

CardiCare: AI Patient Assistant Chatbot for Coronary Artery Disease (CAD)

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1 Introduction

- Coronary artery disease (CAD) is the **second** leading cause of death in Canada¹
- Disease management is complicated by chronic symptoms, medication, exercise, and reduced lifestyle quality¹
- Limited patient support tools; generative AI platforms risk hallucinations

Objective

Design *CardiCare*, an AI chatbot companion for CAD patients, focused on providing accurate, clinician-backed information.

- Deployed on NVIDIA Jetson Nano 8GB
- Does **not** author medical content
- Abstains from out-of-scope & emergency questions
- Protects patient privacy



Fig 1. NVIDIA Jetson Nano 8B Device

2 System Design

Patient Query

Audio Processing (AI)

Emergency Detected? Yes → Abstains
(chest pain, stroke symptoms)

No
Embeds into vector values
LLM verifies match with patient query (Model: Qwen 3:4b)

Match
Returns answer and source from bank

No Match / Near Miss
Abstains and refers patient to healthcare team

POSSIBLE EMERGENCY

I can only share information your care team has already approved, and I don't have an approved answer for that one. Please reach out to your care team with this question. If this might be an emergency, call 911.

APPROVED ANSWER

Along with lowering LDL, statins are thought to help calm and stabilize existing plaque so it is less likely to rupture and trigger a clot. That is part of why they matter so much for people who already have coronary artery disease. The benefit builds up with steady daily use.

Source: matched approved question — "Do statins do more than lower cholesterol?"

NOT AN APPROVED TOPIC

I can only share information your care team has already approved, and I don't have an approved answer for that one. Please reach out to your care team with this question. If this might be an emergency, call 911.

3 Testing - Methods

- Evaluated on a **270-case** development split, single run
- Metrics:** correct-entry coverage (CEC), wrong-entry match rate, false accepts, emergency-miss rate & false-trigger rate
- Tested on **4** versions: Baseline, Levers A-C

