infective endocarditis. The pan-systolic murmur suggests valvular regurgitation, which can occur due to damage to the heart valves caused by the infection. Digital clubbing is a condition characterized by the swelling of the fingers and the formation of curved nails, and it can be associated with chronic conditions such as infective endocarditis. Osler nodes are tender, raised lesions on the fingers or toes, while Janeway lesions are painless, flat, red spots on the palms and soles. Petechial rash refers to the appearance of small, pinpoint-sized red or purple spots on the skin.

The treatment for infective endocarditis typically involves a combination of antibiotic therapy and, in some cases, surgical intervention. The choice of antibiotics depends on the causative agent and may require blood cultures to identify the specific organism. Treatment is usually administered intravenously and may last for several weeks. Surgical intervention may be necessary in cases where there is significant valve damage or the infection is not responding to antibiotics.

It's important for the patient to be admitted to the hospital for further evaluation, including blood cultures, echocardiography, and consultation with a cardiologist. The specific treatment plan will be determined by the healthcare team based on the severity of the infection, the involvement of the heart valves, and other factors specific to the individual patient.

FIGURE 1: Scenario of infective endocarditis.

The second scenario was of angina pectoris which is a complex symptom caused by transient myocardial ischemia [6]. The answer provided by ChatGPT was acute coronary syndrome. In this particular scenario, it is to note that acute coronary syndrome (ACS) is one of the common causes that present with stable angina. This has led us to the conclusion that a subset of symptoms is not sufficient rather ECG findings are also needed in order to create a definite diagnosis. This is not a limitation but a common situation that is commonly experienced by medical practitioners; furthermore, the need for ECG was also mentioned in the answer given by ChatGPT and the management protocol is also satisfactory (Figure 2).



A 40 year old male presented to the cardiac emergency with the complain of central chest pain, discomfort and breathlessness. What is the diagnosis and treatment.



The symptoms described by the 40-year-old male, including central chest pain, discomfort, and breathlessness, are suggestive of a possible cardiac condition. One of the most common conditions associated with these symptoms is acute coronary syndrome (ACS). ACS encompasses a range of conditions, including unstable angina and myocardial infarction (heart attack).

Given the limited information provided, it is crucial to consider ACS as a potential diagnosis. ACS occurs when there is a sudden reduction or blockage of blood flow to the heart, typically due to the formation of a blood clot within the coronary arteries. This can lead to chest pain or discomfort (angina) and potentially result in a heart attack if the blood flow is not promptly restored.

The immediate treatment for a suspected ACS case involves taking the following steps:

1. Call for emergency medical assistance: It's important to seek immediate medical attention by calling emergency services or going to the nearest emergency room.
2. Provide aspirin: Chewing and swallowing a full-strength (325 mg) aspirin tablet can help reduce the risk of further blood clot formation.
3. Administer oxygen: If available, oxygen may be given to relieve breathlessness and improve oxygen supply to the heart.
4. ECG and cardiac monitoring: Electrocardiogram (ECG) will be performed to evaluate the electrical activity of the heart and help determine if there are any signs of a heart attack.
5. Nitroglycerin: If prescribed or administered by a healthcare professional, nitroglycerin may be given to relieve chest pain and improve blood flow to the heart.
6. Medications: Depending on the severity of the condition, other medications like antiplatelet agents (e.g., clopidogrel), anticoagulants (e.g., heparin), and pain relief medication may be administered.
7. Revascularization: Once stable, further interventions such as percutaneous coronary intervention (PCI) or coronary artery bypass grafting (CABG) may be considered to restore blood flow to the heart if there is evidence of significant blockage in the coronary arteries.

FIGURE 2: Scenario of angina pectoris.

The third scenario was of Marfan syndrome which is caused by a mutation in a gene called FBN1 [7]. The clinical picture of this condition was inserted in ChatGPT and the response given consisted of the correct diagnosis and an appropriate treatment plan which again, was general. Rather than mentioning the exact treatment regimen a general guideline was provided (Figure 3).



A one year old female was brought to the pediatric OPD with complain of disproportionately long arms and legs, she has flat feet , curved spine, , chest that caves in and heart murmurs . What is the diagnosis and treatment .



