Utilizing the ChatGPT: An Innovative Method for Simulating Patient Conversations in Community Pharmacy Settings

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Abstract: Generative artificial intelligence (AI), notably ChatGPT via OpenAI, is leading to waves in the educational sphere, opening new, innovative avenues to deepen and enhance student learning experiences. ChatGPTs show promise as an educational resource, particularly in health science and healthcare management. The purpose of this report was to illustrate that prompts to AI chatbots can create realistic simulations of patient interactions in community pharmacy environments, providing essential feedback for learners in the process. The simulations were organized into four categories: simulated patients with common or specific diseases, each further divided with and without a designated drug-related problem. The findings reveal ChatGPT's ability to mimic a real patient, providing detailed and contextually relevant responses. It delivered a unique, authentic learning interaction, diverging from traditional laboratory practices and providing essential feedback to learners. In conclusion, the ChatGPT proves to be a powerful simulated patient tool in community pharmacy practice, acting as an effective learning platform where pharmacy educators can help students improve their dispensing skills.

Keywords: Generative AI, ChatGPT, Pharmacy education, Community pharmacy practice.

INTRODUCTION

Generative AI, a branch of artificial intelligence, can autonomously produce a variety of data, including images, music, and text, by leveraging machine learning and deep learning techniques. Central to this capability is the generative model. Today, this technology is being integrated into education, offering innovative ways to enrich student learning experiences (1). ChatGPT, developed by OpenAI, is a renowned generative artificial intelligence (AI) language model designed to generate text. It employs reinforcement learning with human feedback (RLHF), a technique that harnesses human demonstrations and preference comparisons to steer the model's behavior. Trained on extensive internet data authored by humans, ChatGPT's responses often mimic human-like interactions. Its underlying machine learning algorithms enable it to engage users conversationally, offering insightful replies. Moreover, it continually evolves, refining its responses based on past interactions (2).

Recent studies have highlighted the potential of the ChatGPT as an educational tool in health science and healthcare management. It has been effectively utilized to address intricate medical queries, notably in Diabetes Self-Management and Education (DSME) — a model aimed at enhancing glycemic control, minimizing complications, and improving the quality of life for diabetes patients. While ChatGPT offers clear and concise responses in the DSME domain, some inaccuracies were noted, likely due to outdated training datasets (3). Impressively, this AI chatbot passed the Step 1 United States Medical Licensing Exam (4). In addition, the ChatGPT holds promise in various medical education fields, including automated scoring, teaching assistance, personalized learning, research support, swift information retrieval, case scenario generation, content creation for learning, and language translation (5).

Community pharmacists, often the most accessible health professionals, primarily operate from drug stores located in both small towns and large cities. The primary duty of these patients is to ensure the appropriate, safe, and effective use of medications, promoting overall patient health and well-being. While their main role involves dispensing medications, they also undertake health screenings and manage medication therapy monitoring programs (6). Community pharmacists are skilled at determining when to refer patients to emergency services. Typically, they diagnose common diseases and dispense the appropriate medications. Furthermore, they are trained to pinpoint and address both potential and actual drug-related problems (DRPs), which are events or situations in drug therapy that can impede desired health outcomes (7, 8).

In pharmacy schools, students often hone their dispensing skills in labs due to limited real-world learning opportunities. Traditional laboratories involve students practicing with peers or simulated patients, but these setups can be lowfidelity, costly, and challenging to maintain (9). While virtual simulations are emerging, the future seems promising for AI chatbots such as ChatGPT in educational settings (10, 11). These chatbots can effectively train healthcare workers in conversational skills (11). Given ChatGPT's ability to provide high-quality, empathetic responses, it holds potential as a tool for physicians to enhance patient communication (12).



Figure 1. The help of guiding the ChatGPT to learn WHO's guidelines for good pharmacy practice.

In this report, ChatGPT-4 was accessed via the OpenAI website (https://chat.openai.com/chat) to simulate a community pharmacy scenario. To enhance realism, before simulation, the AI chatbot was briefed on the WHO's guidelines for good pharmacy practice (13). This was followed by a query about the proper community pharmacist protocol. The simulations were categorized into four groups: simulated patients with common diseases with and without specific DRPs, and those with specific diseases commonly encountered in community pharmacies with and without specific DRPs. ChatGPT emulated patients visiting a drugstore, providing details such as age, sex, and other personal attributes that are important for medication selection. The authors subsequently engaged with ChatGPT in a natural conversation, emulating the dispensing protocol steps. All interactions were captured using a screenshot tool.

RESULTS

ChatGPT Instruction Prompt: WHO Pharmacy Practice Guidelines

The authors aimed to use ChatGPT as a simulated patient visiting a drugstore, intending to role-play as a community pharmacist dispensing medications. Prior to the simulation, ChatGPT was briefed on the WHO's guidelines for good pharmacy practice. Subsequently, the authors inquired about the appropriate protocol for a community pharmacist and then initiated the simulated patient prompt, as detailed in Figure 1.