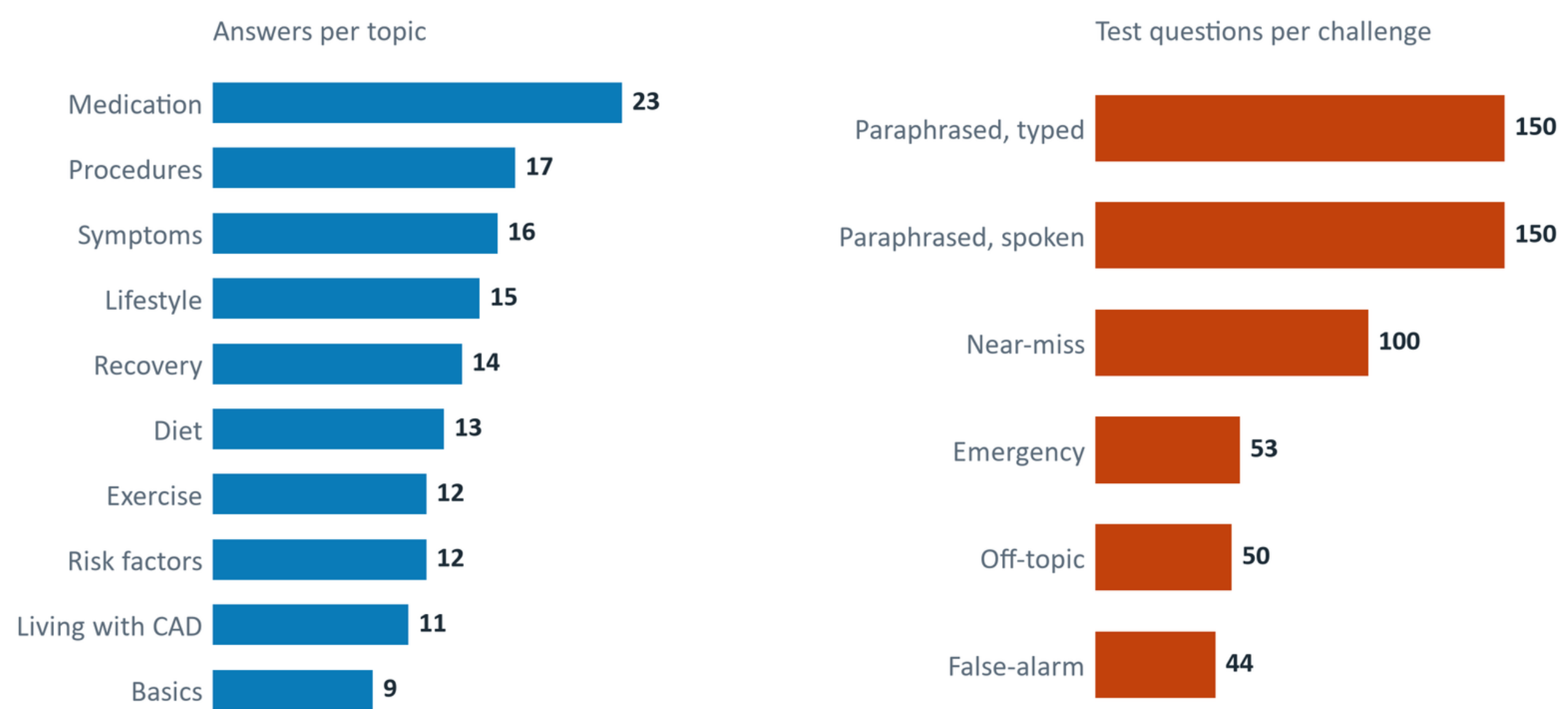


Fig 1. Development Split per Category and Challenge. 270 cases were sorted into different topics and question types.

4 Testing - Results



Fig 2. Correct Entry Coverage (CEC) Across System Versions. Results show an increase in CEC from 23.0%-87.8% (typed) and 25.7%-86.5% (spoken) from baseline to Lever C.

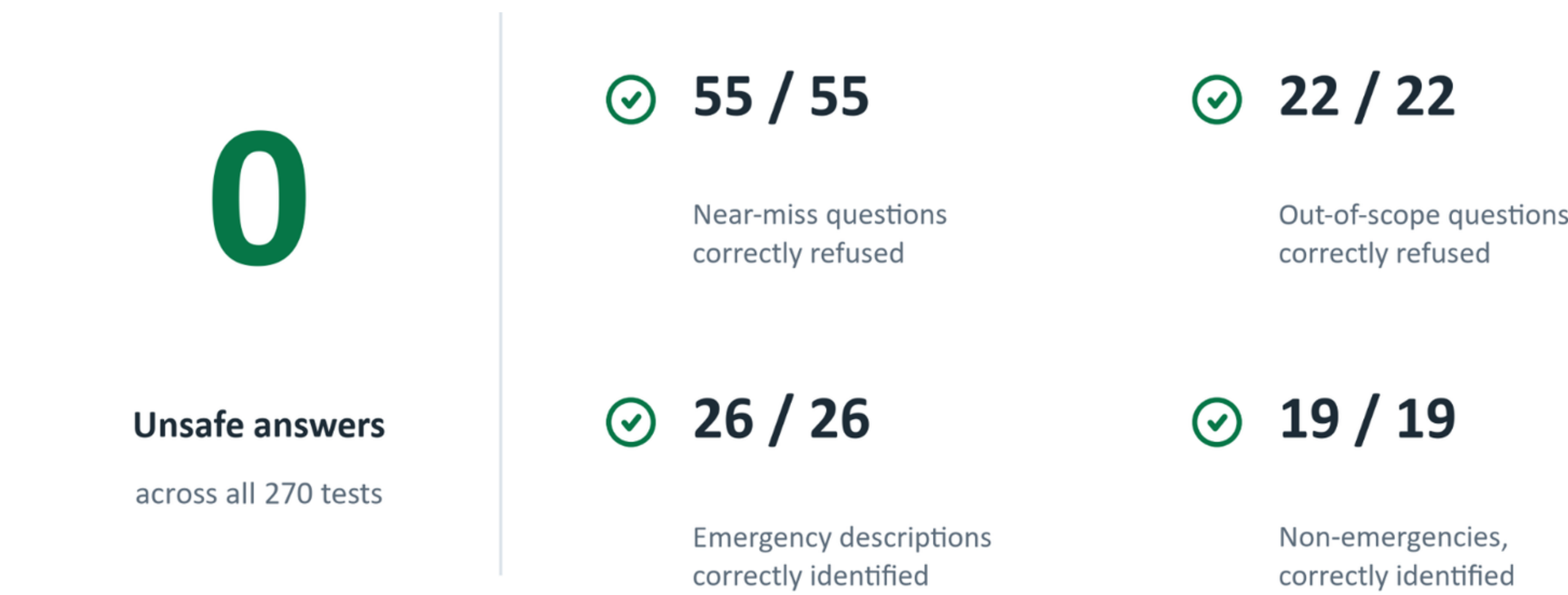


Fig 3. Safety Metrics of the Final Lever C System. No unsafe answers delivered on the development split.