The symptoms described in the one-year-old female, including disproportionately long arms and legs, flat feet, curved spine, chest indentation, and heart murmurs, are indicative of a genetic disorder called Marfan syndrome.

Marfan syndrome is a connective tissue disorder caused by a mutation in the fibrillin-1 (FBN1) gene, which is responsible for providing strength and elasticity to connective tissues. It affects multiple systems in the body, including the skeletal, cardiovascular, and ocular systems.

The diagnosis of Marfan syndrome is typically made based on a combination of clinical features and family history. Diagnostic criteria, known as the Ghent criteria, take into account various physical characteristics, such as tall stature, arm span exceeding the height, chest deformities, joint laxity, and cardiovascular abnormalities, including heart murmurs. Genetic testing can be performed to confirm the diagnosis by identifying mutations in the FBN1 gene.

Treatment for Marfan syndrome focuses on managing the symptoms and minimizing the risk of complications. It often involves a multidisciplinary approach with input from specialists in cardiology, orthopedics, and ophthalmology. The following interventions are commonly employed:

1. Regular medical follow-up: Regular check-ups are necessary to monitor the progression of the disorder and manage associated complications.
2. Medications: Medications may be prescribed to manage cardiovascular complications, such as beta-blockers or angiotensin receptor blockers (ARBs), to reduce the strain on the heart and blood vessels.
3. Cardiac surveillance: Regular monitoring of the heart is essential to detect and manage any potential cardiac complications, including aortic root dilation or mitral valve prolapse.
4. Orthopedic management: Orthopedic interventions may be required to address skeletal abnormalities, such as scoliosis (curved spine) or joint laxity. Bracing, physical therapy, or surgical interventions may be recommended.
5. Eye care: Regular ophthalmologic evaluations are necessary to monitor for ocular complications, such as lens dislocation or retinal detachment.

FIGURE 3: Scenario of Marfan syndrome.

The fourth scenario was mitral stenosis. Since this condition requires signs observed on detailed cardiovascular system (CVS) physical examination as well as the symptoms, a comprehensive scenario was typed in the chatbot which gave the correct diagnosis (Figure 4) [8]. An important thing to note here was that when the same scenario was typed in without the details of the CVS examination the diagnosis made was incorrect, pulmonary hypertension was the diagnosis made which is a condition commonly associated with mitral stenosis (Figure 5).



A 30 year old female complains of breathlessness, fatigue, palpitation, edema, hemoptysis, cough and chest pain, upon examination she has Tapping apex beat , right ventricular heave and a mid diastolic murmur. What is the diagnosis and its treatment.



The combination of symptoms described in the 30-year-old female, including breathlessness, fatigue, palpitations, edema, hemoptysis (coughing up blood), cough, chest pain, tapping apex beat, right ventricular heave, and a mid-diastolic murmur, raises suspicion for a condition known as Mitral Stenosis.

Mitral stenosis is a valvular heart disease that involves the narrowing or obstruction of the mitral valve, which separates the left atrium and left ventricle of the heart. The narrowing of the valve restricts blood flow from the left atrium to the left ventricle, causing increased pressure in the left atrium and pulmonary circulation.

The symptoms of mitral stenosis arise due to impaired blood flow across the narrowed valve and the associated increase in pressure. The tapping apex beat and right ventricular heave are signs of right ventricular enlargement caused by the elevated pressure in the left atrium and pulmonary circulation. The mid-diastolic murmur is a characteristic finding in mitral stenosis, representing turbulent blood flow across the narrowed valve during diastole.

FIGURE 4: Scenario of mitral stenosis with the findings of CVS examination.

CVS: cardiovascular system



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FIGURE 5: Similar scenario but without the CVS examination findings.

CVS: cardiovascular system

The fifth scenario was mitral regurgitation, which was typed in the chatbot with all its associated signs and symptoms along with the CVS examination findings, however, the diagnosis made by ChatGPT was dilated cardiomyopathy [9]. Mitral regurgitation is a frequent comorbid condition with dilated cardiomyopathy (DCM) as it deteriorates left ventricular volume and ejection fraction (Figure 6).



A 41 year old male presented with the complain of breathlessness, fatigue, edema, palpitation and ascites, on examination she has displaced apex beat , apical pan systolic murmur, Right ventricular heave Raised jugular venous pressure and a short mid diastolic murmur. What is the diagnosis and treatment .



