

Using Artificial Intelligence ChatGPT to Access Medical Information About Chemical Eye Injuries : Compative Study

Layan Yousef Alharbi, Rema Rashed Alrashoud, Bader Shabib Alotaibi, Abdulaziz Meshal Al Dera, Raghad Saleh Alajlan, Reem Rashed AlHuthail, Dalal Ibrahim Alesla

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Abstract

Background: Chemical ocular injuries are a major public health issue, causing eye damage from harmful chemicals and potentially leading to severe vision loss or blindness if not treated promptly and effectively. Although medical knowledge has advanced, accessing reliable and understandable information on these injuries remains challenging due to unverified online content and complex terminology. Artificial Intelligence (AI) tools like ChatGPT provide a promising solution by simplifying medical information and making it more accessible to the general public.

Objective: This study aims to assess the use of ChatGPT in providing reliable, accurate, and accessible medical information on chemical ocular injuries. It evaluates the correctness, thematic accuracy, and coherence of ChatGPT's responses compared to established medical guidelines and explores its potential for patient education.

Methods: Nine questions were entered to ChatGPT regarding various aspects of chemical ocular injuries, including : definition, prevalence, etiology, prevention, symptoms, diagnosis, treatment, follow- up, and complications. The responses provided by ChatGPT were compared to the ICD-9 and ICD-10 guidelines for chemical (alkali and acid) injuries of the conjunctiva and cornea. The evaluation focused on criteria such as correctness, thematic accuracy, coherence to assess the accuracy of ChatGPT's answers. The inputs were categorized into three distinct groups, and statistical analyses, including Flesch–Kincaid readability tests, ANOVA, and trend analysis, were conducted to assess their readability, complexity and trends.

Results: The results showed that ChatGPT provided accurate and coherent responses for most questions about chemical ocular injuries, demonstrating thematic relevance. However, the responses sometimes overlooked critical clinical details or guideline-specific elements, such as emphasizing the urgency of care, using precise classification systems, and addressing detailed diagnostic or management protocols. While the answers were generally valid, they occasionally included less relevant or overly generalized information, reducing their consistency with established medical guidelines. The average FRES was 33.84 ± 0.28 , indicating a fairly challenging reading level, while the FKGL averaged 14.21 ± 0.22 , suitable for readers with college-level proficiency. Passive voice was used in $7.22\% \pm 0.66\%$ of sentences, indicating moderate reliance. Statistical analysis showed no significant differences in FRES ($p = .385$), FKGL ($p = .555$), or passive sentence usage ($p = .601$) across categories, as determined by one-way ANOVA. Readability remained relatively constant across the three categories as determined by trend analysis .

Conclusions: ChatGPT shows strong potential in providing accurate and relevant information about chemical ocular injuries. However, Its language complexity may prevent accessibility for individuals with lower health literacy and sometimes miss critical aspects. Future improvements should focus on enhancing readability, increasing context-specific accuracy, and tailoring responses to person needs and literacy levels. While ChatGPT can be a helpful tool for patients and healthcare professionals, it shouldn't replace professional medical advice, as some responses might not match clinical practice or address the needs of patients with different levels of education.

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Original Manuscript

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conclusion: ChatGPT shows strong potential in providing accurate and relevant information about chemical ocular injuries. However, Its language complexity may prevent accessibility for individuals with lower health literacy and sometimes miss critical aspects. Future improvements should focus on enhancing readability, increasing context-specific accuracy, and tailoring responses to person needs and literacy levels. While ChatGPT can be a helpful tool for patients and healthcare professionals, it shouldn't replace professional medical advice, as some responses might not match clinical practice or address the needs of patients with different levels of education.

Keywords: Artificial Intelligence; ChatGPT; Chemical eye injuries; Ophthalmology; Medical information; Patient education; ICD-9; ICD-10; Readability

1. introduction

The Internet has become a significant source of health-related information. In the early 2000s, 4.5% of global Internet searches were health-related. However, much of the online medical information can be inappropriate or even harmful due to unverified content and insufficient online regulations. Additionally, even when the information is accurate, it may be presented in language too complex for the general public, making it inaccessible[1,2,3]. Artificial Intelligence (AI), a field of computer science, focuses on creating systems capable of tasks traditionally requiring human intelligence, such as reasoning, learning, problem-solving, perception, and language comprehension [4]. In November 2022, OpenAI introduced "ChatGPT," a large language model (LLM) trained on extensive multilingual text datasets, enabling it to generate human-like responses to textual inputs. Chatbots, as AI-powered applications, are designed to simulate human conversations effectively through text or voice interactions[5].

With its extensive knowledge base and complex parameters, it allows users to ask questions and receive answers that demonstrate advanced, human-like reasoning[6]. Since its release, ChatGPT has gained significant popularity and is rapidly becoming a common tool for individuals to seek various types of information online[7]. Currently, many studies are assessing the capabilities and potential applications of this chatbot, but the reliability of the information provided by ChatGPT still requires validation.

It was recognized for its potential to revolutionize the entire medical field across several areas, such as patient care, healthcare systems and professionals, research, and education and training[8]. A 2020 survey indicated that 55% of Europeans aged 16–74 searched for health-related information online, reflecting a 21% increase since 2010. In the USA, the percentage rose from 62.8% in 2008 to 74.7% in 2017, showing an 11.9% increase[9,10]. Artificial intelligence (AI) has made significant progress in healthcare, especially in several areas of ophthalmology[11,12]. Since the complexity of ophthalmology makes it highly challenging for ChatGPT to provide accurate answers to questions in this field. In addition, the use of ChatGPT to access medical information in the field of ophthalmology remains unexplored. For this reason, further validation studies are crucial, particularly to evaluate ChatGPT's effectiveness in addressing a broad spectrum of eye disease-related questions within the clinical practice setting in Saudi Arabia.

Considering the growing trend and the increasing popularity of ChatGPT, it is likely that people will probably rely on it to ask questions related to ophthalmology, particularly in cases of emergency eye injuries such as those caused by chemicals. As a result, we aimed to assess the accuracy of the information provided by ChatGPT in ophthalmology, particularly on chemical injury of the conjunctiva and cornea. Additionally, we sought to evaluate the potential for incorrect or even harmful information that could pose risks to patients using the chatbot independently. This study aims to assess the use of Artificial Intelligence ChatGPT for accessing medical information on chemical corneal and conjunctival injuries.

2. methodology

2.1 Generating medical information

The following data were generated on December 21, 2024. using the official ChatGPT-4-turbo application by OpenAI. To evaluate ChatGPT's ability to provide accurate medical information, we presented the AI ChatGPT with a series of questions related to chemical ocular injury. These questions covered topics such as the definition, prevalence, etiology, prevention, symptoms, diagnosis, treatment, follow up and complications of chemical ocular injury. A total of nine distinct ChatGPT responses were analyzed, corresponding to the nine queries submitted.

ChatGPT's responses were then compared to the ICD-9 and ICD-10 guidelines (International Classification of Diseases) for chemical (alkali and acid) injuries of the conjunctiva and cornea and evaluated based on criteria including correctness, thematic accuracy, and coherence of the answers to assess their accuracy. ChatGPT-4-turbo employs a probabilistic algorithm, meaning it uses random sampling to generate a variety of responses, which may include different answers to the same query. This investigation focused completely on ChatGPT's initial response to each query, without regenerating answers. Additional clarifications or explanations were not allowed. All queries were entered into a ChatGPT account owned by the author in a single day, ensuring accuracy in grammar and syntax. Each query was placed into a separate dialogue window to eliminate confounding factors and ensure the accuracy and precision of the responses, as ChatGPT-4-turbo can adapt based on the details of each interaction. The study did not require institutional review board (IRB) approval, as it did not involve human participants and no patient-identifying information was used.

2.2 Evaluation of the answers

In evaluating the responses to each question, we compared them with established guidelines and assessed them based on their correctness, thematic accuracy, and coherence and they are organized as follows :

- Correctness

Correct: the entire answer is correct.

Partially correct: the core statement of the answer is correct, but the rest of the answer contains one or more errors.

Incorrect: the core statement of the answer is incorrect.

- Thematic accuracy

Applicable: the answer identifies the central concept and is thematically specific.

Partially applicable: the answer identifies the central concept, but also partially addresses an unrelated topic.

Not applicable: the answer does not identify the central concept and / or targets an unrelated topic.

- Coherence

Coherent: the core message of the answer is fully supported by the rest of the answer.

Partially coherent: the core statement of the answer is essentially confirmed by the rest of the

answer, but there are deviating statements / contradictions in the rest of the answer.

Incoherent: the core statement of the answer contradicts the rest of the answer [13].

2.3 Data analysis

We performed an in-depth linguistic analysis to evaluate the readability and complexity of the AI-generated responses. To achieve this, Two main readability scores, the Flesch Reading Ease Score (FRES) and the Flesch–Kincaid Grade Level (FKGL), were computed using standard formulas. FRES evaluates text complexity on a scale from 0 to 100, where lower scores suggest more difficult reading.

$$\text{FRES} = 206.835 - 1.015 \times \left(\frac{\text{Words}}{\text{Sentences}} \right) - 84.6 \times \left(\frac{\text{Syllables}}{\text{Words}} \right)$$

FKGL approximates the U.S. education grade level required to comprehend the text.

$$\text{FKGL} = 0.39 \times \left(\frac{\text{Words}}{\text{Sentences}} \right) + 11.8 \times \left(\frac{\text{Syllables}}{\text{Words}} \right) - 15.59$$

Sentence identification, and data extraction

All textual analyses were performed on the final output for each of the nine sections (Definition, Prevalence, Causes, Preventive Measures, Symptoms, Diagnosis, Treatment, Follow-Up, and Complications). Each section's text was analyzed separately as is without alteration, ensuring that the analysis reflected the original language. Sentences were identified by their terminal punctuation (periods, exclamation points, or question marks).

Passive voice identification, word and syllable Counting

Words were counted by recognizing sequences of characters separated by whitespace or punctuation. Contractions (e.g., “don’t”) were treated as single words. Hyphenated words (e.g., “well-labeled”) were similarly counted as single words, ensuring uniform treatment of such constructions. A standard English syllable-counting heuristic was applied to each word, examining vowel groupings and common exceptions (e.g., silent “e” or diphthongs). This automated count was then manually reviewed for potential errors, especially in acronyms or chemical abbreviations, to ensure accurate syllable totals. Each sentence was manually inspected to detect passive constructions, characterized by a form of “be” followed by a past participle (e.g., “...was performed”). Such sentences were marked as passive. The total count of passive sentences in each section was divided by the total sentence count to calculate the percentage of passive usage.

In our study, we first calculated the average (mean) and variability (standard deviation) for both the Flesch Reading Ease and Flesch-Kincaid Grade Level indices, as well as for the percentage of passive sentences, to assess ChatGPT's overall readability performance. We included the analysis of passive sentence percentage because it can impact the readability and comprehension of the text. Passive structures are typically more difficult to read and understand, especially for individuals with lower reading proficiency.