Simulated patient prompts

Case of a simulated patient with a common disease and without a specific DRP.

For practicing as a community pharmacist, the prompt guiding the AI to act as a simulated patient with a common disease but without a specific DRP is illustrated in Figure 2A.

Case of a simulated patient with a common disease and a specific DRP.

In training for community pharmacy roles, the prompt instructed the AI to role-play as a simulated patient with a common disease and specific DRP—in this case, an excessively high dose of the correct medication, as illustrated in Figure 2B.

Case of a simulated patient with a specific disease and without a specific DRP.

For community pharmacist training, a prompt directed the AI to emulate a simulated patient with a specific ailment, in this case, headache (encompassing migraine, cluster headache, and tension headache), but without any DRP, as illustrated in Figure 2C.

Case of a simulated patient with a specific disease and a specific DRP.

For community pharmacy training exercises, a prompt guided the AI to act as a simulated patient presenting with a distinct ailment and DRP. Specifically, the patient had a headache encompassing migraine, cluster headache, or tension headache—and was dealing with the issue of improper dosage selection, as illustrated in Figure 2D.



Figure 3. ChatGPT simulation: initiating a conversation as a simulated patient in community pharmacy environments.

Please grade my dispensing.	Grades (A+ to F):
Certainly! Let's grade your dispensing process based on specific criteria:	Patient Interaction & Communication: A Feedback: You communicated effectively and showed concern for the patient's well- being. Symptom Assessment: A Feedback: You selved detailed questions to understand the nature duration, and course
 Criteria for Dispensing Evaluation: Patient Interaction & Communication: Assessing your ability to communicate effectively, show empathy, and make the patient feel comfortable. Symptom Assessment Evaluating the thoroughness of your inquiry about the patient's symptoms, duration, and severity. Safety Checks: Checking if you ensured the patient doesn't have allergies, inquired about other medications, and understood any underlying conditions. Medication Recommendation: Assessing the appropriateness of the medication recommended based on the patient's symptoms. Dosage & Usage Instructions: 	 Feedback: You asked detailed questions to understand the nature, duration, and several of the symptoms. Safety Checks: A+ Feedback: You ensured the patient's safety by checking for allergies, inquiring about other medications, and understanding underlying conditions. Medication Recommendation: A- Feedback: You recommended an appropriate medication for pain relief. However, a bi mention of other potential options or the reason for choosing naproxen specifically would have been beneficial. Dosage & Usage Instructions: A Feedback: You provided clear instructions on how to take the medication and highlighted the importance of taking it after eating. Education & Advice: A Feedback: You educated the patient about the chronic nature of arthritis and the importance of seeing a doctor. You also informed them about potential side effects.
 Evaluating the clarity and accuracy in explaining how and when to take the medication. Education & Advice: Assessing how well you provided the patient with additional information about their condition, potential side effects, and when to seek further medical attention. 	Overall Grade: A
	General Feedback: You demonstrated a thorough and patient-centered approach to the dispensing process. Your communication was clear, and you ensured the patient's safety all times. Your advice was comprehensive, and you emphasized the importance of seekin further medical attention. Great icb overall

Figure 4. ChatGPT's evaluation and detailed feedback on the simulated conversation.

The example of ChatGPT as a simulated patient

Using the initial prompt for a simulated patient with a common disease and without a specific DRP (Figure 2A), ChatGPT crafted a scenario in which it role-played as a patient, initiating a simulated conversation as depicted in Figure 3. It portrayed patients with detailed attributes like age and sex, crucial for medication selection. After the dispensing simulation, ChatGPT provided a comprehensive analysis and feedback for each step, assigning grades and suggesting areas for improvement. This comprehensive assessment was summarized in Figure 4.

DISCUSSION

The performance of the ChatGPT in simulating patients was impressive. Unlike traditional methods in which students often role-play with familiar lab partners who may not have prior training in simulating patient behaviors, ChatGPT emulates a realistic patient with detailed responses within a given context. It not only provides instant feedback on dispensing practices but also outlines general criteria for evaluation, vital for honing communication skills as a community pharmacist. In a dispensing lab, students often recognize their partners, potentially reducing the authenticity of the experience. In contrast, ChatGPTs offer unique interactions, akin to encountering a stranger seeking assistance at a drugstore, making the learning experience more authentic than traditional laboratory practices. Another benefit of using chatbots as simulated patients is their ability to generate diverse scenarios, providing learners with a wealth of opportunities to engage with various patient backgrounds and stories. Furthermore, accessing chatbots anytime is convenient for learners, allowing for round-the-clock practice.

Teaching skills, distinct from conveying content knowledge, require a mix of cognitive and psychomotor abilities, especially in clinical tasks like patient history-taking, examinations, and data synthesis. Instruction starts with cognitive observation, progresses to psychomotor practice, and then enters the maintenance phase (14, 15). Using the ChatGPT as a learning tool, educators can harness it during the hands-on practice phase. ChatGPT provides immediate feedback, which educators can then use to guide students in refining their skills. Alternatively, educators can leverage ChatGPT interactions for case study discussions, grounding them in realistic scenarios. This approach helps students grasp the practical application of dispensing to patients.

