

Practical applications of artificial intelligence chatbots in obstetrics and gynecology medical education



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Generative artificial intelligence chatbots are sophisticated conversational artificial intelligence tools that have the capability to interpret natural language inputs and produce responses that closely resemble human speech. Artificial intelligence chatbots hold significant promise in revolutionizing medical education by offering invaluable support across various educational domains, including teaching, learning, and assessment. Their practical applications span a wide spectrum, from aligning learning objectives and simplifying administrative tasks to facilitating feedback, aiding faculty development, and supporting mentorship initiatives. However, alongside their potential benefits, concerns exist regarding data privacy, inherent biases, and occasional errors termed “hallucinations,” underscoring the imperative for a cautious and informed approach to their integration within educational settings. It therefore becomes essential for medical educators and academic institutions to proactively engage with artificial intelligence technologies like chatbots, not only to leverage their benefits but also to critically assess and address associated challenges such as bias, privacy, and misinformation. By thoughtfully integrating artificial intelligence tools, medical educators can determine where these technologies are most beneficial, implement safeguards against potential harms, and explore innovative applications to enhance medical education.

Key words: artificial intelligence, biases, chatbot, ChatGPT, data privacy, faculty development, feedback, hallucinations, informed approach, integration, large language models, learning objectives, medical education, mentorship, responsible use, teaching

Introduction

Artificial intelligence (AI) chatbots are conversational AI tools that utilize large language models (LLMs), which are computer programs capable of

processing natural language inputs and generating human-like responses based on previous encounters. The first publicly available AI chatbot was ChatGPT, which was created by the AI research and

development company OpenAI and originally released in November 2022. ChatGPT was initially trained on over 175 billion parameters sourced from the internet.^{1–3} Other generative LLMs exist, such as Anthropic’s Claude and Google’s Gemini.^{4,5}

The use of AI is already commonplace in clinical practice and various aspects of medical education.⁶ For instance, in clinical settings, AI is used for radiology imaging assessment, as well as for clinical decision support tools that aid physicians in diagnosis and treatment recommendations. As another form of AI, chatbots offer a promising opportunity to enhance teaching, learning, and assessment practices for medical educators. While there are certain cautionary considerations for the incorporation of this emerging form of AI in medical education, there are also exciting opportunities for AI chatbots to improve the quality and efficiency of medical education content delivery to learners. The purpose of this article is to explore the practical applications of AI chatbots in the day-to-day responsibilities of medical educators and provide examples of their use.

Potential benefits of using artificial intelligence chatbots in medical education

The ability of AI chatbots to organize, summarize, list, and sort textual information entered directly into their interface is a less controversial use of this new form of AI.^{7,8} In this context, AI chatbots respond to information provided by its human user, who is familiar with the content entering and exiting the AI chatbot. The user can validate the output

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and make necessary edits. An example is the use of AI chatbots to correct writing for grammatical errors and typos, similar to the spelling and grammar check AI integrated into modern electronic word processing software.

More controversial is the use of the vast repositories of medical knowledge and resources of AI chatbots to generate novel content. On the positive side, content creation from AI chatbots can be a valuable asset in brainstorming and idea generation.⁹ An example is the creation of short case vignettes for basic science topics or learning objectives for an educational session. The key to proper use of AI chatbots in these scenarios lies in specific and detailed prompting of the LLM input, as well as validating and editing the output.

One of the most controversial aspects is the direct teaching of learners by AI chatbots. In this scenario, the chatbot interface can tailor the level and pace of learning to the learner's ability.^{10,11} A learner can opt to delve deeper into a specific topic while simultaneously requesting the AI chatbot to teach at a lower level of mastery for new topics. The risk arises when a content expert is unavailable to review the teaching of the AI chatbot, leaving no mechanism to check for errors or biases known to exist in AI chatbot output.^{3,7}

A 2021 report by the National Academy of Medicine on AI in health professions education highlighted the ongoing challenge of information overload, which often overwhelms the cognitive capacities of both students and educators. AI has the potential to shift the focus of learning from simply information acquisition to effective knowledge management.¹² For example, instead of passively absorbing a list of differential diagnoses, a student can use an AI chatbot to compare conditions based on clinical presentations, pathophysiology, or treatment options. Similarly, AI tools can prioritize high-yield information, identify knowledge gaps, and facilitate self-directed learning by tailoring content to individual needs. This shift enables learners to focus on critical thinking and clinical application rather than rote memorization.

