



## A LITERATURE REVIEW: CHATGPT, WHAT WILL THE FUTURE OF PHARMACY PRACTICE BRING—A THREAT OR A BENEFIT?

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### Abstract

**Introduction:** ChatGPT (Chat Generative Pre-trained Transformer) is an artificial intelligence chatbot that uses a technology transformer to predict the following sentences or words in a chat or text. ChatGPT has begun to be widely used in pharmacy services to obtain information about disease, treatment, and patient therapy. However, it has not yet been discovered to what extent the safety and effectiveness of ChatGPT in helping pharmacists for the treatment process and patient care. This article review aims to summarize, evaluate and find the gaps in the research that has been done so that a better understanding of the role of ChatGPT is obtained to optimize its use in pharmaceutical services appropriately.

**Methods:** Using English-language publications that were published and connected to ChatGPT and pharmacy services in 2023, the study used a multi-method qualitative approach, ProQuest, and ScienceDirect databases.

**Result:** ChatGPT shows excellent results in helping pharmacists give counselling and bringing immense potential in optimizing pharmacy services and in making clinical decision support. But ChatGPT can't give accurate and safe information, can't understand pharmacists' instructions or explain adverse drug reactions and their causes. The ChatGPT answer shows no signs of reproducibility to low reproducibility.

**Conclusion:** ChatGPT is a helpful technology, but not a professional medical advisor that can substitute such as a pharmacist. ChatGPT's output must be validated before decision usage for the safety and efficacy of the treatment.

**Keywords:** pharmacy, technology, ChatGPT, transformation

## INTRODUCTION

Medication errors are significant problems in healthcare, and they can occur at any stage of the medication process, including prescribing, dispensing, administration, and monitoring (Elliott *et al.*, 2021). Many studies have shown that medication errors happen in pharmacy services. According to a study, medication errors (ME) were identified on 9.5% of the prescribing sheets that were gathered. Prescription mistakes had the highest frequency of ME (88.24%), followed by transcription mistakes (7.61%), dispensing mistakes (4.02%), and administration mistakes (0.13%) (Mahendra, 2021). Another study conducted by Susanti showed that several factors potentiate medication error, including unreadable prescription writing 0.3%, abbreviated drug name 12%, no dose 39%, no number of administrations 18%, no dose unit 59%, no rules of use 34%, no route of administration 49%, no dosage form information 84%, the incomplete identity of the patient (no medical record number written 62%, height 88%, patient sex 76%, age 87%, and weight 88%) (Susanti, 2015). The question is, what are the causes of medication errors?

There are five causes of medication errors. The most important cause of medication errors is human error factors. These factors may include inadequate staffing, poor communication, and lack of resources. These factors may include a lack of knowledge, experience, training and fatigue, stress, and distractions (Ghorbanzadeh *et al.*, 2019). Physician-related factors are also common causes of medication errors, including incomplete or inaccurate medication orders, lack of knowledge, and poor communication (Biskin Cetin & Cebeci, 2021). System-related factors, such as inadequate technology, lack of standardization, and poor communication, were also identified as a cause of medication errors. Last but not least are patient-related factors such as allergies, comorbidities, non-adherence to medication regimens, language barriers, cultural differences, and lack of patient education (Yangfang, 2012). Can we eliminate the prevalence of medication errors?

Medication errors are inevitable during the medication process, but minimizing incidents by implementing preventive strategies to improve patient safety and safe drug use is possible (Mahendra, 2021). One of the ways of doing so is with the help of technology. But what exactly is technology? Does technology have any importance in healthcare?

Technology has become increasingly important in healthcare, with many developing applications to improve patient care and outcomes. Technology application in patient care includes electronic prescriptions, medical records, and inventory control. Electronic prescriptions, electronic medical records, and electronic inventory control are all examples of electronic health information systems that can improve the efficiency and accuracy of healthcare processes. Electronic prescription (e-prescription) is a system that allows healthcare providers to send prescriptions electronically to pharmacies. An electronic medical record (EMR) is a digital version of a patient's paper chart that contains information about their medical history, diagnoses, medications, allergies, and other relevant clinical data (Ciancaglini *et al.*, 2021). Electronic inventory control is a system that enables healthcare providers to manage and track medication inventory electronically (George & Elrashid, 2023).

Besides that, there is also the application of AI (Artificial Intelligence)-based technology in healthcare, such as ChatGPT (Chat General Pretrained Transformer). ChatGPT is a chatbot made by OpenAI on November 30, 2022. ChatGPT offers a new way to interact with vital artificial intelligence. ChatGPT can give human-like responses in various languages (Jairoun *et al.*, 2023).

