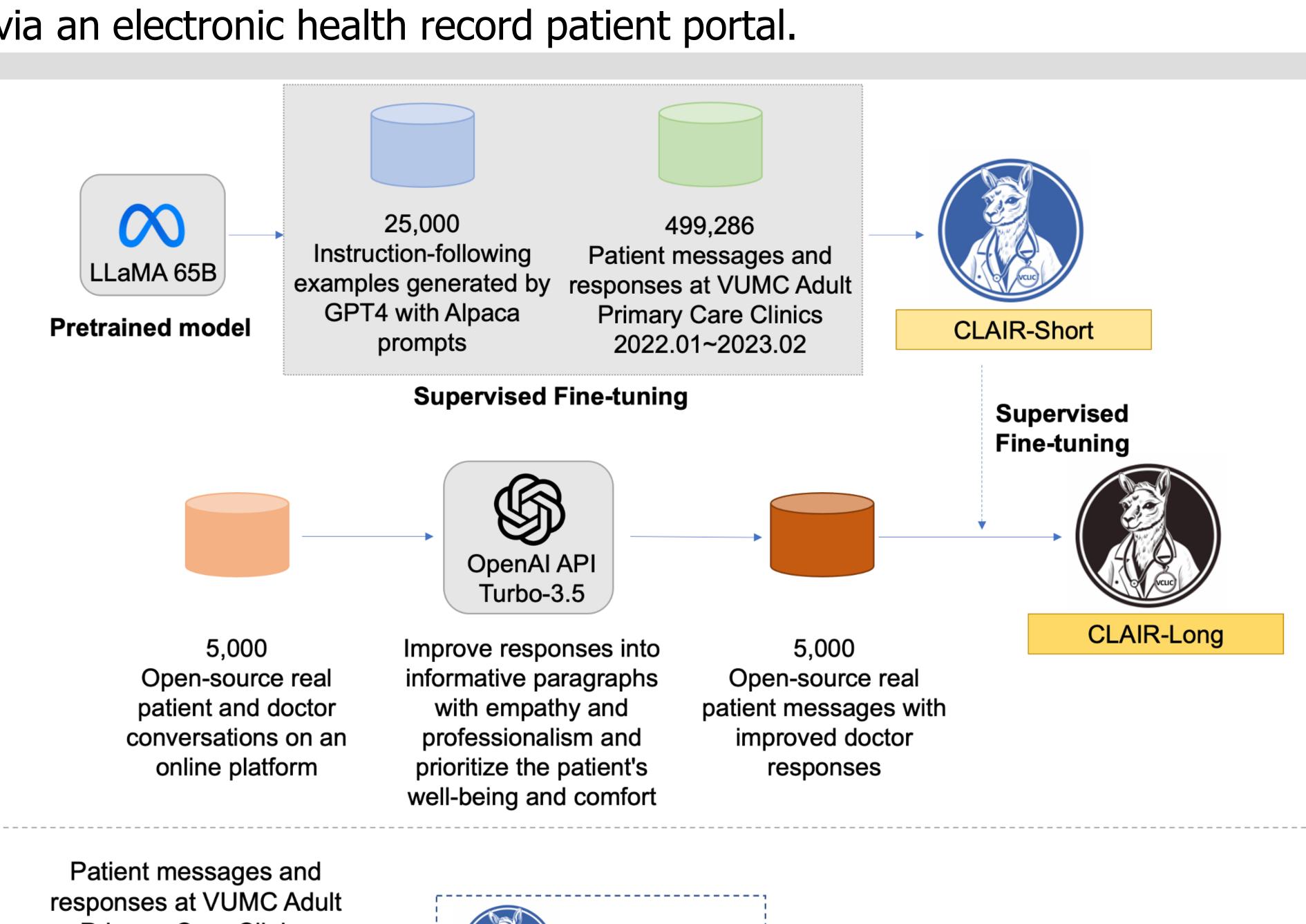
# LEVERAGING LARGE LANGUAGE MODELS FOR GENERATING RESPONSES TO PATIENT MESSAGES

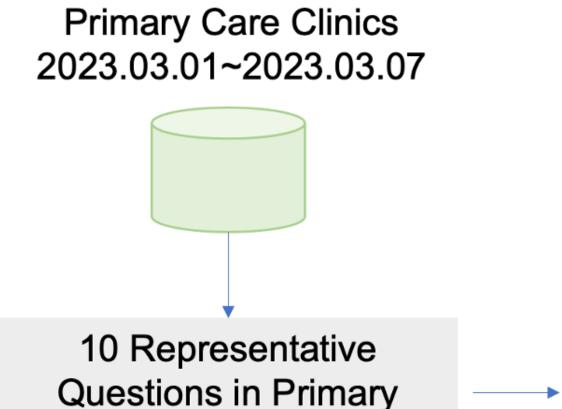
Siru Liu, PhD<sup>1,2</sup>, Allison B. McCoy, PhD<sup>1</sup>, Aileen P. Wright, MD, MS<sup>1,3</sup>, Babatunde Carew, MD<sup>3</sup>, Julian Z. Genkins, MD<sup>3</sup>, Sean S. Huang, MD<sup>1,3</sup>, Josh F. Peterson, MD, MPH<sup>1,3</sup>, Bryan Steitz, PhD<sup>1</sup>, Adam Wright, PhD<sup>1</sup>

