

YOU SHOULD TRY THIS!

Introducing students to Artificial Intelligence in medicine through interactive scenarios

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Implication Statement

Artificial Intelligence (AI) is increasingly shaping medicine, yet students receive little education on its applications and limitations, leaving them unprepared to use these systems in clinical practice. With the goal of deepening high school students' understanding of AI in medicine and providing an opportunity for critical analysis, we developed a series of interactive scenarios and piloted their integration in a healthcare-focused summer camp for high school students. Our interactive workshop will be useful for others who may wish to integrate AI literacy into all education levels. Specifically, future work may integrate similar scenarios in the undergraduate medical education curriculum.

Initier les élèves à l'intelligence artificielle en médecine à travers des scénarios interactifs

Énoncé des implications de la recherche

L'intelligence artificielle (IA) influence de plus en plus le domaine médical, mais les élèves reçoivent peu de formation sur ses applications et ses limites, ce qui les laisse mal préparés à utiliser ces systèmes dans la pratique clinique. Dans le but d'approfondir la compréhension des personnes apprenantes au secondaire en matière d'IA en médecine et de leur offrir une occasion d'analyse critique, nous avons développé une série de scénarios interactifs et testé leur intégration dans un stage d'été axé sur la santé destiné aux personnes apprenantes au secondaire. Notre atelier interactif sera utile à tous ceux qui souhaitent intégrer la culture de l'IA à tous les niveaux d'enseignement. Plus précisément, des travaux futurs pourraient intégrer des scénarios similaires au programme d'enseignement médical de premier cycle.

Introduction

Artificial intelligence (AI) is a powerful area of computer science that is being widely implemented in healthcare.¹ While there is potential to become an invaluable tool, there is little education and research in education surrounding AI use in medicine.² A lack of experience and understanding of AI can contribute to over-trust, over-reliance, or skepticism.³ Introducing AI education into the curriculum for future healthcare providers can increase their AI literacy.²

We present a series of interactive scenarios piloted at CampMed, our medical schools summer camp for high school students. Our scenarios introduce AI in medicine and provide students with introductory, hands-on AI experience, while encouraging critical analysis. Because of constraints surrounding content addition to undergraduate medical education curricula, we targeted students before they enter medical training to create an introductory foundation of AI knowledge.

Innovation

We prepared and led a workshop for 28 high school students attending CampMed to introduce students to AI through experiential learning. We began by brainstorming and conceptualizing three scenarios, then used ChatGPT to help create full versions.⁴ Throughout the workshop, students addressed each scenario with and without the use of AI. Students were instructed to compare their human versus AI output to critically analyze AI’s role in medicine.

The first scenario involved an ethical dilemma surrounding AIs use in diagnostics. After the group resolved it, students compared their solutions with those given by ChatGPT.⁴ Scenario two used an AI scribe (HeidiAI).⁵ Students acted out a patient-physician encounter and compared human *versus* AI scribes. Finally, we had a survival scenario where students had limited untraditional resources to theoretically provide first aid and compared their proposed uses to ChatGPT’s.⁴ Complete scenarios and ChatGPT prompts are attached in Appendix A.⁴ Workshop outline is attached in Appendix B.

Evaluation

We provided a three-question post-workshop questionnaire to measure workshop impact on self-rated AI literacy. Our questionnaire can be found in Appendix C. We collected data for program evaluation and did not require REB approval. Parental consent was acquired.

After our workshop, 82% of students noted a deeper self-rated understanding of AI and its uses in medicine. Eighteen percent of students enjoyed having hands-on experiential learning opportunities. Students wished that our workshop included intergroup comparisons of AI-generated responses. Table 1 outlines response summaries.