Subsequently, we categorized the nine questions about chemical ocular injury into three distinct groups: 1) Definition, Prevalence, Etiology; 2) Prevention, Symptoms, Diagnosis 3) Treatment, Follow-up, and Complications. For each category, we calculated the mean and standard deviation for the Flesch Reading Ease, Flesch-Kincaid Grade Level, and the percentage of passive sentences in

ChatGPT's responses. These initial steps set the stage for more detailed statistical analyses, including ANOVA and trend analysis, which allowed us to investigate whether ChatGPT's readability performance varied across the different question categories. ANOVA was used to compare the means of three or more groups to determine if there were any statistically significant differences among them. In this study, ANOVA was applied to compare the means of the readability metrics across the three categories of questions. Trend analysis was performed to identify patterns and shifts in the readability metrics across the categories. The mean and standard deviation for each readability metric were plotted to visualize trends in the data. This analysis helped uncover any systematic changes in readability and complexity of the responses based on the type of information provided. Hypothesis testing was performed at 5% level of significance. This comprehensive analytical approach enabled us to gain a deeper understanding of the textual characteristics of the AI-generated content and thoroughly assess its suitability for patient education.

3. results

3.1 Qualitative analysis

Figures 1–15 illustrate ChatGPT's responses to a series of questions addressing various aspects of chemical ocular injuries, including their definition, prevalence, etiology, prevention, symptoms, diagnosis, treatment, follow-up, and potential complications. The initial objective of this analysis is to evaluate the accuracy of ChatGPT's answers to each of these questions, ensuring that the information provided aligns with established medical knowledge.

For the definition question (Figure 1), ChatGPT defines chemical eye injury as commonly defined in the medical literature. The analysis of ChatGPT's response shows that it is correct, providing an accurate description of chemical eye injuries, including their causes, symptoms, and some complication and what's the severity depend upon also noted the importance of immediate treatment briefly. It is thematically accurate, as it identifies the central concept and remains fully focused on the topic. The response is also coherent, with its core statement supported by the rest of the answer without contradictions. In comparison, ChatGPT's response offers a broader explanation, detailing causes (acids, alkalis, irritants), symptoms (irritation, burning, blurred vision), and a brief mention of treatment (flushing and medical attention). Meanwhile, the ICD9 and ICD10 guidelines is more concise, emphasizing the urgency and severity of chemical eye injuries and targeting medical professionals or individuals needing a quick understanding of the condition.

ChatGPT's response, while accurate and comprehensive, fails to sufficiently emphasize that chemical eye injuries are true emergencies that demand immediate attention and prompt intervention and primarily focuses on describing general information include (causes, symptoms, and general treatment) This lack of emphasis on the emergency nature of such injuries may diminish the critical need for quick action. Unlike ICD9 and ICD10 guidelines, which explicitly underscores the critical need for urgent care to prevent severe consequences.

For the Prevalence question (Figure 2-3), The analysis of ChatGPT's response reveals that it is partially correct, as it provides accurate and detailed information on the prevalence of chemical eye injuries, including key statistics and contributing factors such as workplace exposure, gender, and

age but In the general population prevalence, ChatGPT's response states that chemical eye injuries account for about 5–10% of all ocular injuries, which is incorrect according to ICD-9 and ICD-10 guidelines. These guidelines indicate that chemical injuries to the eye represent between 11.5% and 22.1% of ocular traumas. The response is also partially applicable in thematic accuracy. Although it stays focused on the central topic of the prevalence of chemical eye injuries and addresses relevant subtopics, such as industrial versus domestic settings and global variations, it also discusses the types of chemicals, which was not the main question. Furthermore, it is coherent, with the core statements consistently supported by the detailed explanations provided throughout the response.

In comparison, ChatGPT's response is more detailed and comprehensive, covering multiple aspects, including workplace statistics (e.g., 20,000 injuries annually in the U.S.), demographic factors (e.g., men aged 20–40), and the influence of chemical types. In contrast, the guidelines provides a more concise overview, primarily focusing on general prevalence rates (11.5–22.1%), demographic risks (young men and children), and the primary setting of workplace injuries. While both answers are accurate and coherent, ChatGPT's response offers a broader and more informative perspective by incorporating additional data and global context, whereas the guidelines focuses on essential statistics and trends, making it more brief . ChatGPT's response failed to mention that alkali injuries are more common than acid injuries and often caused by building materials and cleaning agents as this exclusion is significant for understanding and managing chemical eye injuries effectively.

For the causes question (Figure 4), The analysis of ChatGPT's response to the etiology of chemical eye injuries reveals that it is partially correct, can cause chemical injuries to the eye, including acids, alkalis. However, some of the listed eitology not mentioned in the guidelines including solvents, detergents, industrial chemicals, agricultural chemicals, and chemical warfare agents. Moreover, the response lacks specificity in its categorization and examples compared to the ICD-9 and ICD-10 guidelines. For instance, ChatGPT's response mentions "cleaning agents, battery acid, and pool chemicals" for acids but does not specify compounds like sulfuric acid (H_2SO_4) or hydrofluoric acid (HF), as outlined in the guidelines. ChatGPT's response lacks the specific and systematic presentation of substances that the guidelines offer, which is essential for clinical and educational purposes. The thematic Accuracy is applicable, the response identifies the central concept (causes of chemical eye injuries) and stays fully focused on the topic. The response is coherent, with its main statement consistently supported by the rest of the answer and free from contradictions.

For the preventive question (Figure 5-6), the analysis of ChatGPT's response shows that it is correct, providing an accurate and comprehensive preventive measures that align with standard practices. It emphasizes wearing protective eyewear, following safety protocols, proper chemical handling, and the use of emergency equipment. The thematic Accuracy is applicable, the response identifies the central concept (preventing chemical eye injuries) and stays fully focused on the topic. All measures are practical and thematically relevant. The response is coherent, the answer's core statement (preventing chemical eye injuries through safety practices) is well-supported throughout. It does not contradict itself and maintains logical progression.

While the response provides detailed preventive strategies, it could more effectively highlight the Occupational Safety and Health Administration (OSHA) regulations mentioned in the guidelines to emphasize compliance with mandatory workplace safety standards. The guidelines specifically mandate the use of protective eyewear in workplace settings, and although the response addresses this and its proper use, it does not sufficiently stress its "mandatory" nature under regulatory

requirements. Additionally, the response includes broader prevention measures, such as hygiene practices, proper ventilation, and emergency procedures, which are practical for general audiences but not clearly covered in the guidelines. To improve, the response should emphasize the mandatory nature of protective eyewear per OSHA regulations.

For the Symptoms question (Figure 7), the analysis of ChatGPT's response shows that it is partially correct, the answer includes several accurate and commonly reported symptoms, such as pain and tearing. However, some of the listed symptoms deviate from the most clinically significant findings emphasized in the guidelines. The inclusion of "chemical smell" is not supported by standard guidelines and is not a defining symptom of chemical eye injury. Similarly, "foreign body sensation" may occur but is not a primary or hallmark symptom. Moreover, the answer neglects "blepharospasm" and "reduced visual acuity", which are key symptoms in the guidelines. The thematic Accuracy is partially applicable. While the answer broadly addresses the concept of chemical eye injury symptoms, it does not focus on the critical symptoms highlighted in the guidelines (severe pain, epiphora, blepharospasm, reduced visual acuity), and by including less relevant symptoms (e.g., "chemical smell"), it partially diverts attention from the more urgent diagnostic features. The response is also partially coherent, the core statement that chemical eye injuries can cause a range of symptoms is supported by the list. However, the inclusion of peripheral symptoms ("chemical smell" and "foreign body sensation") introduces inconsistencies, as these are not central to the condition and can detract from the urgency of hallmark symptoms.

For the diagnosis question (Figure 8,9,10), the analysis of ChatGPT's response shows that it is correct, accurately describes the diagnostic process for chemical eye injuries. It includes key steps such as history-taking to determine the type of chemical, exposure time, and symptoms, followed by an initial examination of visual acuity and inspection for physical damage. The use of fluorescein staining, pH testing, slit lamp examination, intraocular pressure measurement. It is thematically accurate, as it identifies the central concept and remains fully focused on the topic. The response is also coherent, with its core statement supported by the rest of the answer without contradictions.

In comparison, ChatGPT's response appropriately begins with the importance of obtaining a patient's history in diagnosing chemical eye injuries. It suggests asking about the chemical agent to identify its type, the nature of exposure (household or industrial), the timing of exposure, and common symptoms such as pain, redness, burning, tearing, blurred vision, and light sensitivity. However, it omits several critical aspects that have been mentioned in ICD9 and ICD10 guidelines including : assessing the chemical's toxicity, understanding the depth of ocular penetration, determining the area of involvement, and asking whether the eyes were rinsed afterward and for how long. Additionally, it fails to mention the need to ask about the use of eye protection at the time of injury and the importance of examining the chemical's packaging for product information, including chemical composition. If such information is unavailable, contacting the local poison control center, such as the American Association of Poison Control Centers (AAPCC) at 1-800-222-1222, is advisable.

Following the history, the physical examination is the next critical step. The ChatGPT response highlights essential components, such as conducting an initial examination to assess visual acuity and inspect for signs of conjunctival injection, corneal opacity, and epithelial defects. It also emphasizes the importance of fluorescein staining to detect epithelial damage, assessing pH levels to ensure they are within the physiologic range (not less than 7 or greater than 7.5, which may indicate ongoing chemical exposure requiring further irrigation), and performing a slit lamp examination. Additionally, intraocular pressure measurement and systemic evaluation for potential involvement are mentioned. For severe injuries, referral for further testing is recommended. However, the response overlooks the use of established classification schemes, such as the Roper-Hall

classification and the Dua classification, which have been mentioned in ICD9 and ICD10 guidelines to evaluate the extent and depth of the injury. Specifically, these schemes document corneal, conjunctival, and limbal involvement, which are critical for predicting the ultimate visual outcome.

For the treatment question (Figure 11), the analysis of ChatGPT's response shows that it is partially correct. ChatGPT provides the answer of the appropriate treatment of chemical eye injury in six steps involving immediate irrigation, seeking medical attention, eye examination, topical medication, pain management, and finally follow-up. It does not clarify the recommended grading approach depending on the severity of injury, since mild burns respond well to medical treatments and lubrication, while more severe burns necessitate more intensive medical therapy and surgery. Moreover, ChatGPT's answer missed mentioning essential components of the management, such as the pre-irrigation instructions, the performing technique, and the correct way to remove the foreign body.