ChatGPT can deliver advanced and shrewd composing after preparing and keep upgrading to as of late given data. ChatGPT also can recreate human discussion in reaction to prompts or questions based on the set of input content. Due to its solid composing capacity, ChatGPT appears competent at composing advanced expositions and talks, summarizing writing, and producing code. AI-driven

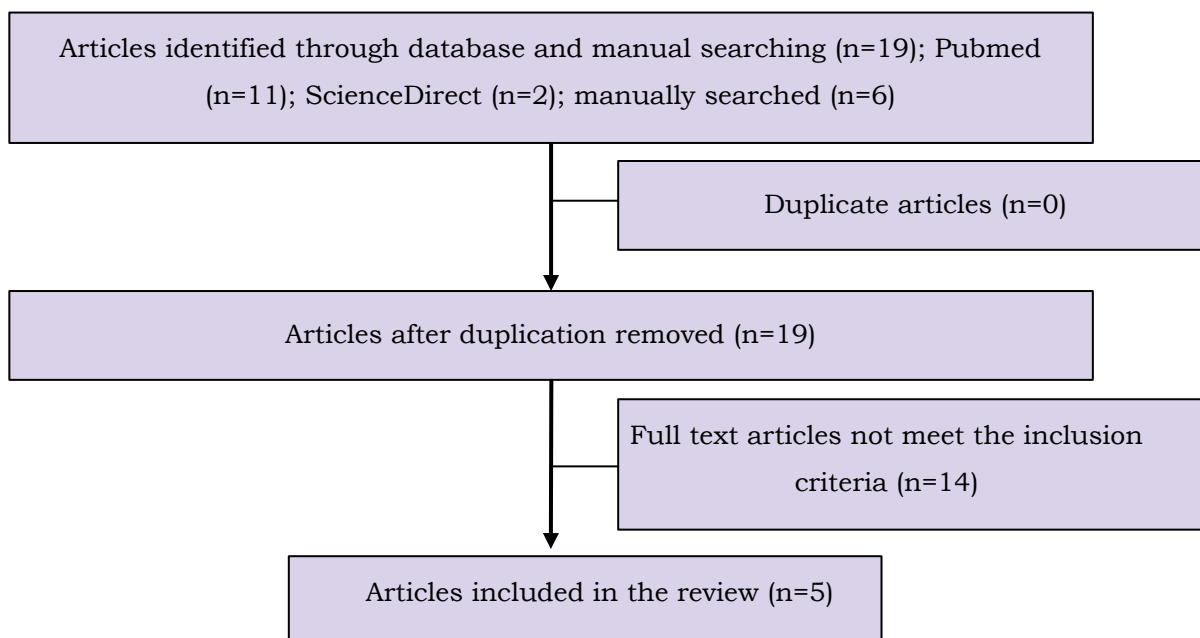
bolster devices like ChatGPT may improve proficiency, decision-making, and quiet care in clinical settings (Huang *et al.*, 2023 ; Zhu *et al.*, 2023).

The great objective of AI is to create intelligent machines that can learn, reason, and perform complex errands on their own, without unequivocal programming, making them practical assistants for humans. ChatGPT provides information, data, and more broad applications in pharmacy. These roles are beneficial for pharmacists to take action rapidly according to care for patient safety.

What is the role of ChatGPT in pharmaceutical care? Can ChatGPT hold this role in pharmacy services? In general, we want to explore the part of ChatGPT in advancing digital transformation in pharmacy services. We also hope this article will provide the information to help pharmacists maximize the usage of ChatGPT for the good of pharmacy services.

### METHODOLOGY

The study adopted a multi-method qualitative approach (Davis *et al.*, 2011) to acquire an in-depth understanding of using ChatGPT’ in Advancing Digital Transformation in Pharmacy Services. Researchers searched English-published articles related to ChatGPT and pharmacy services in 2023 on PubMed, ProQuest, and ScienceDirect databases. The keywords used are “ChatGPT which is related to Pharmacy Services.” Researchers also manually searched for additional references in writing this article. Accordingly, researchers emphasized the importance of ChatGPT, which will affect pharmacists and the pharmacy industry. Here below is the flow diagram of the literature search.



### RESULTS AND DUSCUSSION

The table 1. summarizes the articles included in this review article. Based on our knowledge, this is the first review discussing ChatGPT in improving pharmaceutical care and whether or not ChatGPT will facilitate or distract pharmacy services. Based on the article we reviewed, ChatGPT shows excellent results in helping pharmacists give counselling and bringing immense potential in optimizing pharmacy services (Biswas, 2023). This is strengthened by another research (Liu *et al.*, 2023) that tested ChatGPT’s performance in making clinical decision support. The result shows that ChatGPT made nine correct answers out of twenty in a poll. Ideas generated by AI give new meaningful, and understandable perspectives.