Known limitations of artificial intelligence chatbots

The massive datasets that are used to train AI chatbots are often proprietary to their development companies.¹³ This prevents the scientific or medical education community from fully understanding or validating the entirety of the data, a task that would be nearly impossible to undertake. Also, once an AI chatbot is released they are not regularly updated in real time. Any data or information available after the release date are not incorporated into the model's training data. Additionally, most AI chatbots are not connected to the open internet for data sourcing and have no access to reference databases such as the National Library of Medicine's MEDLINE. Moreover, biases and stereotypes are inevitably built into the tools from their training datasets, which can significantly impact their use in patient care educational scenarios.¹⁴

AI chatbots lack real-time awareness, long-term memory, and a comprehensive understanding of the world. Consequently, they can produce incorrect or nonsensical responses as the LLM algorithm attempts to respond to prompts provided to it. Recognition of these errors by humans has been termed "hallucinations."^{3,8,13,15} This poses a particular risk when the phrasing and instructions given to the AI chatbot lack specificity or detail, as well as when the human user does not refine their prompts or correct inaccuracies based on the chatbot's responses.¹⁰ To mitigate these risks, educators and learners should verify AI chatbot-generated information against trusted medical sources, such as peer-reviewed literature or clinical guidelines, before applying it in educational or clinical contexts. Additionally, structured prompts that include clear objectives and constraints can minimize errors and improve the relevance of AI chatbot-generated content.

Additional concerns about the use of AI chatbots for medical education revolve around copyright and privacy. Many medical educators also worry about dishonesty, plagiarism, professionalism, and accountability when AI tools are used to create novel content.^{7,16}

Furthermore, it is critically important that protected and private information is not inadvertently entered into the AI chatbot interface. While it is the responsibility of academic medical centers and the medical education community at large to address these higher-level concerns, medical educators also bear the responsibility of understanding the usefulness of these new AI tools to improve the delivery of medical education content and enhance the educational experience for their learners.

Practical applications of artificial intelligence chatbots in medical education

Faculty serving as medical school clerkship directors, residency and fellowship program directors, and educators across diverse medical fields must balance their roles as educators with the demands of clinical practice and administrative duties. While the role of a medical educator can be rewarding, the many responsibilities and time constraints can lead to burnout.¹⁷ Generative AI technologies like AI chatbots can help streamline time-consuming tasks and perhaps offload some of the burden of administrative tasks for medical educators. In the following section, we will highlight practical applications of AI chatbots that may improve the workload of obstetrics and gynecology medical educators, while also providing best practices and cautionary recommendations.

Learning objectives

Educators of obstetrics and gynecology benefit from robust peer-reviewed learning objectives outlined by the Association of Professors of Gynecology and Obstetrics for undergraduate medical education and the Council on Resident Education in Obstetrics and Gynecology for graduate medical education.^{18,19} Many medical educators rely on these nationally recognized guidelines as a foundation for developing institution-specific learning objectives, provided proper citation is given.

The American Association of Medical Colleges (AAMC) provides a curriculum development guide for core Entrustable

Professional Activities (EPAs) for graduate medical students entering residency.²⁰ Additionally, the Accreditation Council for Graduate Medical Education offers obstetrics and gynecology-specific Milestones for evaluating residents across 6 domains of physician competency.²¹ One challenge faced by medical educators is effectively integrating EPAs or Milestones with their learning objectives.

AI chatbots present an opportunity to align learning objectives on obstetrics and gynecology topics with these competency documentation tools. [Figure 1](#) illustrates a ChatGPT response to the prompt “Incorporate the AAMC EPAs into learning objectives for a medical school curriculum on the topic of contraception.” In this scenario, the medical educator’s responsibility includes validating the AI chatbot output for accuracy and appropriate levels of entrustable standards for learners. In this context, the AI chatbot serves as an efficient tool for generating potential learning objectives incorporating EPAs across various topics in the curriculum.