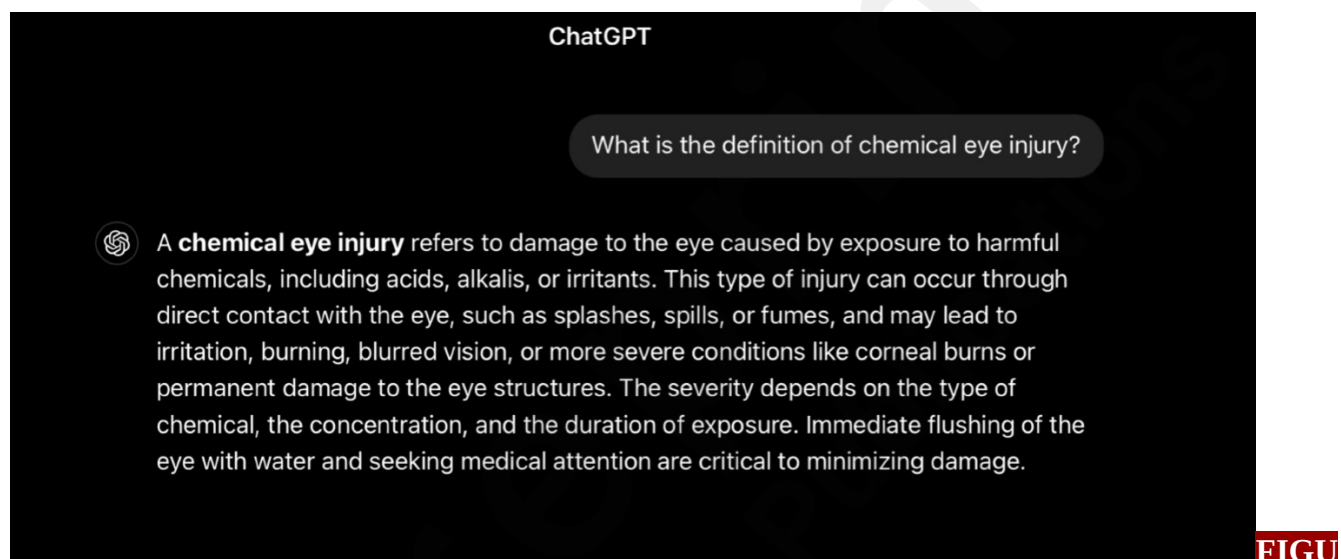
It is thematically accurate, as it identifies the central concept and remains fully focused on the topic. The response is also coherent, with its core statement supported by the rest of the answer without contradictions. In comparison, the ICD-9 and ICD-10 guidelines provide detailed clarification of each step along with detailed explanations, such as providing the types of irrigating fluids, each with different benefits. Whereas ChatGPT's response seems to be short and brief. In addition, the ICD-9 and ICD-10 guidelines demonstrate that there are standard treatments and other treatments that are prescribed in special circumstances, unlike ChatGPT's response that subtypes them into topical medication and pain management. The probability of the need for surgery like debridement of necrotic epithelium, amniotic membrane disease transplantation, limbal stem cell transplant, and cultivated oral mucosal epithelial transplantation is not mentioned in ChatGPT's response.

For the follow-up question (Figure 12-13), ChatGPT provides a detailed and structured explanation of follow-up care for chemical eye injuries. The analysis of ChatGPT's response reveals that it is partially correct, as it accurately describes many key elements, such as reevaluation, infection monitoring, pain management, and long-term care. However, it misses critical points emphasized in the ICD10 and ICD9 guidelines, such as the necessity of daily follow-up for severe burns and inpatient admission for compliance concerns or pediatric patients. Furthermore, while the response mentions long-term care, it fails to address specific complications like glaucoma monitoring or interventions for eyelid and conjunctival damage. The response is partially applicable. While it addresses the central concept of follow-up care and includes relevant details, it does not fully align with the thematic focus of the guidelines. Key guideline-specific elements, such as the progression of follow-up intervals, the importance of early aggressive management of complications, and the long-term need for glaucoma and dry eye monitoring, are underemphasized or omitted. The response is coherent, with its core message regarding follow-up care being consistently supported by subsequent details. The organization and flow of information are logical, providing a stepwise approach from reevaluation to long-term care. However, coherence does not compensate for the absence of critical guideline-specific details.

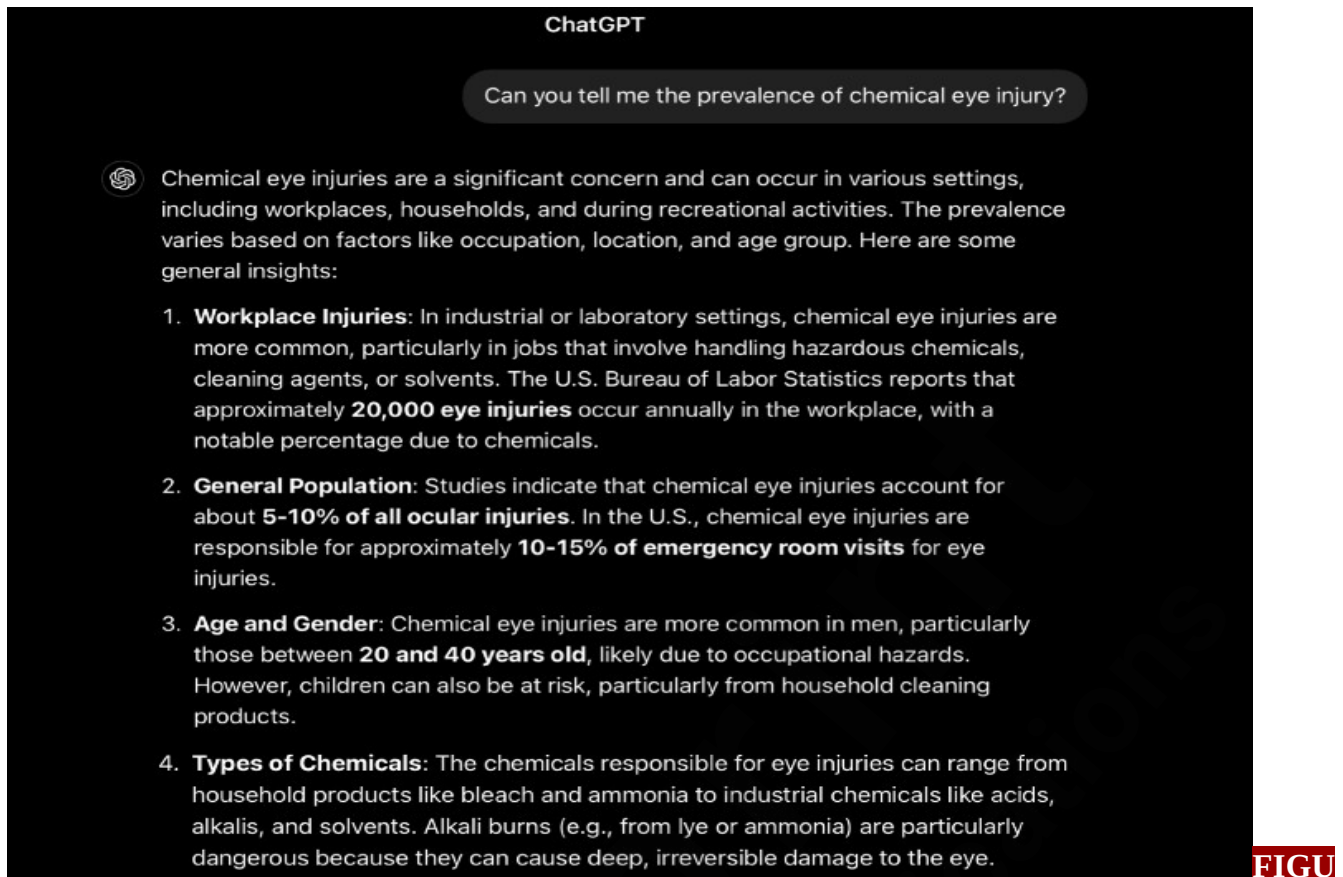
For the complication question (Figure 14-15), ChatGPT identifies the complications of chemical eye injuries as commonly described in medical literature. The analysis of ChatGPT's response shows that it is partially correct, providing a general overview of common complications such as corneal damage, glaucoma, and dry eye syndrome. However, certain points, such as "permanently reduced

tear production" and "chronic pain," are unnecessary or overly broad.

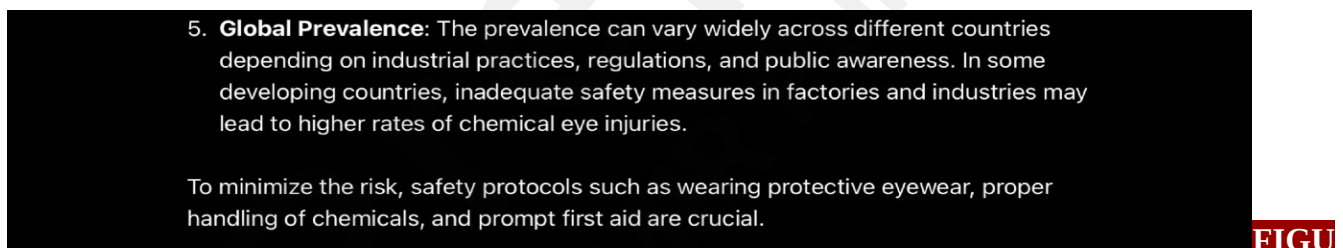
The response is applicable, as it focuses on the central concept of complications associated with chemical eye injuries. It lists key complications and provides brief explanations for most of them. However, the response does not fully align with the ICD10/ICD9 guidelines, which offer more specific details about the pathophysiology and mechanisms underlying these complications. For example, the guidelines emphasize the multifactorial causes of glaucoma (e.g., inflammatory debris and damage to the trabecular meshwork) and the detailed impact of dry eye syndrome, including mucus deficiency and its effect on the tear film, which ChatGPT does not sufficiently address. The response is partially coherent. While the listed complications are thematically relevant and logically connected, the explanation lacks depth and fails to detail the progression or severity of complications.

**FIGU**

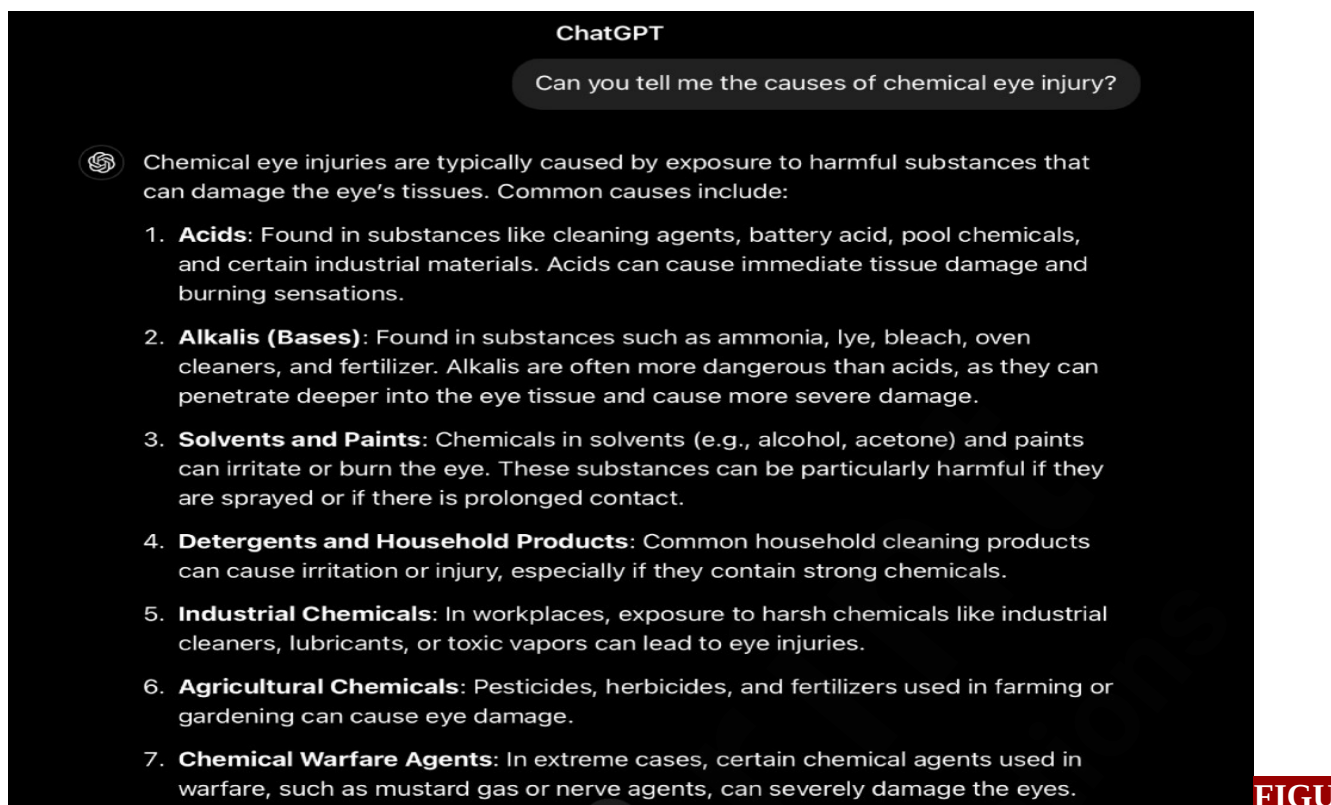
RE 1 ChatGPT's response to question "what is the definition of chemical eye injury?"