Lever C (Qwen 3:4b) vs. GPT-OSS-20B

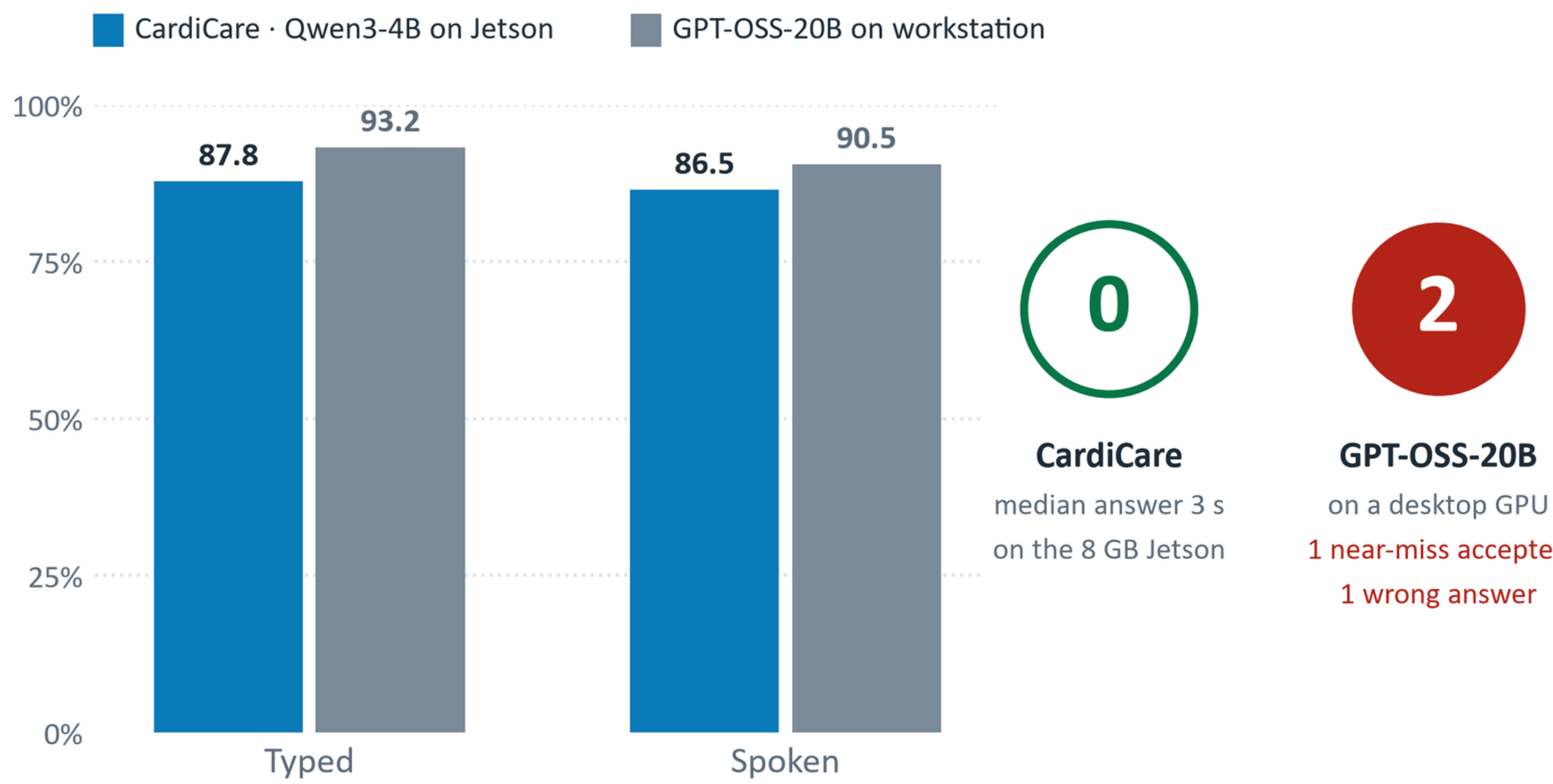


Fig 4. Performance and Safety Metrics for GPT-OSS-20b vs. Lever C (Qwen 3:4b). GPT-OSS-20b achieved higher CEC (93.2% typed, 90.5% spoken) than Lever C (87.8% typed, 86.5% spoken). Lever C produced fewer errors (0) compared to GPT (2).

5 Conclusion & Future Steps

- CardiCare achieved **87.8%** typed and **86.5%** spoken CEC on the development split, with **0** observed safety failures.
- Attribution analysis identified the **verifier** as the primary bottleneck.
- Future Steps:** Improve verifier accuracy, test on an independent dataset, expand knowledge bank.

6 Acknowledgements

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7 References

[1] Public Health Agency of Canada. (2022, July 28). Government of Canada. Heart Disease in Canada. <https://www.canada.ca/en/public-health/services/publications/diseases-conditions/heart-disease-canada.html>