Table 1. Post-session questionnaire questions and response summaries from 28 high school students

Question	Response Summary
“How has this session impacted your understanding of AI in medicine?”	82% of students had a self-rated increase in understanding of the uses of AI in medicine and its scope in the field 18% of students noted that AI in medicine is not perfect yet and that further research and validation by humans needed to be included
“How has your knowledge of AI in medicine increased as a result of this session?”	82% of students claimed that their knowledge of AI in medicine has increased. 11% of students claimed to have been previously involved in AI activities and still found the session informative and curiosity provoking, deepening their understanding of AI 18% of students claimed that first-hand experience using AI clarified its uses
“How would you rate your overall enjoyment of the session on AI in medicine? What would you change?”	61% of students explicitly stated that they enjoyed the session 36% of students found the session interesting and informative 25% of students enjoyed the interactive, group work component Proposed changes: • Increase education on AI fundamentals • Create a more complex clinical case for use with the AI scribe • Add an intergroup comparison portion

Next steps

The emergence of AI in medicine is increasing the need for AI literacy. We conceptualized and implemented three scenarios to provoke critical analysis by high school students, comparing AI-generated responses to their own critical reflections. Follow-up questionnaires served as an indirect measure of self-rated AI literacy and showed increased self-rated AI literacy after the workshop. Hands-on experiential learning sessions with AI systems can prepare future healthcare professionals to use AI. Next steps may include incorporating AI education into undergraduate medical education curriculum to increase AI literacy prior to entering practice, however, access to AI tools and curriculum expansion limitations may pose constraints.⁶

There are limitations to this study. Pre-workshop AI knowledge was not surveyed. Additionally, our sample size was small, and we used high school students, which may limit generalizability to other populations and may reflect limitations in the participants' knowledge base. This workshop introduced students to a broad overview of AI and fostered critical-thinking skills rather than an understanding of the nuances and complexities of AI in medicine.

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Conflict of Interest:

There are no conflicts of interest.

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Appendix A – Full Scenarios

Scenario #1:

ChatGPT⁴ Prompt: "Give me an example of an ethical dilemma involving the use of artificial intelligence in healthcare, particularly in diagnostics."

A hospital is implementing an AI-driven diagnostic tool that has proven to be highly accurate in identifying certain diseases earlier than human doctors can. However, the AI occasionally produces false positives, leading to unnecessary and sometimes invasive procedures. Furthermore, the AI's decision-making process is not entirely transparent, making it difficult for doctors to understand how it reaches its conclusions.

Dilemma: Should the hospital continue to use the AI tool to potentially save lives through early detection, even if it means subjecting some patients to unnecessary treatments and facing challenges in transparency, or should it prioritize traditional methods that are better understood and involve less risk of false positives, even if it means potentially missing early diagnosis opportunities?

As a group, discuss all aspects of the ethical situation that you would consider in making your decision. Once you have made a decision, input the scenario into ChatGPT. How did the two answers differ? Do you agree with ChatGPT's answer? Did your group and ChatGPT prioritize different things?

Scenario #2

Choose one student to be the physician and one student to be the patient and act out the following situation. Have one student take notes using the template on the following page. Use Heidi AI as an AI scribe to record your dialogue. Once you have finished, ask Heidi to transcribe your dialogue into a History and Physical Note. Compare your note to the one generated by Heidi.

Heidi. How do the two notes differ? Did Heidi get more information than the student scribe? Did Heidi leave out any information that the student scribe deemed to be important? Have Heidi make a differential diagnosis.

Script:

ChatGPT⁴ Prompt: "Provide a sample of a patient-physician script during a clinical visit for acute abdominal pain, including the physician taking a full history"

Physician: Good morning! How are you today?

Patient: Hi doctor. I've been better, actually. I've been having some really intense pain in my lower right abdomen since yesterday. It's been getting worse and I'm also feeling nauseous.

Physician: I'm sorry to hear that. Let's talk more about your symptoms. When did the pain start exactly?

Patient: It started yesterday afternoon as a dull ache, but overnight it turned into a sharp pain that won't go away.