The symptoms and examination findings described in the 41-year-old male, including breathlessness, fatigue, edema, palpitations, ascites, displaced apex beat, apical pan systolic murmur, raised jugular venous pressure, and a short mid-diastolic murmur, suggest a diagnosis of Dilated Cardiomyopathy.

Dilated cardiomyopathy is a condition characterized by the enlargement and weakening of the heart's left ventricle. This results in impaired pumping function, leading to symptoms of heart failure and related complications.

The displaced apex beat, apical pan systolic murmur, raised jugular venous pressure, and right ventricular heave indicate the presence of left ventricular dysfunction and associated valvular regurgitation. The short mid-diastolic murmur suggests mitral valve involvement, which can occur secondary to the dilated left ventricle and the resulting mitral valve annular dilation.

FIGURE 6: Scenario of mitral regurgitation.

The next sixth and seventh scenarios were of aortic stenosis and aortic regurgitation, respectively (Figures 7, 8). For both conditions, scenarios with signs, symptoms, and CVS examination findings were typed in the ChatGPT and the diagnosis was perfectly made for both, along with an appropriate management plan which was generally correct but cannot be totally dependent on in a clinical setting.



A 50 year old male presents with angina , exertional dyspnea, episodes of acute pulmonary edema , and exertional syncope, upon examination he has harsh ejection systolic murmur, slow rising carotid pulse, narrow pulse pressure and Thrusting apex beat . What is the diagnosis and treatment.



The symptoms and examination findings described in the 50-year-old male, including angina, exertional dyspnea, episodes of acute pulmonary edema, exertional syncope, harsh ejection systolic murmur, slow-rising carotid pulse, narrow pulse pressure, and a thrusting apex beat, suggest a diagnosis of Aortic Stenosis.

Aortic stenosis is a condition characterized by the narrowing or obstruction of the aortic valve, which is responsible for regulating blood flow from the heart's left ventricle to the rest of the body. The narrowing of the valve results in increased pressure and reduced blood flow across the aortic valve, leading to symptoms and complications.

The symptoms of aortic stenosis, such as angina (chest pain), exertional dyspnea (shortness of breath with activity), episodes of acute pulmonary edema (fluid accumulation in the lungs), and exertional syncope (fainting during physical exertion), are the result of decreased blood flow to the organs and inadequate cardiac output.

The harsh ejection systolic murmur heard on examination is typically loudest at the upper right sternal border and represents turbulent blood flow across the narrowed aortic valve during systole. The slow-rising carotid pulse and narrow pulse pressure are characteristic of severe aortic stenosis. The thrusting apex beat can occur due to left ventricular hypertrophy (thickening of the heart muscle) in response to the increased workload caused by the narrowed aortic valve.

FIGURE 7: Scenario of aortic stenosis.



A 30 year old male presented with the complains of palpitation, breathlessness and angina , on examination early diastolic murmur , , soft mid diastolic murmur and collapsing pulse. What is the diagnosis and treatment.



The symptoms and examination findings described in the 30-year-old male, including palpitations, breathlessness, angina, early diastolic murmur, soft mid-diastolic murmur, and collapsing pulse, suggest a diagnosis of Aortic Regurgitation (also known as Aortic Insufficiency).

Aortic regurgitation is a condition characterized by the backflow of blood from the aorta into the left ventricle during diastole due to incomplete closure of the aortic valve. This results in decreased forward blood flow and increased volume load on the left ventricle.

The symptoms of aortic regurgitation, such as palpitations, breathlessness, and angina, are due to the increased workload on the left ventricle and reduced cardiac output.

The early diastolic murmur heard on examination represents the regurgitant flow of blood from the aorta into the left ventricle during early diastole. The soft mid-diastolic murmur may be associated with blood flow across the mitral valve due to increased left ventricular filling and dilation. The collapsing pulse (also known as a water-hammer pulse) refers to a rapid and forceful arterial pulse that collapses quickly after its peak, reflecting the rapid ejection of blood during systole and the subsequent rapid regurgitation back into the left ventricle during diastole.

FIGURE 8: Scenario of aortic regurgitation.

