Developing and Pilot Testing an AI-powered Virtual Simulation to Help Medical Students Practice Delivering Difficult News to Patients

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Introduction

- **Challenge -** physicians find it difficult to discuss **abnormal screening test results** with patients.
  - Uncertainty
  - Possibility of serious disease
- **Current training** - medical students practice communication with **standardized patients**.
  - Resource intensive
  - Limited for inconclusive results
- **Performance evaluations -** essential for improving student communication skills.
  - Resource intensive
  - Variable across programs
- **Solution -** we developed a **screen-based virtual simulation** prototype for medical students to rehearse difficult conversations with patients.
- **Innovation** - uses **artificial intelligence** (AI) and the **GPT-4** large language model.
  - Generates realistic **simulated patient conversations**
  - Provides **automatic feedback** on learner performance

Background

Simulation scenario - phone conversation to address patient's concerns about abnormal mammogram.

Why?
- Breast cancer - most **common** incident cancer among women.
- Abnormal mammograms
  - **Common**
  - Often found to be **non-diagnostic** of a serious condition
  - **Challenging** patient-provider communication
- **Phone call** is the most likely scenario for abnormal mammogram discussion with patients.

Objectives

- **Assess training needs** via in-depth interviews with primary care physicians, medical students, and breast cancer survivors.
- **Design and develop** virtual simulation prototype for students to rehearse a phone conversation with a patient.
- **Create online didactic pre-learning material** to equip learners with communication tools.
- **Evaluate efficacy of GPT-4** in generating realistic patient dialog and providing automatic feedback on performance.
- **Conduct pilot study** to assess feasibility, acceptability, and usability of the prototype.

Research Phases

Formative Phase In-depth interviews with physicians, medical students, and breast cancer survivors to assess training needs → **Development Phase** Develop virtual simulation using software integrated with GPT-4 to mimic real-life conversations → **Pilot Phase** Conduct a pilot study with 10 DGSOM medical students to evaluate virtual simulation

Methods

Formative (in-depth) Zoom interviews:
- 5 primary care physicians
- 5 medical students
- 5 breast cancer survivors

Goal: explore experiences with delivering or receiving difficult news and related training they received.

Based on interview findings:
- Designed scenario with a fictional patient Olivia Patterson.
- Olivia had a recent **diagnostic mammogram** showing a suspicious lesion needing a biopsy.
- Learners play the role of a primary care physician discussing results with Olivia via a **simulated phone call** (Figure 1).

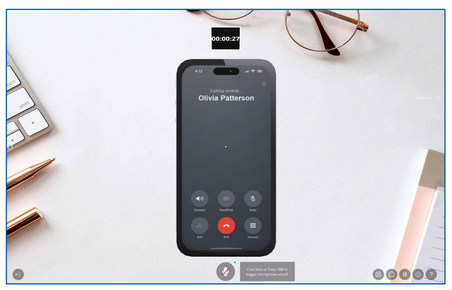


Figure 1

SCAN TO WATCH VIDEO

Simulation development:
- Developed prototype using **SimInsights' Hyperskill** authoring software.
- Learners interact with virtual patient via a computer microphone.
- Prototype incorporates **automatic speech recognition** and **text-to-speech technology**.
- **Patient dialog** is generated in real time by a **GPT-4 AI chatbot** in response to the learner's spoken input.
- GPT-4 provides **detailed feedback** on the learner's empathy, management of uncertainty, and adherence to the SPIKES protocol.
- Integration with GPT-4 allowed for a shift from a complex branching path scenario to a **dynamic AI chatbot**, streamlining simulation design and saving time and resources.
- Wrote and refined **text instructions** (known as prompts) that guide patient responses and the automatic feedback system.
- Improved the system via **repeated test conversations**.

Figure 2

Figure 3

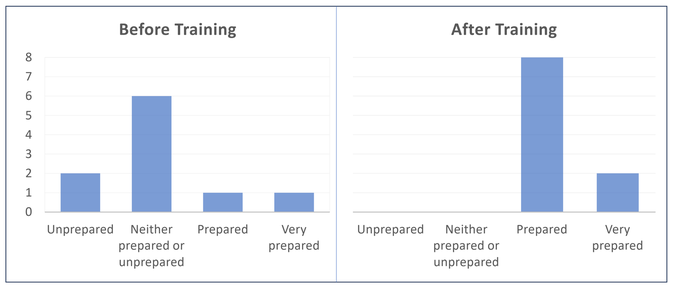
Pilot study:
- 10 medical students.
- **Pre-simulation training** - didactic online module taught students communication tools such as the SPIKES protocol (Figure 2).
- Students visited the UCLA Simulation Center in-person (Figure 3).
- **Recorded conversations** between students and virtual patient.
- Documented **GPT-4 generated feedback** on performance.
- **Pre and post evaluation surveys** measured students' comfort levels and perceived preparedness.

Results

- All 10 students had completed first year of medical school.
- 9 out of 10 students had previously received training in breaking bad news.
- The simulated phone call with the virtual patient took students 10-15 minutes to complete.
- Patient responses took 3-5 seconds to generate.
- Automatic feedback took 30-45 seconds to generate.

Quantitative Findings

Students were asked: **"How prepared do you feel to discuss difficult news with patients?"**



System Usability Scale:
Mean = **90.8**, Range = **77.5 to 100**
(Scores > 68-70 indicate satisfactory usability)

Qualitative Findings

Likes

- "The patient responses felt very authentic."
- "This was great… I hope it gets implemented into FOP."
- "I appreciate the side-by-side of my transcript and the feedback. I also thought the feedback clearly communicated which aspects of the objectives I completed."

Dislikes

- "I didn't know how many sentences I could say to the AI and then my conversation may have been a little disjointed."
- "The hardest part was just that if I did not address part of the question in the moment, it might not get re-introduced into the conversation later."
- "I would have appreciated more suggestions for improvements."

Next Steps

- Seek additional funding.
- Conduct a **randomized controlled trial** using objective performance measures to evaluate training efficacy.
- **Expand** simulation to include different types of **patients**, **conditions**, **specialties**, and **scenarios**.

Affiliations

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