Orientation and scheduling

Administrative duties associated with onboarding, orientation, and scheduling often consume a substantial portion of educational directors’ time and resources. Unfortunately, not all directors have access to support from assistant directors or administrative coordinators, and many are not allotted sufficient administrative time. AI chatbots can be valuable resources to alleviate some of the burden of these administrative tasks.

AI chatbots can assist in generating orientation materials tailored to the needs of students, residents, fellows, and faculty. By providing prompts related to orientation topics, such as objectives and expectations, AI chatbots can efficiently generate customized materials. Additionally, they can facilitate automated communication by drafting emails, announcements, or reminders. This automated communication streamlines the dissemination of crucial information, saving time for the educational director.

Furthermore, AI chatbots can aid in scheduling by analyzing input regarding

availability, preferences, and educational requirements to propose efficient scheduling arrangements. They can provide suggestions for optimizing schedules, ensuring that educational activities are well-coordinated. Moreover, AI chatbots support task delegation and tracking, enabling educational directors to assign tasks and receive updates on their progress. In the context of medical educators who often lack sufficient administrative support, AI chatbots help distribute responsibilities such as scheduling teaching sessions, tracking trainee progress, and managing evaluations. By automating the routine coordination of tasks, they allow educators to focus more on teaching and mentorship. While human review is still necessary, the gained efficiency can be expected to alleviate some of the administrative burden on the educational director.

It is imperative to proceed with caution when utilizing AI chatbots for such purposes to prevent the inadvertent entry of proprietary or sensitive information into the system. Institutional programs must establish clear policies and best practices regarding the utilization of AI with sensitive information.

Feedback and assessment

The sorting functionality of AI chatbots simplifies the organization of comments regarding trainees’ clinical performance, a task that typically demands significant time for educational directors. Anonymized comments can be entered and AI chatbots can categorize the data based on areas of competent performance, excellence, and areas requiring further focus and improvement. Moreover, AI chatbots can be prompted to generate a summary paragraph which can streamline the process of creating narrative rotational evaluations for medical students or can be used for residency clinical competency committees. Medical educators should exercise caution and verify institutional policies regarding the utilization of even anonymized data in AI chatbots for summary evaluations, as certain programs may impose restrictions on this practice due to privacy concerns.

Through specific input, AI chatbots can efficiently generate multiple-choice and short-answer questions, complete with explanations of correct and incorrect answers. However, a recent study focusing on ChatGPT demonstrated that this AI chatbot’s accuracy ranges from 40% to 100%, with a median accuracy of 61.1%, across various medical examinations.²² Given this variability in accuracy and the potential for AI chatbots to produce hallucinations, their utility for assessment purposes remains uncertain. While they may assist in question generation, their current accuracy limitations suggest that their role should be carefully considered rather than assumed to be beneficial. Any questions generated by AI chatbots must undergo thorough validation and accuracy checks by content experts well-versed in the subject matter to determine their reliability before implementation. This precautionary measure ensures the integrity and reliability of the assessment questions, safeguarding against potential inaccuracies or misleading content that may arise from the responses of AI chatbots.

A less controversial but significant example of the utility of AI chatbots in supporting medical educators is their ability to aid in the development of innovative assessment tools. For instance, AI chatbots can be employed to craft Objective Structured Clinical Examination (OSCE) checklists and assign weighted evaluation criteria. [Figure 2](#) demonstrates a ChatGPT response to the prompt “Create an OSCE checklist with weighted assessment values for a simulation-based session focusing on the pelvic examination for obstetrics and gynecology residents, particularly emphasizing patients with physical disabilities.” Here, the AI chatbot integrates novel elements, such as the evaluation of patients with physical disabilities, into an existing OSCE checklist that a residency program director may already utilize. As simulation plays an increasingly significant role in medical education, AI chatbots may also prove beneficial by enabling learners to practice history-taking and communication skills with virtual patients.²³

FIGURE 1

ChatGPT response to the prompt “Incorporate the AAMC EPAs into learning objectives for a medical school curriculum on the topic of contraception.” AAMC, American Association of Medical Colleges.