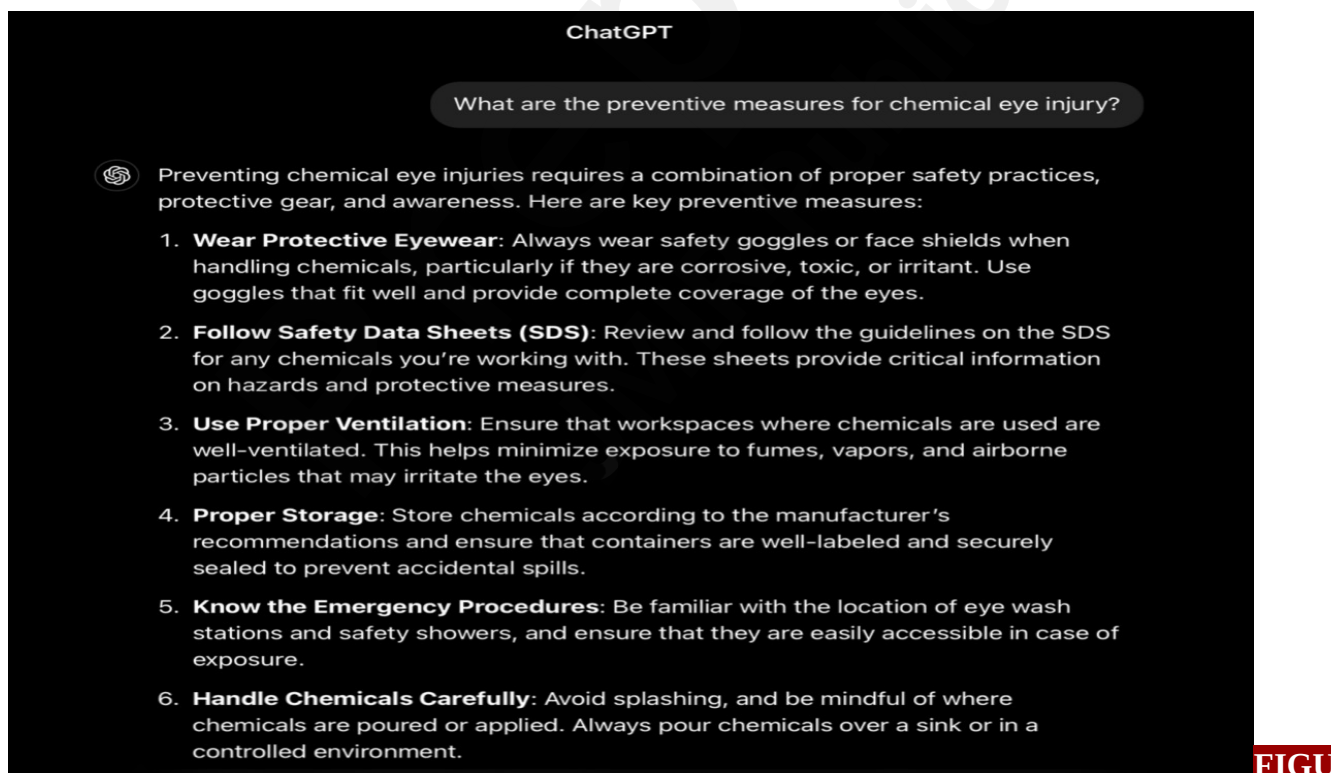
RE 2 ChatGPT's response to question " can you tell me the prevalence of chemical eye injury?"



RE 3 Rest of ChatGPT's response to the question " can you tell me the prevalence of chemical eye injury?"



RE 4 ChatGPT's response to question "can you tell me the causes of chemical eye injury?"



RE 5 ChatGPT's response to question "what are the preventive measure of chemical eye injury?"

7. **Work in a Controlled Environment:** Use fume hoods, containment devices, and other safety equipment when handling hazardous chemicals to limit accidental exposure.
8. **Use the Right Tools:** When working with chemicals, use appropriate dispensing tools, such as pipettes or syringes, to minimize the risk of spills or splashes.
9. **Maintain Good Hygiene:** Avoid touching your face, especially your eyes, when handling chemicals. Wash your hands thoroughly after working with chemicals.

FIGU

RE 6 Rest of ChatGPT's response to the question " what are the preventive measure of chemical eye injury?"

ChatGPT

What are the symptoms of chemical eye injury?

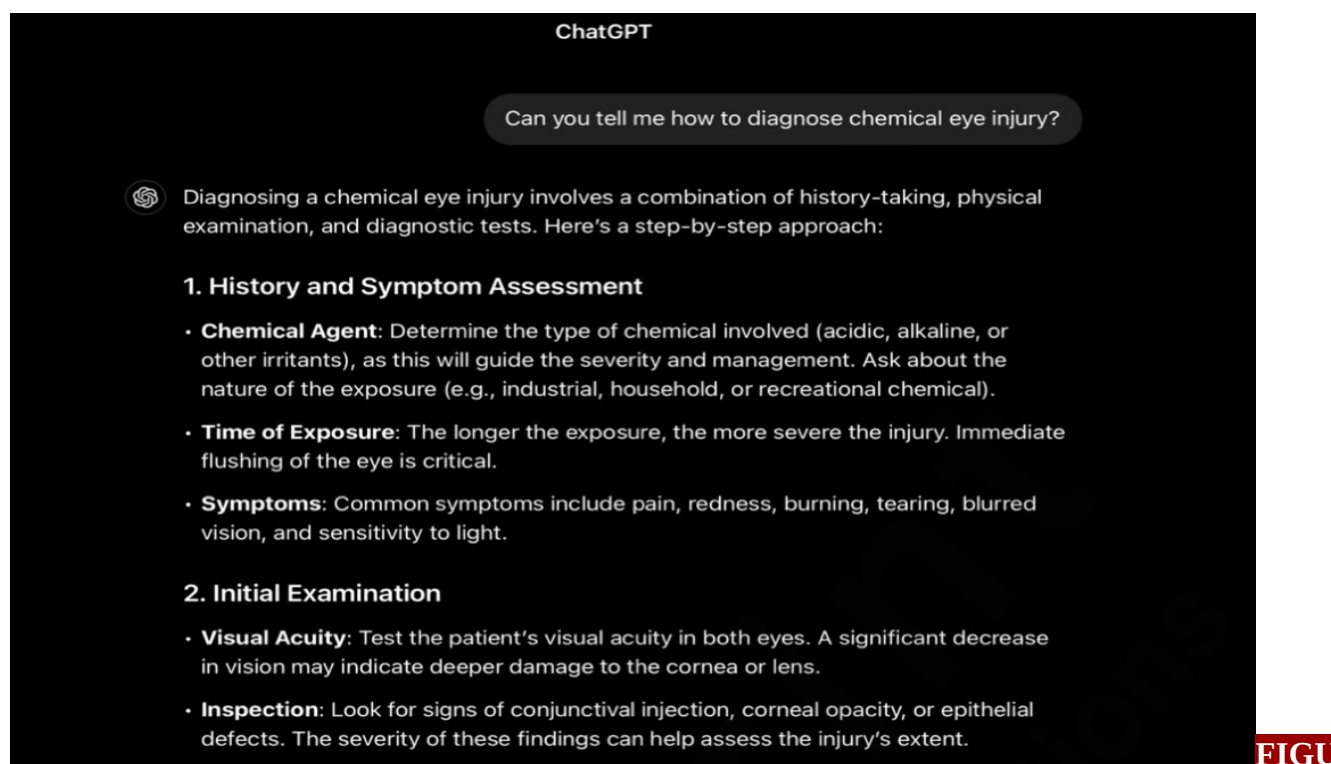


Chemical eye injuries can range from mild irritation to severe damage, depending on the substance involved. Common symptoms of a chemical eye injury include:

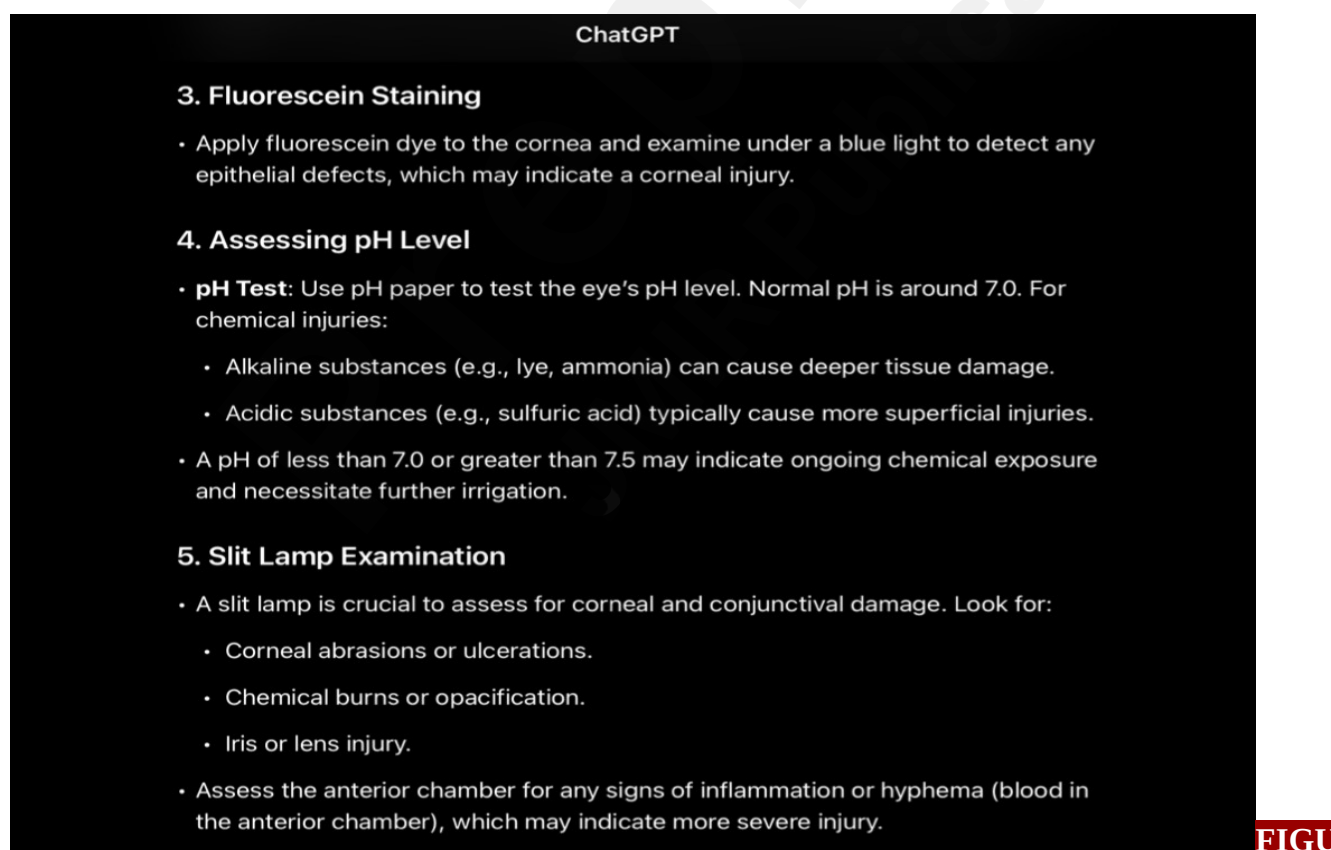
1. **Pain or burning sensation** in the eye
2. **Redness or irritation** of the eye and surrounding area
3. **Tearing or excessive watering** of the eye
4. **Blurred vision** or difficulty seeing clearly
5. **Sensitivity to light (photophobia)**
6. **Swelling** of the eyelids
7. **Foreign body sensation**, like something is in the eye
8. **Discharge** from the eye, which may be clear or cloudy
9. **Chemical smell** (in some cases, especially if the substance is strong or pungent)