The eighth scenario was of aortic dissection, a condition in which there is a tear in the aorta leading to dissection through the laminae and the formation of a new false lumen [10]. The patient in such a condition presents with low blood pressure, shortness of breath, chest pain, and dizziness. A scenario with similar signs and symptoms was inserted in ChatGPT and the diagnosis made was correct (Figure 9).



A 31 year old female presented with, sudden severe chest pain with ripping sensation , severe stomach pain, loss of consciousness and shortness of breath. What is the diagnosis and treatment.



The symptoms described in the 31-year-old female, including sudden severe chest pain with a ripping sensation, severe stomach pain, loss of consciousness, and shortness of breath, are highly concerning for a life-threatening condition called Aortic Dissection.

Aortic dissection occurs when there is a tear in the inner layer of the aorta, the largest artery that carries blood from the heart to the rest of the body. Blood can flow into the tear, creating a false channel within the layers of the aortic wall. This can lead to the separation or dissection of the layers of the aortic wall.

FIGURE 9: Scenario of aortic dissection.

The ninth scenario was atrial fibrillation, a condition in which abnormal electrical impulses start firing in the atria, this condition is recognized by abnormal ECG findings such as heart rate higher than 100 beats per minute, absent P waves, and irregularly irregular rhythm [11]. A clinical picture consisting of the findings

typical of this condition was typed in the chatbot and the diagnosis made was correct (Figure 10).



A 29 year old female was presented with palpitation, breathlessness and fatigue. Her heart rate is more then 100 beats per minute, on ECG p wave is absent and R R interval is irregularly irregular. What is the diagnosis and treatment.



The symptoms and findings described in the 29-year-old female, including palpitations, breathlessness, fatigue, heart rate over 100 beats per minute, absent P waves on ECG, and irregularly irregular R-R interval, suggest a diagnosis of Atrial Fibrillation (AF).

Atrial fibrillation is a common cardiac arrhythmia characterized by the irregular and rapid electrical activity in the atria, leading to an irregular and often rapid ventricular response. In AF, the normal coordinated contraction of the atria is disrupted, resulting in ineffective pumping of blood and an irregular heart rhythm.

FIGURE 10: Scenario of atrial fibrillation.

The 10th and final scenario was atrioventricular block. There are three degrees of AV block, which can be differentiated by their characteristic ECG findings [12]. The scenario inserted was of first-degree AV block and the diagnosis made was correct (Figure 11). In this case, the treatment plan was also correctly provided in an appropriate regimen (Figure 12).



A 42 year old male presented in cardiac emergency with the complain of dizziness, fainting spells, tiredness, and shortness of breath . upon examination he has heart rate below 60 beats per minute. On ECG PR interval is prolonged. What is the diagnosis and treatment .



The symptoms and findings described in the 42-year-old male, including dizziness, fainting spells, tiredness, shortness of breath, heart rate below 60 beats per minute, and prolonged PR interval on ECG, suggest a diagnosis of Sinus Bradycardia with First-Degree Atrioventricular (AV) Block.

Sinus bradycardia refers to a slower than normal heart rate originating from the sinus node, which is the natural pacemaker of the heart. A heart rate below 60 beats per minute in adults is generally considered bradycardia. First-degree AV block refers to a delay in the conduction of electrical impulses from the atria to the ventricles, resulting in a prolonged PR interval on the ECG.

FIGURE 11: Scenario of first-degree atrioventricular block.

The treatment of sinus bradycardia with first-degree AV block depends on the severity of symptoms, underlying causes, and potential complications. Treatment options may include:

1. Observation: If the patient is asymptomatic and there are no underlying conditions or complications, observation without specific treatment may be appropriate.
2. Medications: In certain cases, medications such as atropine or temporary transcutaneous pacing may be used to increase the heart rate and alleviate symptoms during acute episodes.
3. Pacemaker: If sinus bradycardia with first-degree AV block is symptomatic or persistent, the insertion of a permanent pacemaker may be necessary. A pacemaker is a small device implanted under the skin, usually near the collarbone, which helps regulate the heart rate and ensures appropriate electrical conduction.

The treatment approach for sinus bradycardia with first-degree AV block will depend on the individual patient's condition, symptoms, and underlying causes. It is important to consult with a healthcare professional, typically a cardiologist or an electrophysiologist, for an accurate diagnosis and appropriate management plan.