Physician: I see. Has this ever happened to you before? Any history of similar episodes?

Patient: No, this is the first time I've experienced pain like this.

Physician: Are you able to describe it in more detail? Does anything make it better or worse?

Patient: Moving around makes it worse, and pressing on the area really hurts. I've been trying to rest, but even that's uncomfortable. It's been hard to concentrate on anything else.

Physician: I can imagine. Can you rate the pain on a scale from 0-10, with 0 being no pain and 10 being the worst pain you've ever felt?

Patient: Probably an 8 and it goes to a 9 when I press on the area

Physician: I am sorry to hear that. We are going to do everything to determine what is going on and reduce your pain. Has it affected your ability to eat or drink normally?

Patient: A little. I've had a reduced appetite since the pain started, and I'm afraid to eat much because it seems to make the pain worse.

Physician: Alright. It sounds like this pain is pretty severe. I am going to ask a few questions about your past medical history, as you would be surprised what can be related. Have you had any recent illnesses or surgeries?

Patient: Not recently, no. I had my tonsils removed when I was a child. I'm generally healthy, just the occasional cold here and there.

Physician: Do you have any medical conditions we should know about? Any allergies or medications you're currently taking?

Patient: I have allergies to penicillin and I take medication for seasonal allergies, but otherwise I'm pretty healthy.

Physician: Got it. And have you traveled anywhere or had any changes in your diet or lifestyle recently?

Patient: No, nothing out of the ordinary.

Physician: Alright. Let's do a few tests to investigate further and get a clearer picture of what's going on.

Patient: Thank you, doctor. I appreciate your help.

Physician: You're welcome. Let's get those tests done and we'll take it from there.

Patient Interview Template:

Hx of Presenting Illness	
Past Medical Hx	
Family Hx	
Social Hx	
Plan	

Scenario #3

ChatGPT⁴ Prompt: Write a survival scenario where I'm stranded in northern Ontario with an injured companion and minimal gear. Present it as a problem-solving challenge.

You and your friend embarked on a wilderness adventure in northern Ontario, canoeing along remote rivers and camping in the vast forests. However, your trip takes an unexpected turn when your canoe overturns in a strong current, washing away most of your supplies, including your communication devices. You manage to swim ashore, but your friend suffers a serious injury during the accident. Your friend has a compound fracture in their lower leg, where the bone has broken through the skin, causing significant bleeding. They are in severe pain and unable to walk. It was a beautiful summer day and you were dressed for the heat. You see a storm on the horizon and will need to find shelter. You quickly gather what remains of your supplies, which include:

- A few bandages and gauze pads
- Antiseptic wipes (limited quantity)
- Duct tape
- A small amount of clean water
- A multitool with a knife and screwdriver
- Raincoat
- Sunglasses

Using your limited supplies, how do you plan on helping your friend and surviving until a search team finds you (whenever that may be)? First, discuss your action plan as a group and decide. Then, put the scenario into ChatGPT. How did your plans of action differ? After seeing ChatGPT's plan, would you change your original idea?

Appendix B. Workshop outline

Table 2. Outline of the schedule followed throughout our 90-minute workshop.

Time	Schedule	Required Resources	Group Size
0-15 minutes	Introductory AI presentation and instructions on carrying out group work	NA	Entire group
15 – 75 minutes	Groups independently work through all 3 scenarios	1 electronic device per group that can support both Heidi AI5 and ChatGPT4	Small groups (split into groups of 5-6 students)
75-90 minutes	Group debrief and administration of questionnaire	Paper copies of questionnaire	Entire group

Appendix C. Post-session questionnaire

Paper handouts were given to students to complete in-person following the workshop.

AI & Medicine- Post-session questionnaire

1. How has the session impacted your understanding of AI in medicine?
2. How much has your knowledge of artificial intelligence in medicine increased as a result of this session?
3. How would you rate your overall enjoyment of the session on artificial intelligence in medicine? What would you change?