FIGU

RE 7 ChatGPT's response to question " what are the symptoms of chemical eye injury?"



RE 8 ChatGPT's response to question "can you tell me how to diagnose chemical eye injury?"



RE 9 Rest of ChatGPT's response to the question "can you tell me how to diagnose chemical eye injury?"

6. Check for Intraocular Pressure (IOP)

- An elevated IOP may suggest glaucoma or damage to the anterior segment, which can be a complication of severe chemical injury.

7. Assessment for Systemic Involvement

- For severe exposures (e.g., large chemical spills), consider evaluating the patient for systemic symptoms (respiratory distress, skin burns, or other signs of systemic toxicity).

8. Referral and Further Testing

- For significant injuries (especially with alkali burns or delayed presentation), refer the patient to an ophthalmologist for more advanced assessment and management.
- Imaging (e.g., corneal pachymetry or OCT) may be indicated in certain cases for further evaluation.

FIGURE 10

RE 10 Rest of ChatGPT's response to the question “can you tell me how to diagnose chemical eye injury?”

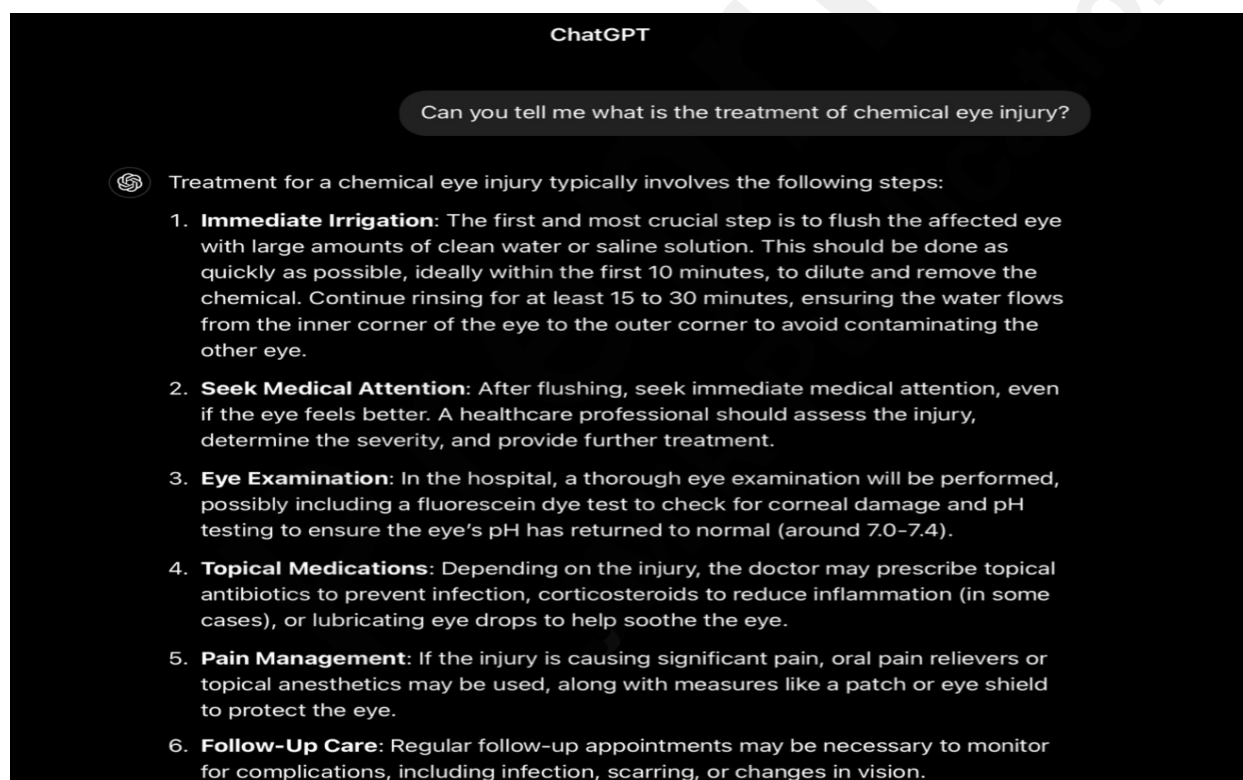


FIGURE 11

RE 11 ChatGPT's response to question “can you tell me what is the treatment of chemical eye injury?”

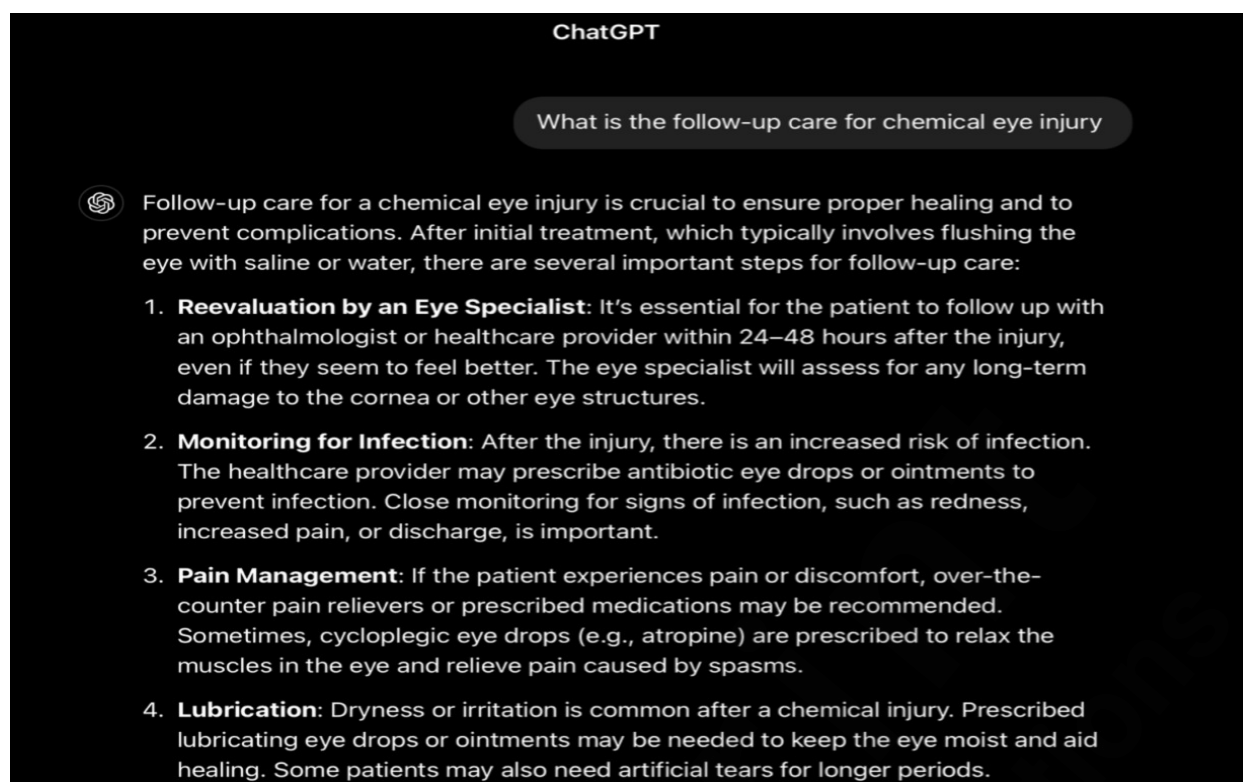


FIGURE 12 ChatGPT's response to question “ what is the follow up care for chemical eye injury?”