However, ChatGPT can't give accurate and safe information to help pharmacists provide good pharmacy services. ChatGPT users must know how to make accurate prompts to generate a precise outcome. Users must also know the ethics regarding using ChatGPT in making therapeutic questions based on patients using the correct preference and avoiding copyright violation (Garg *et al.*, 2023). This is strengthened by a study by Biswas that shows ChatGPT can't understand pharmacists' instructions or explain adverse drug reactions and their causes. To investigate performance and risk regarding ChatGPT's usage in answering questions about drugs, (Morath *et al.*, 2023) have done a test by giving a prompt to ChatGPT. The result shows that only 13 out of 50 answers provide great content and have complete information to start therapy without endangering the patient. The majority of answers are wrong (38%, n=19) or contain partially correct contents (36%, n=18), and no reference is given. High-risk that might danger patients most likely happen in 26% (n=13) cases and low-risk cases in 28% (n=14) cases. In all high-risk cases, actions can be started from the information given. ChatGPT's answers generated a few times vary from time to time and only give three identical answers from twelve total answers, showing no signs of reproducibility to low reproducibility. This finding highlights potential problems with effectiveness and efficiency. Usage of AI applications in drug information is impossible as long as there are still obstacles such as inaccurate content, no reference, reproducibility, dan ethical problems.

Technology usage helps, accelerates, and eases pharmacists in giving pharmacy services to patients. However, there is a reminder that patient safety is the end goal of every pharmacy practice. For this reason, the technology usage must be tested prior, especially for ChatGPT, where information given relies on references cited and prompt given. That's why there should be further development in ChatGPT's usage for pharmacy services. Another important thing in using technology is users must be a pharmacist that has the skill and competence to evaluate and validate ChatGPT's answers.

## CONCLUSION

Although ChatGPT is a helpful technology, it is not a professional medical advisor substitute such as a pharmacist that fulfills the terms in making drug-related decisions and patient safety information. Therefore, ChatGPT's output must be validated before decision usage.

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## Conflict of interest

There is no conflict to declare

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**Table 1.** Result of ChatGPT use in Pharmacy Practice

No.	Title	Objective	Results
1	Prospective Role of ChatGPT in Pharmacy: According to ChatGPT (Biswas, 2023)	To understand the role of ChatGPT in Pharmacy Services	ChatGPT states that it can do many things now and in the future. However, ChatGPT is not a substitute for professional medical advice, and a qualified professional should validate its outputs before being used for decision-making.
2	Evaluating the Performance of ChatGPT in Clinical Pharmacy (Huang <i>et al.</i> , 2023)	To analyse ChatGPT's performance in important clinical pharmacy practice areas, including as prescription review, patient medication education, identification of adverse drug reactions (ADRs), determining the causality of ADRs, and drug counselling.	The results indicate that ChatGPT is amazing in Medicare counseling and powerless in medicine surveys, understanding pharmaceutical instruction, ADR acknowledgment, and ADR causality.

3	Performance and risks of ChatGPT used in drug information: an exploratory real-world analysis (Morath <i>et al.</i> , 2023)	To examine the effectiveness and risk of using a chat Generative Pre-trained Transformer (ChatGPT) to answer questions about drugs.	Only 13 out of 50 replies had the right information and were accurate enough to start management without endangering patients. Most of the responses (38%, n=19) were either incorrect or only partially accurate (36%, n=18), and no references were given. In 26% (n=13) of the cases, there was a high likelihood that a patient would suffer injury, and in 28% (n=14) of the cases, the risk was deemed low. Actions may have been taken in each high-risk situation based on the information given. Only three out of 12 answers were comparable when the ChatGPT was used twice, showing no reproducibility to poor reproducibility.
4	Exploring the Role of Chat GPT in patient care (diagnosis and Treatment) and medical research: A Systematic Review (Garg <i>et al.</i> , 2023)	Examine the potential of ChatGPT in diagnosing and treating patients and its contribution to medical research.	There are troubles and ethical problems related to utilizing ChatGPT in helpful settings and therapeutic inquiries. Understanding requests, note composing, decision-making, trial enrolment, information administration, choice back, inquiring about before, and understanding instruction are all things that ChatGPT can offer assistance with. As a result, it needs human-like characteristics, and its specialist as a creator is called into question
5	Using AI-generated suggestions from ChatGPT to optimize clinical decision support (Liu <i>et al.</i> , 2023)	To examine if ChatGPT may generate helpful suggestions to enhance clinical decision support (CDS) logic and determine if it outperforms human-generated suggestions.	ChatGPT contributed 9 of the 20 highest-scoring suggestions in the poll. AI-generated ideas were found to provide fresh viewpoints and were judged as highly intelligible and important, with moderate utility, poor acceptability, bias, inversion, and repetitive.