Please note that the information provided here is for general educational purposes, and you should consult a healthcare professional for a proper evaluation and guidance regarding your specific situation.

FIGURE 12: Management of first-degree atrioventricular block.

The response provided by ChatGPT has effectively addressed the general management plan for the disorder, this does not only guide junior physicians while creating the treatment plan but also acts as a reassurance for the patients and their family while searching online about their condition. The response cannot act as a prescription or provide the exact information on what to use at a particular time or state of the patient or during an emergency situation. Out of the 10 clinical scenarios inserted in ChatGPT, eight were perfectly diagnosed, however, the other two answers given by ChatGPT were not entirely incorrect since those conditions were associated with the actual diagnosis.

Furthermore, the management plans and the treatment protocols that were given by ChatGPT were in line with the literature and current medical knowledge. The exact drug names and regimens were not provided but a general guideline that was given by this AI tool is definitely beneficial for junior doctors in getting an idea on how to proceed or refresh their previous knowledge.

Discussion

This exploratory research delved into the capabilities that ChatGPT holds to understand and generate responses regarding clinical conditions in the healthcare domain in natural and understandable language, particularly in the field of cardiovascular disorders. The AI model has exhibited its proficiency in creating well-informed answers up to date with the research and guidelines related to the particular conditions. This AI model is easily accessible to the general population and the answers provided are in a simple and understandable language making it highly convenient to use.

The model presented consistent information based on its training data, mitigating the risk of human error or variability. With the use of ChatGPT, the need to dive into several websites and the confusion of deciding which website provides the correct information has become negligible, since it is providing complete, comprehensive information and also has an option of regenerating a response in case of dissatisfaction. This has reduced the amount of time and effort that it takes to find the correct information online. In cases when healthcare information is not sufficient, ChatGPT can provide a general guideline on management plan and treatment protocol [13].

However, it has its own limitations. It has been observed that in order to get the correct diagnosis the typical signs and symptoms as well as examination findings are needed. In the absence of any one of these, a

provisional diagnosis is generated, though it is expected to have a list of differential diagnoses in case of any confusion or lack of information. Furthermore, the management and the treatment plans are general in terms that in every condition the treatment that you give depends upon the stage, state, and situation for instance the age, the comorbidities, and the stage and progression of the disease all in combination comprehend the medication needed.

Moreover, ethical concerns always emerge while relying on AI tools for medical advice as any misinterpretation can lead to detrimental outcomes. It has been observed that ChatGPT is an excellent tool to be used academically in writing articles, research papers, or in getting a deeper and more comprehensive insight into a particular medical condition. In clinical settings, it can definitely assist physicians in confirming their made diagnosis or in case of confusion making the correct diagnosis but in the presence of all typical signs, symptoms, and physical examination findings.

Limitations and future outcomes

In our study, we found a few limitations and potential future directions that could assist in further exploration and research. One of the limitations of this study which is necessary to address is that the clinical scenarios inserted had the typical picture, and unique and rare findings were not mentioned in it, this could be a challenge for AI tools such as ChatGPT to address. Furthermore, while asking for the management plan, we used the same scenario that was typed in for diagnosis, this gave a general management plan. In future studies, we would want to see the responses ChatGPT can give when the clinical scenarios are more complex with comorbidities and at different stages of the disease. If these limitations are addressed in future studies and worked on then the AI tools would definitely become a great dependable source for medical practitioners.

Conclusions

To conclude, ChatGPT is a valuable resource in the field of medicine. Its comprehensive, and properly organized response in an understandable language has made it an effective and efficient tool to be used. Furthermore, it is easily accessible and free of cost through various digital platforms. However, it is crucial to note that its limitations such as the need for all associated and typical signs, symptoms, and physical examination findings and its inability to personalize treatments need to be acknowledged. Despite these challenges, ChatGPT has proved to be an efficient and effective tool both academically and in clinical setups.

Additional Information

Disclosures

Human subjects: All authors have confirmed that this study did not involve human participants or tissue.

Animal subjects: All authors have confirmed that this study did not involve animal subjects or tissue.

Conflicts of interest: In compliance with the ICMJE uniform disclosure form, all authors declare the following: **Payment/services info:** All authors have declared that no financial support was received from any organization for the submitted work. **Financial relationships:** All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work. **Other relationships:** All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

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