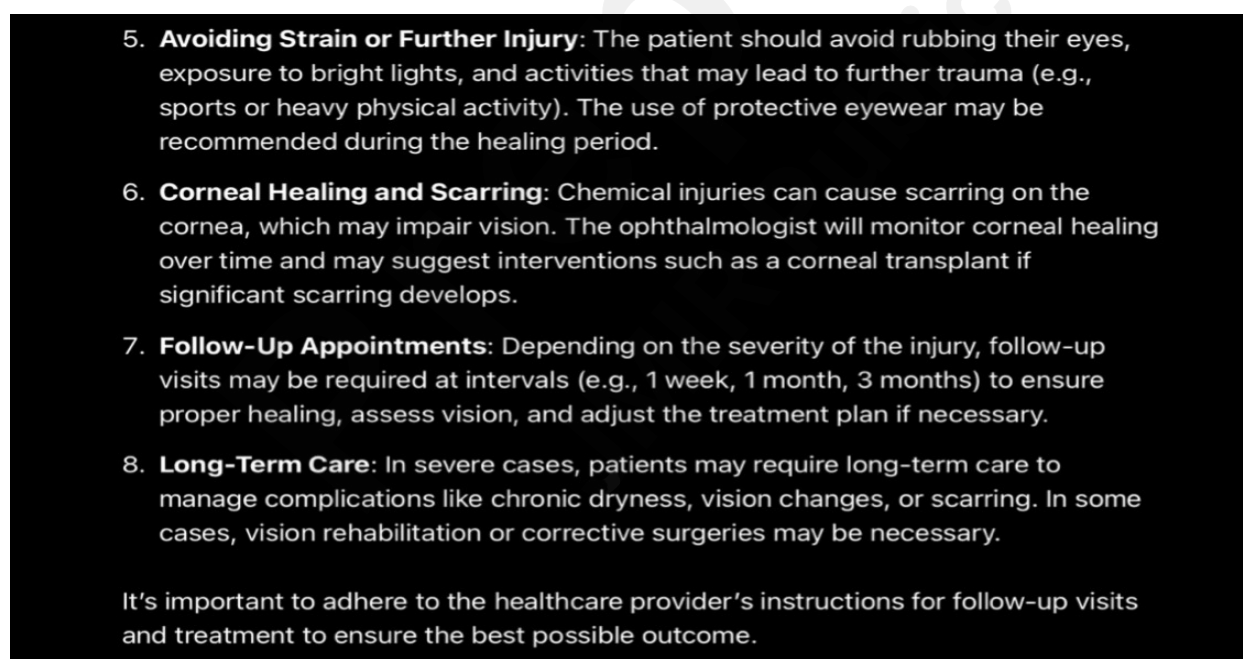
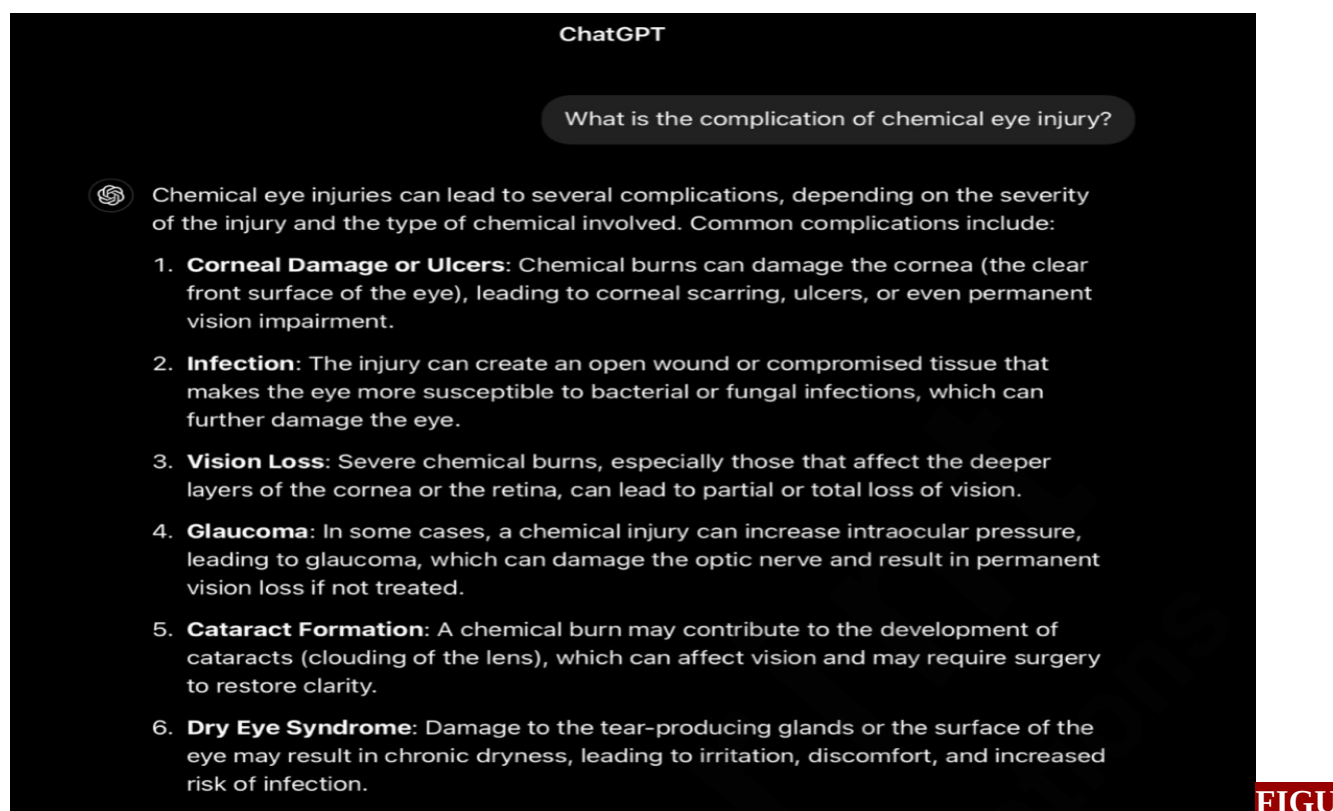
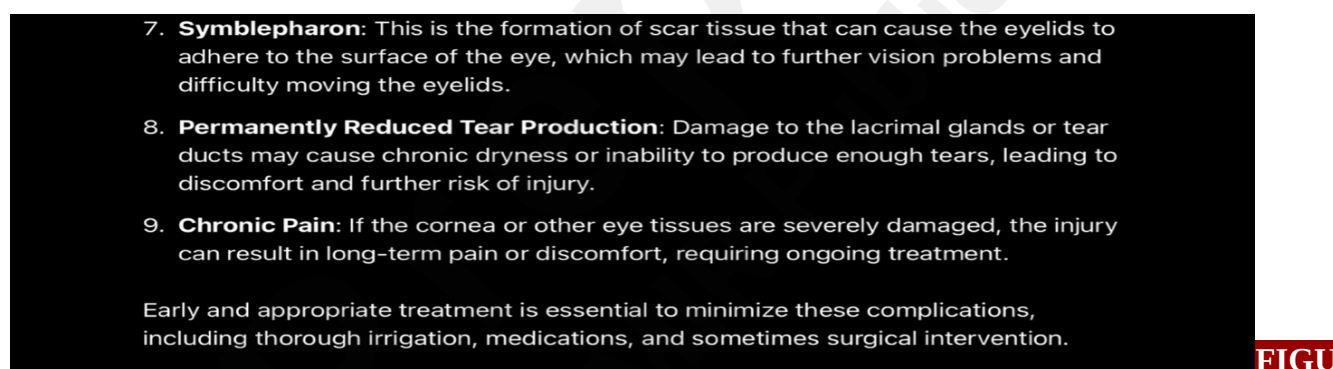


FIGURE 13 Rest of ChatGPT's response to the question “ what is the follow up care for chemical eye injury?”



RE 14 ChatGPT's response to question " what is the complication of chemical eye injury?"



RE 15 Rest of ChatGPT's response to the question " what is the complication of chemical eye injury?"

3.2 Quantitative analysis

3.2.1 Overall readability

Table 1. Overall and question-specific readability metrics

Section	Sentences	Words	Syllables	FRES	FKGL	Passive Sentences	% Passive
Definition	4	92	161	35.44	14.03	0	0%
Prevalence	14	297	500	32.15	14.86	2	14.30%

Causes	10	210	367	33.12	14.47	1	10.00%
Preventive Measures	11	241	416	31.97	14.72	1	9.10%
Symptoms	3	78	129	40.24	12.16	0	0%
Diagnosis	19	414	716	30.12	15.24	2	10.50%
Treatment	9	212	354	34.59	13.98	1	11.10%
Follow-up	10	235	406	31.84	14.66	1	10.00%
Complications	4	99	166	35.06	13.78	0	0%
Mean	9.33	208.67	357.22	33.84	14.21	0.89	7.22
±	±	±	±	±	±	±	±
SD	5.20	108.66	199.59	2.97	0.97	0.78	5.60
FRES: Flesch Reading Ease Score FKGL: Flesch–Kincaid Grade Level							

Across all nine sections, we found (Table 1) that the text presented an average FRES of 33.84 ± 0.28 , indicating a fairly challenging reading level. The FKGL averaged at 14.21 ± 0.22 , suggesting that the content is suitable for readers with college-level proficiency. Regarding sentence construction, passive voice was utilized in $7.22\% \pm 0.66\%$ of the sentences, implying a moderate reliance on the passive form.

3.2.2 Category-specific readability metrics

Table 2. Readability metrics by category

Category	Sentences	Words	Syllables	FRES	FKGL	Passive Sentences	% Passive
Definition, Prevalence, Causes	9.33 ± 5.03	199.67 ± 102.91	342.67 ± 170.76	33.57 ± 1.69	14.45 ± 0.42	1.00 ± 1.00	8.10 ± 7.34
Preventive Measures, Symptoms, Diagnosis	11.00 ± 8.00	244.33 ± 168.09	420.33 ± 293.58	34.11 ± 5.39	14.04 ± 1.65	1.00 ± 1.00	6.53 ± 5.70
Treatment, Follow-Up, Complications	7.67 ± 3.22	182.00 ± 72.80	308.67 ± 126.32	33.83 ± 1.74	14.14 ± 0.46	0.67 ± 0.58	7.03 ± 6.12
FRES: Flesch Reading Ease Score FKGL: Flesch–Kincaid Grade Level							

Table 2 displays the metrics across the three category groupings. The mean FRES, FKGL, and passive-voice percentages for the Definition, Prevalence, and Causes categories were 33.57 ± 1.69 , 14.45 ± 0.42 , and $8.10\% \pm 7.34\%$, respectively. The average scores were 34.11 ± 5.39 , 14.04 ± 1.65 , and $6.53\% \pm 5.70\%$, respectively, for the Preventive Measures, Symptoms, and Diagnosis category while the averages were 33.83 ± 1.74 , 14.14 ± 0.46 , and $7.03\% \pm 6.12\%$ for the Treatment, Follow-Up, Complications category, respectively. These findings reveal relatively low Flesch scores, indicating text complexity, with the highest average Grade Level observed in the first category (14.45). Although the percentage of passive sentences varies across categories, each remains under 10% on average.

3.2.3 Statistical significance

There was no statistically significant difference in Flesch Reading Ease ($p = .385$), Flesch–Kincaid

Grade Level ($p = .555$), or the percentage of passive sentences ($p = .601$) across the categories, as determined by one-way ANOVA. This indicates that any observed variations in readability measures were likely attributable to random fluctuations rather than systematic differences.

3.2.4 Trend analysis

In (Figure16) a trend analysis showed that the FRES was consistently within the low- to mid-30s range for all three categories, suggesting challenging reading material. The FKGL similarly remains around 14, underscoring the advanced reading level required to analyze the text. Minor variations in passive-voice usage (ranging from 6.53% to 8.10%) indicate some stylistic differences. Overall, the readability was relatively constant across the three categories.

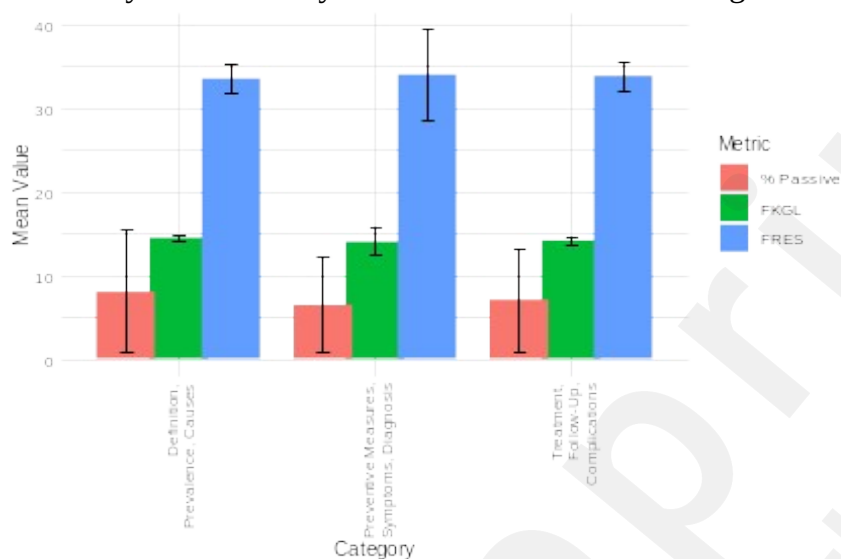


Figure 16. Average score for FKGL, FRES, and % of passive sentences across groups

4. Discussion

ChatGPT was able to respond to all queries related to chemical ocular injuries, including questions related definition, prevalence, causes, preventive measures, symptoms, diagnosis, treatment, follow-up, and complications. The responses were accurate, in most instances, and thematically relevant, and adhered closely to the sentence structure and grammatical rule. Nonetheless, certain details were overlooked, such as the urgency of care in managing chemical ocular injuries and the need for exact classification systems and management protocols based on ICD-9 and ICD-10 guidelines. These omissions align with findings from similar studies that highlight ChatGPT's tendency to provide generalized but incomplete responses, which can reduce its clinical utility [14]. ChatGPT accurately described the basic etiology and treatment steps, but failed to include important information, such as the recommended pre-irrigation instructions or specific surgical interventions which are needed in case of severe injuries. These results are consistent with those reported in another study which evaluated the performance of ChatGPT's in ophthalmology-related fields. The results showed that ChatGPT performed correctly on 46% to 58% of questions across categories. The best performance was reported in general medicine while the poorest was reported in areas related to retina and vitreous topics. The results further support those from the current study and indicate that ChatGPT provided accurate yet generalized information, and often missed essential details [15].