**ChatGPT**

Certainly! Here are some learning objectives for a medical school curriculum on "Contraception" incorporating the AAMC Entrustable Professional Activities (EPAs):

1. By the end of this course, students should be able to:
 - EPA 1: Gather a comprehensive medical and reproductive history from patients seeking contraceptive counseling.
 - EPA 2: Formulate a prioritized list of contraceptive options tailored to individual patient needs and preferences, considering medical history, lifestyle, and reproductive goals.
 - EPA 3: Interpret the results of common diagnostic tests related to contraception, such as pregnancy tests, STI screenings, and hormonal assays.
 - EPA 4: Discuss contraceptive options with patients, including mechanism of action, efficacy, potential side effects, and risks.
 - EPA 5: Accurately document contraceptive counseling discussions and patient preferences in the medical record.
 - EPA 6: Present contraceptive counseling plans effectively to preceptors or colleagues in an organized and concise manner.
 - EPA 7: Formulate clinical questions regarding contraceptive efficacy, safety, and patient preferences, and utilize evidence-based resources to answer these questions.
 - EPA 8: Communicate contraceptive plans clearly during patient handoffs, ensuring continuity of care.
 - EPA 9: Collaborate with other healthcare professionals, such as nurses, pharmacists, and counselors, to provide comprehensive contraceptive care and support.
 - EPA 10: Recognize urgent contraceptive needs, such as emergency contraception after unprotected intercourse, and initiate timely evaluation and management.
 - EPA 11: Obtain informed consent from patients for contraceptive procedures, such as intrauterine device (IUD) insertion or sterilization.
 - EPA 12: Demonstrate proficiency in performing contraceptive procedures, including IUD insertion, contraceptive implant insertion/removal, and contraceptive injections.
 - EPA 13: Identify systemic issues related to contraceptive access, affordability, and education, and contribute to initiatives aimed at improving contraceptive services and promoting reproductive health equity.

These learning objectives align with the AAMC EPAs and provide a comprehensive framework for teaching and assessing students' competency in contraceptive counseling and management.



STI, sexually transmitted infection.

FIGURE 2

A and B, ChatGPT response to the prompt “Create an OSCE checklist with weighted assessment values for a simulation-based session focusing on the pelvic examination for obstetrics and gynecology residents, particularly emphasizing patients with physical disabilities.” OSCE, Objective Structured Clinical Examination.

A**ChatGPT**

OSCE Checklist: Pelvic Examination for Patients with Physical Disabilities

Simulation-Based Session for Obstetrics and Gynecology Residents

Instructions for Residents:

Perform a pelvic examination on the simulated patient presenting with physical disabilities. Prioritize adaptability, sensitivity, and patient-centered care. Communicate effectively and respectfully throughout the examination process, ensuring the patient's comfort and dignity are maintained at all times.

Assessment Criteria:

1. Introduction and Consent:

- Introduces self and role, addressing any communication needs the patient may have.
- Explains the purpose of the examination in clear, accessible language.
- Obtains informed consent, ensuring the patient understands and is comfortable proceeding.
- (Weight: 5%)

2. Patient Preparation:

- Assures patient comfort and privacy, addressing any specific physical requirements.
- Makes necessary adjustments to the examination environment or equipment to accommodate the patient's needs.
- Provides appropriate draping while considering any mobility or positioning challenges.
- (Weight: 5%)

3. Communication and Rapport:

- Establishes rapport with the patient, acknowledging and validating any concerns or preferences related to their disability.
- Utilizes effective communication techniques, such as using clear, simple language and offering alternative methods of communication if needed.
- Maintains open dialogue throughout the examination, ensuring the patient feels heard and respected.
- (Weight: 10%)

