



EXPLORING THE USE OF CHATGPT FOR COUNSELING PATIENTS WITH DIABETIC RETINOPATHY IN REGIONS WITH LIMITED OPHTHALMIC CARE

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Abstract – Diabetic retinopathy is a sight-threatening complication of diabetes. In areas with limited ophthalmic services, AI-powered Chat GPT can be utilized to offer counseling and guidance to patients. This article examines the potential of Chat GPT in improving access to eye care in underserved regions. While it cannot replace medical evaluation, Chat GPT can provide educational information and basic counseling to raise awareness and guide patients. Benefits include consistent information delivery and easy accessibility, but limitations, such as the inability to perform physical examinations or provide accurate diagnoses, must be acknowledged. Ethical concerns also need consideration. Further research is necessary to assess Chat GPT's capabilities, but it holds promise for

enhancing healthcare delivery. However, integration into healthcare systems should follow appropriate guidelines and involve collaboration with healthcare professionals to ensure ethical and responsible implementation. Conclusion: The use of AI-powered ChatGPT for counseling DR patients in regions with limited ophthalmic care holds promise as a supplementary tool for improved health education and communication in healthcare. While not a substitute for medical expertise, it can enhance healthcare delivery. Further research is required to refine the technology, address limitations, and tackle ethical concerns.

Keywords: ChatGPT, Diabetic Retinopathy, Ophthalmic Care, Diabetes, Counseling Patients.

Introduction

Diabetic retinopathy (DR) stands as the most prevalent microvascular complication associated with diabetes and constitutes the leading cause of acquired vision impairment among the working-age population, accounting for 5-17% of blindness cases worldwide (Resnikoff et al., 2004; Leasher et al. 2016). It is estimated that one-third of individuals diagnosed with diabetes suffer from DR, with roughly one-third of this population facing the hazard of vision-threatening retinopathy (International Diabetes Federation, 2021). The findings from the Wisconsin Epidemiological Study of Diabetic Retinopathy (WESDR) (Klein, et al 2008) provided the rationale for the development of guidelines for dilated-pupil examination by experienced ophthalmologists in detection and treatment of DR. These guidelines propose initial assessments at the time of diagnosis for individuals with type 2 diabetes mellitus and subsequently on an annual basis, and for those with type 1 diabetes mellitus, such evaluations should commence after 5 years of diagnosis and continue annually (Christina et al., 2020). However, access to ocular healthcare can vary considerably in developing countries due to factors such as limited resources, uneven distribution of healthcare professionals, and insufficiency of healthcare infrastructure (World Health Organization, 2019). In regions with limited access to specialized ophthalmic care, early diagnosis and management of DR become particularly challenging, often resulting in delayed or inadequate treatment. Therefore, it is crucial to find innovative solutions that can help provide ophthalmic support to patients in these areas. Recently, various reports have highlighted the

potential benefits and possible applications of ChatGPT, an advanced artificial intelligence (AI) language model, in addressing challenges in the realm of healthcare education and practice (Smith; Doe; Johnson, 2022; Dave; Athaluri; Singh, 2023; Will ChatGPT transform healthcare, 2023; Sallam, 2023). This article explores a novel approach to addressing the challenge in regions marked by limited access to specialized ophthalmic care, where the timely diagnosis and management of DR often present significant difficulties. This approach harnesses the capabilities of ChatGPT to provide counseling patients with DR. Consequently, it can help raise awareness among patients about the disease, its symptoms, and provide initial guidance, ultimately contributing to the early detection and better management of DR in underserved populations. While Chat GPT does not replace specialized medical evaluation, it can be a valuable resource for patients in regions with limited access to ophthalmic services (Dale, 2021; Stokel-Walker; Van Noorden, 2023).

Objective

To investigate the application of ChatGPT in providing counseling to patients with Diabetic Retinopathy (DR) in underserved ophthalmic healthcare areas.

Methods

As an ophthalmologist working in the public healthcare system, I ask the Chat GPT three questions that a layperson might have regarding DR.

1 - I HAVE DIABETES AND CAN'T GET AN APPOINTMENT WITH AN OPHTHALMOLOGIST. WHEN SHOULD I SUSPECT THAT I HAVE DIABETIC RETINOPATHY?

2 - WHEN SHOULD I SEEK MEDICAL HELP?

3 - HOW IS THE PROGRESSION OF DIABETIC RETINOPATHY?

Results And Discussion

The answers given by GPT Chat to each question are shown in Table 1.

Table 1 - The result of a dialogue about an diabetic retinopathy and/or doubts using the ChatGPT tool (available on <https://chat.openai.com/chat>) on 27/06/2023

Question 1: I HAVE DIABETES AND CAN'T GET AN APPOINTMENT WITH AN OPHTHALMOLOGIST. WHEN SHOULD I SUSPECT THAT I HAVE DIABETIC RETINOPATHY?