In general, the responses were focused on the central concept of each question, with minimal deviation from the topics. The responses related to prevalence provided statistics and global variations that were thematically relevant although they were partially incorrect when compared to ICD-9/ICD-10 standards. Thematic relevance was maintained in other topics, such as the description of diagnostic tools and complications. Nonetheless, ChatGPT introduced tangential or unrelated information, which reduced the overall coherence and thematic focus. Such finding was also reported in prior studies which assessed the performance of AI models in medical domains [16].

The Flesch Reading Ease and Flesch–Kincaid Grade Level were used to assess the readability of the responses regarding chemical ocular injuries. Results showed a moderately low readability score, which suggests that the output was aligned with academic or professional standards, and can limit the accessibility for individuals with low levels of health literacy. The previous findings are consistent with findings from studies that evaluated the performance of ChatGPT on medical licensing examinations. The study showed that the responses were clear but overly complex for lay audiences [17]. Interestingly, there was no statistically significant difference in readability scores between the different content categories, which indicates that ChatGPT maintains a consistent language complexity regardless of the inherent difficulty. Basic information about the definition or prevalence of chemical ocular injuries was presented at the same level of complexity as more complex topics, such as treatment and surgical procedures. The same findings were reported in a meta-analysis of studies that evaluated the performance of ChatGPT in board examinations. The meta-analysis concluded that AI provided the same level of complexity across question types, irrespective of whether the questions were simple or advanced [18]. In a study assessing ChatGPT's performance on radiology board-style examination questions, the AI demonstrated minimal variability in the complexity of responses which indicates a uniformity in language complexity regardless of the level of difficulty of the questions [19].

While this may be beneficial to achieve uniformity, it underlines the deficiency of ChatGPT in presenting variability in speech, depending on the audience it addresses. It is desirable that simpler concepts, such as causes and symptoms, should be presented in more accessible terms, while advanced topics like surgical interventions may justifiably require technical language. This rigidity in adaptability is a finding similarly drawn from studies in other medical contexts where the responses of ChatGPT lacked subtlety in adjusting to the diversity of user groups [20]. However, it must be noted that readability metrics do not take into account health literacy (knowledge of medical terms) into account. Even the simplest text may confuse a user if the text includes unexplained medical jargon or lacks explanation altogether. Besides, readability assessments do not address the accuracy of the information, which is a critical factor for patient safety and effective decision-making [17].

In this regard, ChatGPT has proven to be an exceptionally good tool for dissemination regarding chemical ocular injuries. The strong points assure that it provides structured comprehensive answers which are logically organized, even for complex topics, in an intelligible and easy-to-understand way. Moreover, responses from ChatGPT come rather fast, allowing one to access information quickly—in some cases, this speed can be crucial in emergency situations where quick reference material is required. This is also in line with observations that it can make information more accessible and lead to tailored, opportune responses, especially in medical and educational domains [21]. This also makes ChatGPT a resource for users looking for initial guidance on chemical ocular injuries given its capability for fact retrieval and the integration of information from various topics. For instance, in medical education, ChatGPT has been noted to enhance personalized learning, improve clinical reasoning, and facilitate better understanding of complex concepts. This is consistent with its ability to explain complex medical concepts related to ocular injuries [22].

Despite such strengths, some significant limitations are also associated with ChatGPT. Most notably, it sometimes misses the inclusion of very important information in its responses, like the need for immediate irrigation in chemical ocular injuries, which is crucial for appropriate management. Such omissions are in line with concerns raised on the dependability of ChatGPT, including incomplete or

biased generation that may negatively impact patient care [23]. Furthermore, it cannot adapt to the users' contexts, such as patient history, the severity of injury, or even individual needs. This was indicated in patient education, whereby ChatGPT was unable to modify its responses to the level of difficulty or subtlety of a given medical scenario presented to it [24].

Meanwhile, as much as the level of difficulty regarding the language applied to ChatGPT would be highly useful for professional personnel, possibly the patient's low level of literacy may make it difficult to understand. This mismatch in the levels of language complexity with users' literacy is still far from optimization, according to the studies reviewed, because such an AI application could unconsciously exclude an audience that doesn't have a high educational background. This duality in the nature of ChatGPT—a potential and a challenge at the same time—is drawing a line for further development and control, which will make it more useful with reduced risks. The concept of health literacy has to be put into consideration while educating the masses about chemical ocular injuries. According to the studies, only a small percentage of adults possess proficient health literacy, which indicates that communicating complex medical information is quite a challenge [21]. With most of those users unable even to read-comprehend complex medical terminology or instructions of treatment or procedures, our findings indicate the need for the contents of ChatGPT to be as readable as possible.

Future versions of AI-based platforms may adjust the level of language complexity dynamically depending on user comprehension. This could be achieved by incorporating features such as preliminary assessments or interactive dialogue to gauge the user's understanding and tailor responses accordingly [22]. Additionally, integrating visual aids, such as step-by-step infographics or flowcharts, could enhance comprehension, particularly for inherently complex topics like chemical burn management and surgical interventions [24]. However, the current study has certain limitations. Data collection was performed in one point in time within this dynamic field of AI. Furthermore, as in any qualitative research study, investigator bias might occur. In addition, wording of the input questions can introduce some influence in the results. Future studies can overcome some of these limitations by comparing ChatGPT with other models to place it within a broader perspective in terms of its strengths and weaknesses. Other studies may wish to examine the extent to which ChatGPT is consistent and reliable across successive responses and even when asked the same question in different ways [23,25]. This might allow some insights into aspects of the capability of AI platforms to act as a reliable tool in both medical and patient education.

5. Conclusion

ChatGPT shows significant potential in providing information about chemical ocular injuries, offering factually accurate and relevant responses that are generally clear and well-constructed. However, its language complexity may sometimes make information less accessible to individuals with lower health literacy. Additionally, the responses sometimes lack key information relevant to treatment, such as the need for urgency when dealing with chemical burns. Future iterations should aim to enhance readability, improve context-specific accuracy, and better tailor responses to user needs and literacy levels. Although ChatGPT can serve as a valuable supplementary tool for patients and healthcare professionals, it should not replace professional medical advice, as some responses may not align with clinical practice or address the needs of patients with different levels of education.

6. Acknowledgment

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7. **Contribution:**

LYA: Abstract – methodology - data collection – results -discussion - references

RR Alrashoud: introduction – results- discussion -conclusion- references

BSA: results - discussion

AMA :research objective/question – results - discussion

RSA: introduction- results – discussion

RR AlHuthail: research supervision

DIA: research supervision

8. **Conflicts of interest:**

The authors report no conflict of interest in this work

9. **Limitations**

This study has several limitations. It evaluated only ChatGPT-4-turbo at a single point in time, limiting generalizability and reproducibility. Additionally, responses varied based on question phrasing, and ChatGPT did not provide real-time source citations, raising concerns about verification and reliability. Future research should compare AI models and integrate real-time citations to enhance accuracy and accessibility.

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Supplementary Files

Figures

ChatGPT's response to question "what is the definition of chemical eye injury?".

ChatGPT

What is the definition of chemical eye injury?

 A **chemical eye injury** refers to damage to the eye caused by exposure to harmful chemicals, including acids, alkalis, or irritants. This type of injury can occur through direct contact with the eye, such as splashes, spills, or fumes, and may lead to irritation, burning, blurred vision, or more severe conditions like corneal burns or permanent damage to the eye structures. The severity depends on the type of chemical, the concentration, and the duration of exposure. Immediate flushing of the eye with water and seeking medical attention are critical to minimizing damage.

ChatGPT's response to question "can you tell me the prevalence of chemical eye injury?".

ChatGPT

Can you tell me the prevalence of chemical eye injury?

 Chemical eye injuries are a significant concern and can occur in various settings, including workplaces, households, and during recreational activities. The prevalence varies based on factors like occupation, location, and age group. Here are some general insights:

- Workplace Injuries:** In industrial or laboratory settings, chemical eye injuries are more common, particularly in jobs that involve handling hazardous chemicals, cleaning agents, or solvents. The U.S. Bureau of Labor Statistics reports that approximately **20,000 eye injuries** occur annually in the workplace, with a notable percentage due to chemicals.
- General Population:** Studies indicate that chemical eye injuries account for about **5-10% of all ocular injuries**. In the U.S., chemical eye injuries are responsible for approximately **10-15% of emergency room visits** for eye injuries.
- Age and Gender:** Chemical eye injuries are more common in men, particularly those between **20 and 40 years old**, likely due to occupational hazards. However, children can also be at risk, particularly from household cleaning products.
- Types of Chemicals:** The chemicals responsible for eye injuries can range from household products like bleach and ammonia to industrial chemicals like acids, alkalis, and solvents. Alkali burns (e.g., from lye or ammonia) are particularly dangerous because they can cause deep, irreversible damage to the eye.

Rest of ChatGPT's response to the question "can you tell me the prevalence of chemical eye injury?".

5. Global Prevalence: The prevalence can vary widely across different countries depending on industrial practices, regulations, and public awareness. In some developing countries, inadequate safety measures in factories and industries may lead to higher rates of chemical eye injuries.

To minimize the risk, safety protocols such as wearing protective eyewear, proper handling of chemicals, and prompt first aid are crucial.

ChatGPT's response to question "can you tell me the causes of chemical eye injury?".

ChatGPT

Can you tell me the causes of chemical eye injury?



Chemical eye injuries are typically caused by exposure to harmful substances that can damage the eye's tissues. Common causes include:

1. **Acids:** Found in substances like cleaning agents, battery acid, pool chemicals, and certain industrial materials. Acids can cause immediate tissue damage and burning sensations.
2. **Alkalis (Bases):** Found in substances such as ammonia, lye, bleach, oven cleaners, and fertilizer. Alkalis are often more dangerous than acids, as they can penetrate deeper into the eye tissue and cause more severe damage.
3. **Solvents and Paints:** Chemicals in solvents (e.g., alcohol, acetone) and paints can irritate or burn the eye. These substances can be particularly harmful if they are sprayed or if there is prolonged contact.
4. **Detergents and Household Products:** Common household cleaning products can cause irritation or injury, especially if they contain strong chemicals.
5. **Industrial Chemicals:** In workplaces, exposure to harsh chemicals like industrial cleaners, lubricants, or toxic vapors can lead to eye injuries.
6. **Agricultural Chemicals:** Pesticides, herbicides, and fertilizers used in farming or gardening can cause eye damage.
7. **Chemical Warfare Agents:** In extreme cases, certain chemical agents used in warfare, such as mustard gas or nerve agents, can severely damage the eyes.