4. Physical Examination:

- Demonstrates adaptability in performing the examination, considering the patient's physical limitations and adjusting techniques as necessary.
- Conducts a comprehensive external examination, taking into account any unique anatomical features or assistive devices.
- Uses gentle, patient-centered approach when inserting the speculum, ensuring minimal discomfort.
- Successfully visualizes the cervix and vaginal walls, making allowances for any mobility restrictions.
- Executes the bimanual examination with sensitivity, modifying pressure and positioning as required.
- (Weight: 40%)



FIGURE 2
continued**B****5. Adaptability to Patient's Needs:**

- Proactively identifies barriers to examination posed by the patient's disability and implements appropriate solutions.
- Seeks patient feedback and consent throughout the examination process, offering choices and alternatives when applicable.
- Demonstrates flexibility and creativity in overcoming challenges related to positioning, mobility, or sensory impairments.
- (Weight: 15%)

6. Documentation:

- Records findings accurately and comprehensively, including any relevant details related to the patient's disability.
- Documents specific adaptations or modifications made during the examination to accommodate the patient's needs.
- Ensures documentation is accessible and understandable to other healthcare providers involved in the patient's care.
- (Weight: 10%)

7. Professionalism and Respect:

- Demonstrates respect for the patient's autonomy, privacy, and dignity throughout the examination.
- Maintains professionalism in all interactions, avoiding assumptions or stereotypes related to the patient's disability.
- Upholds ethical standards by safeguarding the confidentiality of sensitive information.
- (Weight: 10%)

8. Post-Examination Care:

- Provides post-examination support tailored to the patient's needs, addressing any discomfort or emotional reactions sensitively.
- Offers additional resources or referrals as needed, ensuring continuity of care beyond the examination.
- Collaborates with the patient to develop a plan for follow-up or ongoing support, considering their individual circumstances.
- (Weight: 5%)

Total Possible Score: 100%

Note: Weighted assessment values are subject to adjustment based on program requirements and objectives. Adaptations for patients with physical disabilities should be a central focus throughout the examination process.



Faculty recruitment and development

Medical educators are often tasked with identifying and encouraging faculty to take on teaching roles within the department. Recruiting faculty to engage in medical education—whether as clinical preceptors, small-group facilitators, or lecturers—requires significant effort from educational leaders. Faculty often need guidance, encouragement, and structured opportunities to step into these roles, particularly in departments with high clinical demands. In this context, AI chatbots can be a valuable resource.

The capabilities of AI chatbots extend to the creation of role descriptions tailored to specific teaching needs, including required expertise, expected time commitment, and responsibilities. By efficiently generating structured outlines for teaching positions, AI chatbots streamline the process of defining and advertising these roles. Moreover, AI chatbots can assist in crafting outreach materials to effectively communicate the importance and benefits of faculty involvement in education. For educational directors seeking to expand their pool of engaged faculty, AI chatbots can help draft individualized recruitment messages, suggest incentives, and even generate strategies to encourage participation in teaching.

Facilitating ongoing faculty development constitutes a crucial yet often overlooked aspect of the medical educators' roles. As previously discussed, AI chatbots demonstrate proficiency in compiling learner comments into a summary of teaching performance, thereby streamlining the process of providing faculty members with constructive feedback and facilitating their annual performance reviews.

Other applications of AI chatbots in faculty development include generating department newsletters, electronic discussion forums, or topics for medical education grand rounds. Additionally, AI chatbots can offer suggestions for faculty teaching awards and highlighting exemplary teaching contributions within the department. Moreover, AI chatbots can play a role in promoting faculty members' participation in

continuing education initiatives. By providing recommendations for conferences, workshops, and online courses tailored to individual faculty members' interests and needs, AI chatbots can empower faculty to stay current with advancements in medical education and enhance their teaching methodologies.

Mentorship

AI chatbots can also be valuable tools to support mentorship activities, another key aspect of the medical educators' responsibilities. It is common for medical educators to assume roles as faculty advisors for clubs and organizations, and AI chatbots can streamline this process by facilitating discussions on pertinent topics, creating schedules for faculty and student participation in educational events, and developing promotional materials for these activities.