ChatGPT: As an AI language model, I'm not a substitute for professional medical advice, diagnosis, or treatment. However, I can provide some general information. If you have diabetes and are unable to get an appointment with an ophthalmologist, it's important to be vigilant about monitoring your eye health. Diabetic retinopathy is often asymptomatic in the early stages, but there are some signs and symptoms that you should be aware of. These may include:

- 1. Blurred or distorted vision:** You may experience difficulties with your vision, such as blurred or distorted vision. Objects may appear fuzzy or you may have trouble focusing.
- 2. Floaters or dark spots:** You may notice the presence of dark spots or "floaters" in your field of vision. These are caused by changes in the vitreous, the gel-like substance inside your eyes.
- 3. Fluctuating vision:** Your vision may fluctuate throughout the day, with periods of clearer or cloudier vision.
- 4. Impaired color vision:** You may have difficulty perceiving colors as vividly as before or have trouble distinguishing between certain colors.
- 5. Vision loss:** In advanced stages of diabetic retinopathy, you may experience significant vision loss or even blindness.

ChatGPT: It's important to remember that these symptoms can also be indicative of other eye conditions or general vision problems. However, if you notice any changes in your vision or experience any of the aforementioned symptoms, it's crucial to seek

medical attention from a healthcare professional, preferably an ophthalmologist or an optometrist with experience in diabetic eye care.

Additionally, managing your diabetes through regular monitoring of blood glucose levels, controlling blood pressure, and adhering to a healthy lifestyle can help reduce the risk of developing diabetic retinopathy or slow its progression if already present.

I highly recommend reaching out to a healthcare professional who can provide personalized advice and guidance based on your specific situation.

Question 2: WHEN SHOULD I SEEK MEDICAL HELP?

ChatGPT: If you have diabetes and are concerned about your eye health, it's important to seek medical help in the following situations:

1. Annual comprehensive eye exams: Regardless of whether you're experiencing symptoms, it's recommended for individuals with diabetes to undergo annual comprehensive eye exams. These exams are essential for early detection and monitoring of diabetic retinopathy and other eye conditions.

2. Sudden changes in vision: If you experience sudden or significant changes in your vision, such as blurred vision, difficulty focusing, or vision loss, it's important to seek immediate medical attention. These changes may indicate a serious issue that requires prompt evaluation and treatment.

3. Persistent or worsening symptoms: If you notice persistent symptoms related to your eyes, such as floaters, dark spots, distorted vision, or impaired color vision, it's advisable to consult a healthcare professional. Even if these symptoms come and go, it's best to have them evaluated to rule out any underlying eye conditions.

4. Routine diabetes management: Regularly monitoring and managing your diabetes is crucial for preventing complications, including diabetic retinopathy. If you're experiencing difficulties managing your blood sugar levels or if your diabetes management plan needs adjustment, it's important to consult with your primary care physician or endocrinologist.

5. Recommended follow-up intervals: If you have been diagnosed with diabetic retinopathy or are at an increased risk, your eye care professional will provide guidance on the appropriate follow-up intervals. Adhering to these recommendations is vital for ongoing monitoring and timely intervention if needed.

ChatGPT: Remember, it's always better to err on the side of caution when it comes to your health. If you have any concerns or questions about your eye health as a person with diabetes, I strongly encourage you to consult with a healthcare professional, preferably an ophthalmologist or an optometrist experienced in diabetic eye care. They will be able to provide personalized advice and guidance based on your specific circumstances.

Question 3: HOW IS THE PROGRESSION OF DIABETIC RETINOPATHY?

ChatGPT: The progression of diabetic retinopathy can vary from person to person. It generally develops gradually over time and is classified into different stages based on the severity of the disease. The progression can be categorized as follows:

- 1. Mild non-proliferative diabetic retinopathy (NPDR):** In the early stages, small areas of swelling or microaneurysms may develop in the tiny blood vessels of the retina. These changes may not cause noticeable symptoms or vision problems.
- 2. Moderate NPDR:** As the disease progresses, the blood vessels in the retina may become blocked or leak fluid. This can lead to the formation of larger areas of swelling, called macular edema, which can cause blurry or distorted vision.
- 3. Severe NPDR:** In this stage, more blood vessels become blocked, leading to a significant reduction in blood supply to the retina. As a result, the retina may send signals for the growth of new blood vessels, a process known as neovascularization.
- 4. Proliferative diabetic retinopathy (PDR):** Neovascularization characterizes PDR. Fragile new blood vessels grow on the surface of the retina and into the vitreous gel, which can cause severe vision problems. These new blood vessels are prone to bleeding, leading to the formation of scar tissue, retinal detachment, and potentially permanent vision loss.

ChatGPT: It's important to note that not all individuals with diabetic retinopathy will progress to the advanced stages, and the rate of progression can vary. Strict control of blood sugar levels, blood pressure, and cholesterol, along with regular eye exams and appropriate treatment, can help slow down or prevent the progression of diabetic retinopathy.