ChatGPT's response to question " what are the preventive measure of chemical eye injury?".

What are the preventive measures for chemical eye injury?



Preventing chemical eye injuries requires a combination of proper safety practices, protective gear, and awareness. Here are key preventive measures:

1. **Wear Protective Eyewear:** Always wear safety goggles or face shields when handling chemicals, particularly if they are corrosive, toxic, or irritant. Use goggles that fit well and provide complete coverage of the eyes.
2. **Follow Safety Data Sheets (SDS):** Review and follow the guidelines on the SDS for any chemicals you're working with. These sheets provide critical information on hazards and protective measures.
3. **Use Proper Ventilation:** Ensure that workspaces where chemicals are used are well-ventilated. This helps minimize exposure to fumes, vapors, and airborne particles that may irritate the eyes.
4. **Proper Storage:** Store chemicals according to the manufacturer's recommendations and ensure that containers are well-labeled and securely sealed to prevent accidental spills.
5. **Know the Emergency Procedures:** Be familiar with the location of eye wash stations and safety showers, and ensure that they are easily accessible in case of exposure.
6. **Handle Chemicals Carefully:** Avoid splashing, and be mindful of where chemicals are poured or applied. Always pour chemicals over a sink or in a controlled environment.

Rest of ChatGPT's response to the question "what are the preventive measure of chemical eye injury?".

7. **Work in a Controlled Environment:** Use fume hoods, containment devices, and other safety equipment when handling hazardous chemicals to limit accidental exposure.
8. **Use the Right Tools:** When working with chemicals, use appropriate dispensing tools, such as pipettes or syringes, to minimize the risk of spills or splashes.
9. **Maintain Good Hygiene:** Avoid touching your face, especially your eyes, when handling chemicals. Wash your hands thoroughly after working with chemicals.

ChatGPT's response to question " what are the symptoms of chemical eye injury?".

ChatGPT

What are the symptoms of chemical eye injury?



Chemical eye injuries can range from mild irritation to severe damage, depending on the substance involved. Common symptoms of a chemical eye injury include:

1. **Pain or burning sensation** in the eye
2. **Redness or irritation** of the eye and surrounding area
3. **Tearing or excessive watering** of the eye
4. **Blurred vision** or difficulty seeing clearly
5. **Sensitivity to light (photophobia)**
6. **Swelling** of the eyelids
7. **Foreign body sensation**, like something is in the eye
8. **Discharge** from the eye, which may be clear or cloudy
9. **Chemical smell** (in some cases, especially if the substance is strong or pungent)

ChatGPT's response to question "can you tell me how to diagnose chemical eye injury?".

ChatGPT

Can you tell me how to diagnose chemical eye injury?



Diagnosing a chemical eye injury involves a combination of history-taking, physical examination, and diagnostic tests. Here's a step-by-step approach:

1. History and Symptom Assessment

- **Chemical Agent:** Determine the type of chemical involved (acidic, alkaline, or other irritants), as this will guide the severity and management. Ask about the nature of the exposure (e.g., industrial, household, or recreational chemical).
- **Time of Exposure:** The longer the exposure, the more severe the injury. Immediate flushing of the eye is critical.
- **Symptoms:** Common symptoms include pain, redness, burning, tearing, blurred vision, and sensitivity to light.

2. Initial Examination

- **Visual Acuity:** Test the patient's visual acuity in both eyes. A significant decrease in vision may indicate deeper damage to the cornea or lens.
- **Inspection:** Look for signs of conjunctival injection, corneal opacity, or epithelial defects. The severity of these findings can help assess the injury's extent.

Rest of ChatGPT's response to the question "can you tell me how to diagnose chemical eye injury?".

3. Fluorescein Staining

- Apply fluorescein dye to the cornea and examine under a blue light to detect any epithelial defects, which may indicate a corneal injury.

4. Assessing pH Level

- **pH Test:** Use pH paper to test the eye's pH level. Normal pH is around 7.0. For chemical injuries:
 - Alkaline substances (e.g., lye, ammonia) can cause deeper tissue damage.
 - Acidic substances (e.g., sulfuric acid) typically cause more superficial injuries.
- A pH of less than 7.0 or greater than 7.5 may indicate ongoing chemical exposure and necessitate further irrigation.

5. Slit Lamp Examination

- A slit lamp is crucial to assess for corneal and conjunctival damage. Look for:
 - Corneal abrasions or ulcerations.
 - Chemical burns or opacification.
 - Iris or lens injury.
- Assess the anterior chamber for any signs of inflammation or hyphema (blood in the anterior chamber), which may indicate more severe injury.

Rest of ChatGPT's response to the question "can you tell me how to diagnose chemical eye injury?".

6. Check for Intraocular Pressure (IOP)

- An elevated IOP may suggest glaucoma or damage to the anterior segment, which can be a complication of severe chemical injury.

7. Assessment for Systemic Involvement

- For severe exposures (e.g., large chemical spills), consider evaluating the patient for systemic symptoms (respiratory distress, skin burns, or other signs of systemic toxicity).

8. Referral and Further Testing

- For significant injuries (especially with alkali burns or delayed presentation), refer the patient to an ophthalmologist for more advanced assessment and management.
- Imaging (e.g., corneal pachymetry or OCT) may be indicated in certain cases for further evaluation.

ChatGPT's response to question "can you tell me what is the treatment of chemical eye injury?".

ChatGPT

Can you tell me what is the treatment of chemical eye injury?



Treatment for a chemical eye injury typically involves the following steps:

1. **Immediate Irrigation:** The first and most crucial step is to flush the affected eye with large amounts of clean water or saline solution. This should be done as quickly as possible, ideally within the first 10 minutes, to dilute and remove the chemical. Continue rinsing for at least 15 to 30 minutes, ensuring the water flows from the inner corner of the eye to the outer corner to avoid contaminating the other eye.
2. **Seek Medical Attention:** After flushing, seek immediate medical attention, even if the eye feels better. A healthcare professional should assess the injury, determine the severity, and provide further treatment.
3. **Eye Examination:** In the hospital, a thorough eye examination will be performed, possibly including a fluorescein dye test to check for corneal damage and pH testing to ensure the eye's pH has returned to normal (around 7.0-7.4).
4. **Topical Medications:** Depending on the injury, the doctor may prescribe topical antibiotics to prevent infection, corticosteroids to reduce inflammation (in some cases), or lubricating eye drops to help soothe the eye.
5. **Pain Management:** If the injury is causing significant pain, oral pain relievers or topical anesthetics may be used, along with measures like a patch or eye shield to protect the eye.
6. **Follow-Up Care:** Regular follow-up appointments may be necessary to monitor for complications, including infection, scarring, or changes in vision.

ChatGPT's response to question " what is the follow up care for chemical eye injury?".

ChatGPT

What is the follow-up care for chemical eye injury



Follow-up care for a chemical eye injury is crucial to ensure proper healing and to prevent complications. After initial treatment, which typically involves flushing the eye with saline or water, there are several important steps for follow-up care:

1. **Reevaluation by an Eye Specialist:** It's essential for the patient to follow up with an ophthalmologist or healthcare provider within 24–48 hours after the injury, even if they seem to feel better. The eye specialist will assess for any long-term damage to the cornea or other eye structures.
2. **Monitoring for Infection:** After the injury, there is an increased risk of infection. The healthcare provider may prescribe antibiotic eye drops or ointments to prevent infection. Close monitoring for signs of infection, such as redness, increased pain, or discharge, is important.
3. **Pain Management:** If the patient experiences pain or discomfort, over-the-counter pain relievers or prescribed medications may be recommended. Sometimes, cycloplegic eye drops (e.g., atropine) are prescribed to relax the muscles in the eye and relieve pain caused by spasms.
4. **Lubrication:** Dryness or irritation is common after a chemical injury. Prescribed lubricating eye drops or ointments may be needed to keep the eye moist and aid healing. Some patients may also need artificial tears for longer periods.

Rest of ChatGPT's response to the question "what is the follow up care for chemical eye injury?".

5. **Avoiding Strain or Further Injury:** The patient should avoid rubbing their eyes, exposure to bright lights, and activities that may lead to further trauma (e.g., sports or heavy physical activity). The use of protective eyewear may be recommended during the healing period.
6. **Corneal Healing and Scarring:** Chemical injuries can cause scarring on the cornea, which may impair vision. The ophthalmologist will monitor corneal healing over time and may suggest interventions such as a corneal transplant if significant scarring develops.
7. **Follow-Up Appointments:** Depending on the severity of the injury, follow-up visits may be required at intervals (e.g., 1 week, 1 month, 3 months) to ensure proper healing, assess vision, and adjust the treatment plan if necessary.
8. **Long-Term Care:** In severe cases, patients may require long-term care to manage complications like chronic dryness, vision changes, or scarring. In some cases, vision rehabilitation or corrective surgeries may be necessary.

It's important to adhere to the healthcare provider's instructions for follow-up visits and treatment to ensure the best possible outcome.

ChatGPT's response to question " what is the complication of chemical eye injury?".

ChatGPT

What is the complication of chemical eye injury?



Chemical eye injuries can lead to several complications, depending on the severity of the injury and the type of chemical involved. Common complications include:

1. **Corneal Damage or Ulcers:** Chemical burns can damage the cornea (the clear front surface of the eye), leading to corneal scarring, ulcers, or even permanent vision impairment.
2. **Infection:** The injury can create an open wound or compromised tissue that makes the eye more susceptible to bacterial or fungal infections, which can further damage the eye.
3. **Vision Loss:** Severe chemical burns, especially those that affect the deeper layers of the cornea or the retina, can lead to partial or total loss of vision.
4. **Glaucoma:** In some cases, a chemical injury can increase intraocular pressure, leading to glaucoma, which can damage the optic nerve and result in permanent vision loss if not treated.
5. **Cataract Formation:** A chemical burn may contribute to the development of cataracts (clouding of the lens), which can affect vision and may require surgery to restore clarity.
6. **Dry Eye Syndrome:** Damage to the tear-producing glands or the surface of the eye may result in chronic dryness, leading to irritation, discomfort, and increased risk of infection.

Rest of ChatGPT's response to the question "what is the complication of chemical eye injury?".

7. **Symblepharon:** This is the formation of scar tissue that can cause the eyelids to adhere to the surface of the eye, which may lead to further vision problems and difficulty moving the eyelids.
8. **Permanently Reduced Tear Production:** Damage to the lacrimal glands or tear ducts may cause chronic dryness or inability to produce enough tears, leading to discomfort and further risk of injury.
9. **Chronic Pain:** If the cornea or other eye tissues are severely damaged, the injury can result in long-term pain or discomfort, requiring ongoing treatment.

Early and appropriate treatment is essential to minimize these complications, including thorough irrigation, medications, and sometimes surgical intervention.

Average score for FKGL, FRES, and % of passive sentences across groups.