Similarly, many medical educators frequently take on the role of research mentors for students, residents, and fellows. While the creation and submission of peer-reviewed manuscripts may be subject to controversy and many journals now stipulate regulations surrounding the use of AI in manuscript creation, AI chatbots can still prove instrumental in various research-related tasks.²⁴ They can aid in hypothesis generation, determining study design, drafting research proposals, establishing research timelines, interpreting data, and reviewing results for meaningful discussion. Caution again is advised to avoid the entry of private or personal data into the AI chatbot platform.

Moreover, medical educators often serve as career advisors for senior students embarking on their respective residencies and residents applying to fellowship. AI chatbots, as well as other AI technologies, can assist in scheduling meetings, reviewing applicant strengths and qualifications, making recommendations for areas to highlight in applications, and providing support throughout the application process.

Best practices

To effectively integrate AI chatbots into medical education while mitigating their limitations, educators should adopt

intentional strategies. Refining prompts is key to generating relevant responses; for example, instead of asking, "Explain preeclampsia," a more efficient prompt would specify pathophysiology, diagnostic criteria, and management tailored to third-year medical students. Faculty should also validate AI chatbot-generated content against trusted medical sources before using in teaching. AI chatbots should complement, not replace, traditional methods, assisting with case generation, quiz generation, and content summaries while maintaining human oversight. Iterative refinement of prompts can improve response accuracy, and educators should practice adjusting inputs to elicit clearer and more precise information.

Ethical considerations are paramount, and faculty must ensure that no protected health information or confidential data are entered into AI chatbot interfaces. Institutions should provide training on AI literacy, covering AI chatbot limitations, bias recognition, and misinformation mitigation. Faculty workshops can offer hands-on experience in refining prompts and evaluating AI chatbot outputs. By applying these best practices, educators can responsibly leverage AI chatbots to enhance medical education while maintaining accuracy, integrity, and student engagement.

Discussion

The scientific and medical education communities approach AI chatbot tools with a healthy skepticism. Concerns stem from the notion of entrusting large computer algorithms with tasks traditionally undertaken by humans alone. High among these concerns are the implications of using AI chatbots in academic writing and peer review, with apprehensions ranging from issues of plagiarism and bias to concerns about intellectual property rights and potential compromises to academic integrity.^{24,25} Furthermore, academic medical institutions and faculty members have voiced apprehensions regarding the broader implications of AI tools in healthcare and medical education. These encompass worries about the

dissemination of misinformation, threats to privacy, the exacerbation of existing inequalities, challenges to human autonomy, and the emergence of ethical dilemmas.²⁶

Looking ahead, it becomes increasingly clear that the future of medical education, healthcare, and society at large will involve the widespread integration of AI tools into our daily lives. Just as the advent of the internet, social media, educational videos, and podcasts revolutionized traditional approaches to medical education and reshaped scholarly practices in academia, so too will AI and chatbot technologies bring about significant disruptions in the delivery of medical education in the foreseeable future.

It falls upon medical educators to acquaint themselves with AI tools such as AI chatbots, enabling active participation in the ongoing discourse regarding the appropriate integration of AI into healthcare delivery and medical education. A practical starting point involves embracing some of the AI resources, like AI chatbots, as described in this paper. By leveraging AI chatbots for less controversial and low-risk tasks, educators can efficiently manage their day-to-day responsibilities, all while gaining insights into these tools' capabilities and limitations. This hands-on experience not only fosters a deeper understanding of AI chatbots but also encourages faculty to explore new, innovative applications of AI, capitalizing on human ingenuity to drive further advancements in medical education.

Equipped with a faculty well-versed in the utilization of AI chatbots tools, academic medical institutions can take proactive steps toward creating responsible guidelines and policies concerning the integration of AI into medical education, benefiting both faculty and learners. Moreover, as the medical education community collectively recognizes the intricacies of AI tools through widespread adoption, it can collaboratively establish standards for incorporating AI tools. This concerted effort not only enhances transparency but also

calms concerns surrounding their implementation, fostering a more conducive environment for leveraging the potential of AI in medical education. Future work should also include systematic evaluations of AI chatbot-based educational interventions, with calls for reports on both successes and challenges, as well as comparative trials assessing the effectiveness of AI chatbots compared to human educators. ■

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