Early detection and timely intervention are crucial in managing diabetic retinopathy. Regular comprehensive eye exams, as recommended by your eye care professional, can help monitor the progression of the disease and guide appropriate treatment options. If you have diabetes and are at risk of diabetic retinopathy, it's important to work closely with your healthcare team to optimize your diabetes management and ensure regular eye screenings.

ChatGPT has garnered attention for its potential to provide valuable advice and support to patients dealing with various medical conditions (Sallam, 2023). Its ability to communicate effectively and offer information has positioned it as a promising tool, particularly in regions where access to specialized healthcare professionals is scarce (Van Dis, et al. 2023). This paper presents a pioneering contribution to healthcare by harnessing the capabilities of ChatGPT as a virtual counselor for patients with DR in regions facing limited access to ophthalmic care. Our innovative approach addresses the critical issue of delayed or inadequate diagnosis of DR by providing accessible, multilingual, and scalable counseling through ChatGPT. This AI model can provide timely information, raise awareness about DR, and offer initial guidance. By leveraging ChatGPT's expertise in natural language understanding and generation, we ensure that eye care information and guidance are readily available to underserved populations. Ultimately, this enhances patient education, promotes early detection, and improves the overall management of DR, thereby improving healthcare outcomes.

Based on insights derived from our dialogue with ChatGPT, it becomes evident that recognizing the variability in the progression of DR among individuals is of paramount importance. Key factors contributing to this variability include the duration of diabetes, the level of glycemic control, and the management of blood pressure. These insights underscore the critical role of early detection, even in asymptomatic cases, as a crucial step in addressing DR. Furthermore, the invaluable understanding emerges that effective management of diabetes significantly influences the progression of retinopathy, offering individuals with diabetes a tangible means of mitigating its impact on their eye health.

However, it is imperative to acknowledge the limitations of this technology. ChatGPT lacks the capability to perform physical examinations or offer accurate medical diagnoses, which underscores the necessity of human healthcare providers for comprehensive care (Van Dis, et al. 2023). Moreover, ethical concerns, including patient data privacy and the need for medical supervision, must be addressed diligently in the integration of AI in healthcare services (Dave; Athaluri; Singh, 2023; Will ChatGPT transform healthcare?, 2023; Sallam, 2023; Van Dis, et al. 2023).

This novel use of AI technology not only has the potential to transform

healthcare delivery in resource-constrained settings but also serves as a model for leveraging AI in other medical contexts where patient education and counseling are paramount. Decision-makers should emphasize diabetes education and support programs to help patients better manage their conditions, thus reducing the risk of retinopathy. They may also consider the scalability and adaptability of ChatGPT, recognizing it as a valuable resource to complement limited ophthalmic services. These strategies can collectively contribute to better outcomes for individuals with diabetes and reduce the impact of DR retinopathy on public health.

Future Considerations And Conclusion

It is worth noting that Chat GPT always recommends seeking qualified professionals for assessment and guidance, as highlighted in Table 1. The AI model itself recognizes the importance of verifying information with additional sources, especially in critical areas such as healthcare, as Chat GPT does not verify the accuracy or reliability of the provided information (Dale, 2021).

Further research is needed to fully evaluate the capabilities of Chat GPT and its potential in the healthcare field. However, it is evident that Chat GPT represents a significant advancement and optimizes our learning, medical practice, and scientific work (Dave; Athaluri; Singh, 2023; Will ChatGPT transform healthcare?, 2023; Sallam, 2023). To do so, it is crucial to use Chat GPT ethically and responsibly, ensuring that its integration into healthcare systems is accompanied by appropriate guidelines developed in collaboration with healthcare professionals to ensure a safe and effective approach (Dale, 2021).

In conclusion, the use of AI-powered Chat GPT for counseling patients with DR in regions with restricted ophthalmic care shows promise. While this tool cannot replace the expertise of medical professionals, it can serve as a valuable instrument to improve health education, communication, and ultimately contribute to more effective and efficient healthcare delivery. Further research is needed to enhance the technology, address its limitations, and tackle ethical concerns.

Study Limitation

The use of Chat GPT to guide patients with limited access to ophthalmic care can be a valuable tool, as long as it is used within its limitations. While it is important to emphasize that Chat GPT does not replace medical assistance, it has demonstrated the potential to provide guidance to individuals diagnosed with diabetes.

Consent

All authors give consent for the publication of the manuscript. The manuscript has been read and approved by all the authors, the requirements for authorship as stated earlier in this document have been met, and each author believes that the manuscript represents honest work.

Ethical Approval

Ethical approval of this study was obtained from: Santa Casa de Belo Horizonte ethical committee, under number 5.425.090, CAAE 44367015.1.0000.5138.

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