CONCLUSION

ChatGPT serves as a potent simulated patient tool for community pharmacy practice, offering invaluable feedback to learners. To optimize its effectiveness, the chatbot should first be instructed on the use of guidelines on good pharmacy practices and community pharmacist protocols. Initiating conversations with detailed scenarios about drugstore interactions provides a realistic context. Thus, pharmacy educators can utilize the ChatGPT as a powerful learning platform for students to refine their dispensing skills.

CONFLICTS OF INTEREST

None.

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REFERENCES

- Yu H, Guo Y. Generative artificial intelligence empowers educational reform: current status, issues, and prospects. Front Educ. 2023;8:1183162. <u>https://doi.org/10.3389/feduc.2023.118316</u> <u>2</u>
- OpenAI. What is ChatGPT? 2023 [Available from: <u>https://help.openai.com/en/articles/678345</u> <u>7chatgpt-general-fag.</u>
- 3. Sng GGR, Tung JYM, Lim DYZ, Bee YM. Potential and Pitfalls of ChatGPT and Natural-Language Artificial Intelligence Models for Diabetes Education. Diabetes Care.

2023;46(5):e103-e5. https://doi.org/10.2337/dc23-0197

 Gilson A, Safranek CW, Huang T, Socrates V, Chi L, Taylor RA, et al. How Does ChatGPT Perform on the United States Medical Licensing Examination? The Implications of Large Language Models for Medical Education and Knowledge Assessment. JMIR Med Educ. 2023;9:e45312.

https://doi.org/10.2196/45312

 Khan RA, Jawaid M, Khan AR, Sajjad M. ChatGPT - Reshaping medical education and clinical management. Pak J Med Sci. 2023;39(2):605-7.

https://doi.org/10.12669/pjms.39.2.7653

- Portillo EC, Ho T, de Villiers MM, Zorek JA. Community Pharmacy: Featuring the Illustrated Case Studies "Organized Chaos," "Transformation," & "Breathe". In: Zorek JA, editor. Interprofessional Practice in Pharmacy: Featuring Illustrated Case Studies. New York, NY: McGraw Hill; 2021.
- Pharmaceutical Care Network Europe Association. PCNE Classification for Drug-Related Problems V9.1 2020 [Available from: <u>https://www.pcne.org/upload/files/417_PC</u> <u>NE classification V9-1 final.pdf.</u>
- Feichtl MM, Melin K. Community/Ambulatory Care. In: Nemire RE, Assa-Eley M, editors. Pharmacy Student Survival Guide, 4e. New York, NY: McGraw Hill; 2023.
- Nazar H, Lindsey L, Fletcher J, Rook L, Todd A, Husband A. Training Student Pharmacists in Medication Dispensing and Checking Within a High-Fidelity Clinical Environment. Am J Pharm Educ. 2019;83(7):7106. https://doi.org/10.5688/ajpe7106
- Ferrone M, Kebodeaux C, Fitzgerald J, Holle L. Implementation of a virtual dispensing simulator to support US pharmacy education. Curr Pharm Teach Learn. 2017;9(4):511-20. https://doi.org/10.1016/j.cptl.2017.03.018
- Tanana MJ, Soma CS, Srikumar V, Atkins DC, Imel ZE. Development and Evaluation of ClientBot: Patient-Like Conversational Agent to Train Basic Counseling Skills. J Med Internet Res. 2019;21(7):e12529. https://doi.org/10.2196/12529

12. Ayers JW, Poliak A, Dredze M, Leas EC, Zhu Z, Kelley JB, et al. Comparing Physician and Artificial Intelligence Chatbot Responses to Patient Questions Posted to a Public Social Media Forum. JAMA Intern Med. 2023;183(6):589-96. https://doi.org/10.1001/jamainternmed.202

3.1838

13. World Health Organization. Annex 8 Joint FIP/WHO guidelines on good pharmacy practice: standards for quality of pharmacy [Available services 2011 from: https://www.who.int/docs/defaultsource/medicines/norms-andstandards/guidelines/distribution/trs961annex8fipwhoguidelinesgoodpharmacypractice.pdf.

- 14. Sawyer T, White M, Zaveri P, Chang T, Ades A, French H, et al. Learn, See, Practice, Prove, Do, Maintain: An Evidence-Based Pedagogical Framework for Procedural Skill Training in Medicine. Acad Med. 2015;90(8):1025-33. https://doi.org/10.1097/ACM.0000000000 00734
- 15. Burgess A, van Diggele C, Roberts C, Mellis C. Tips for teaching procedural skills. BMC Med Educ. 2020;20(2):458. https://doi.org/10.1186/s12909-020-02284-1