<sup>1</sup>Department of Biomedical Informatics, Vanderbilt University Medical Center, Nashville, TN, USA; <sup>2</sup>Department of Computer Science, Vanderbilt University, Nashville, TN, USA; <sup>3</sup>Department of Medicine, Vanderbilt University Medical Center, Nashville, TN, USA

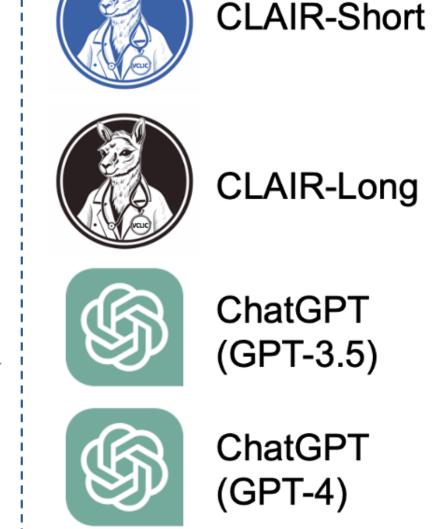
## **OBJECTIVE**

This study aimed to develop and assess the performance of fine-tuned large language models for generating responses to patient messages sent via an electronic health record patient portal.





Care (Rephrased)



Generated

Empathy

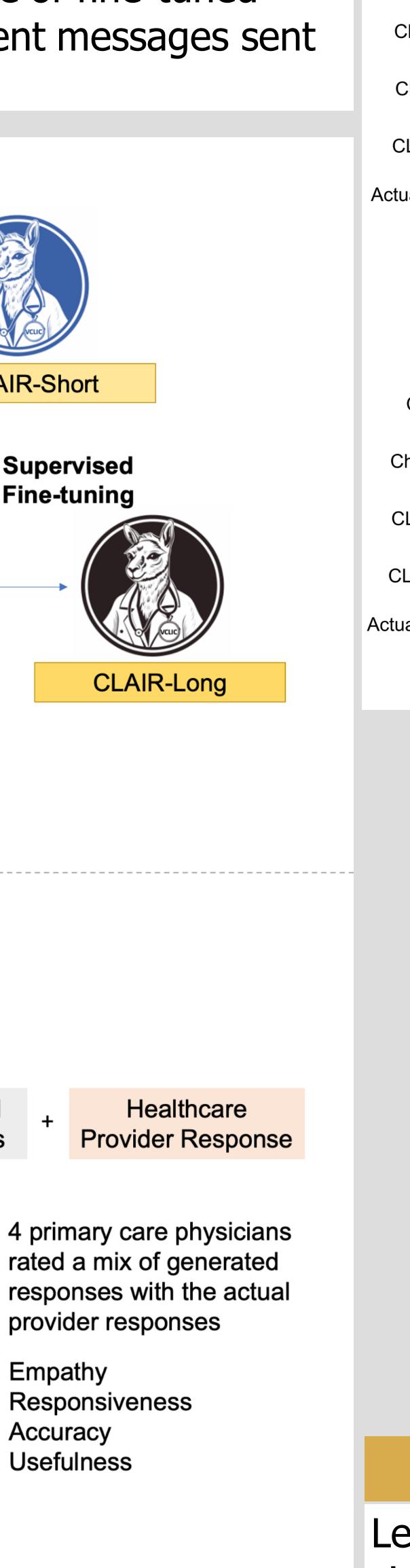
Accuracy

Usefulness

Responsiveness

#### Prompt:

"Imagine that you are a primary care doctor, and you have received a message from your patient. Your task is to reply the patient's message with polite and informative paragraphs, providing helpful guidance or next steps for the patient to take, offering patient education. Be sure to approach the message with empathy and professionalism, prioritizing the patient's well-being and comfort throughout your response. Remember that you are this patient's primary care doctor, and your goal is to provide your patient with the best possible care and support."



#### Strongly Disagree ChatGPT4 ChatGPT4 Disagree ChatGPT3.5 ChatGPT3.5 Nor Disagree **CLAIR-Long CLAIR-Long** Strongly Agree **CLAIR-Short CLAIR-Short Actual Provider Actual Provider** Response a. Empathy ChatGPT4 ChatGPT4 ChatGPT3.5 ChatGPT3.5 **CLAIR-Long CLAIR-Long CLAIR-Short CLAIR-Short Actual Provider Actual Provider** Response Response d. Usefulness b. Responsiveness

# To John Doe, MD

Medical Questions

Dear Doctor <u>HCW</u>, I had two weeks of a bad cold. Never had a fever, and I tested negative for covid, but my cough won't go away even a couple weeks later, and my energy level isn't great. I'm having to take an allergy pill every day just to go to sleep. Do I need a flu test, or an allergy test?

#### **AI-generated Suggestions**

Please provide detailed information before submitting your message to ensure a timely response from healthcare providers.

- Have you tried any over the counter cough medicines?
- Have you tried mucinex?
- Any shortness of breath or chest pain?
- Any dizziness or weakness?

### CONCLUSION

Leveraging large language models to generate responses to patient messages demonstrates significant potential in facilitating communication between patients and primary care providers.



