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Predicting Emergency Department Return Visit Admission Using Retrieval Augmented In-context Learning

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The following presenter(s) have no relevant financial relationship(s) with ineligible companies to disclose.

- Katherine Brown, PhD

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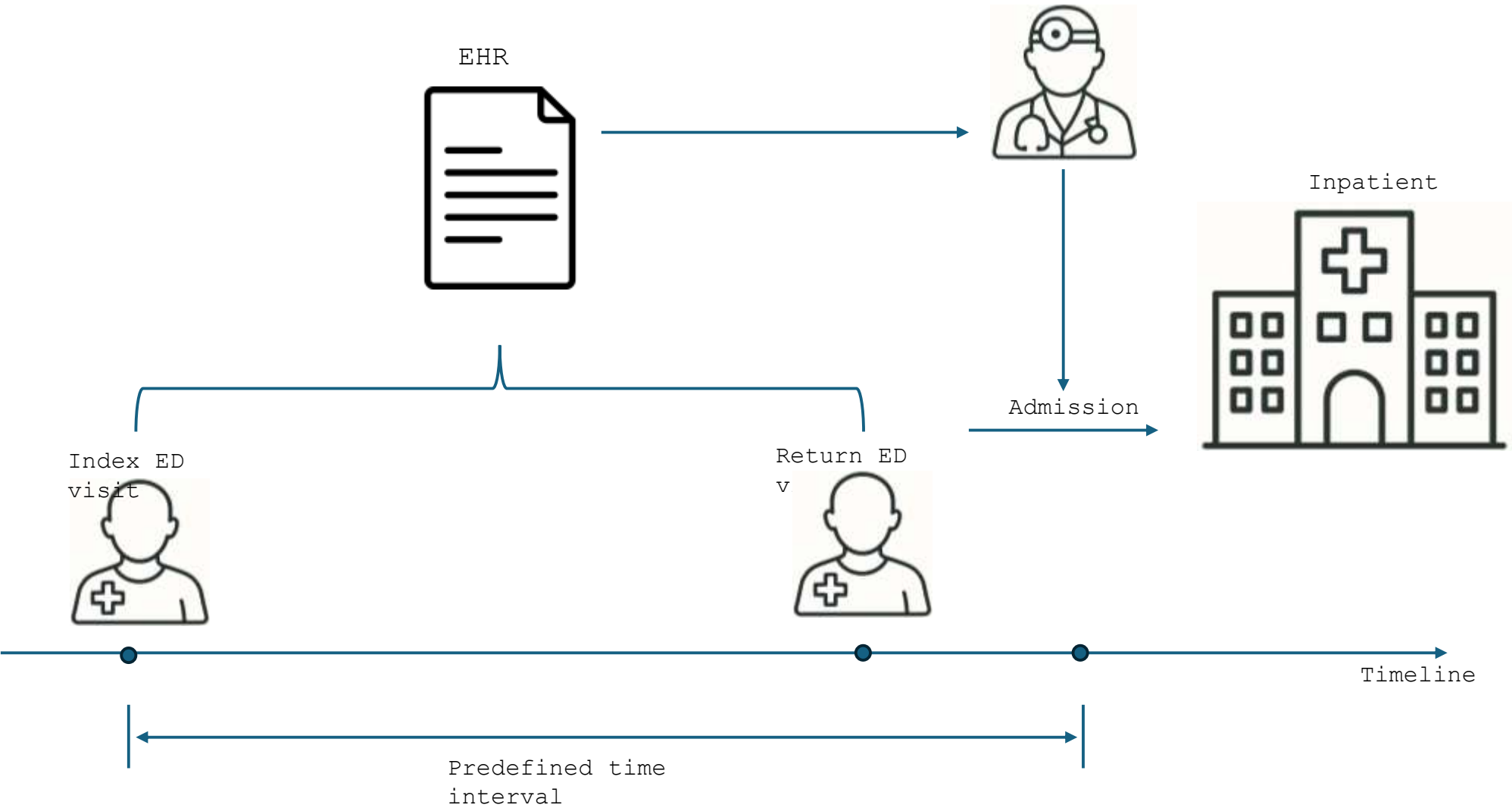
*All of the relevant financial relationships listed for these individuals have been mitigated.

LEARNING OBJECTIVES

At the conclusion of this presentation the learner will be able to:

1. Implement LLMs to predict emergency department return visit
2. Mitigate performance differences between LLMs across multiple sites
3. Learning objective

Return Visit Admission (RVA) in Emergency Department



Related Work

1. Williams, Christopher YK, et al. Evaluating the use of large language models to provide clinical recommendations in the Emergency Department. *Nature communications* 15.1 (2024): 8236.

- a. Use LLM zero-shot prompt to predict whether a patient should be admitted based on clinical notes
- b. It is highly related to RVA
- c. We have replicated in our data

2. Wang, Jinge, et al. Preliminary evaluation of ChatGPT model iterations in emergency department diagnostics. *Scientific reports* 15.1 (2025): 10426.

3. Williams CY, Zack T, Miao BY, Sushil M, Wang M, Kornblith AE, Butte AJ. Use of a large language model to assess clinical acuity of adults in the emergency department. *JAMA network open*. 2024 May 1;7(5):e248895-

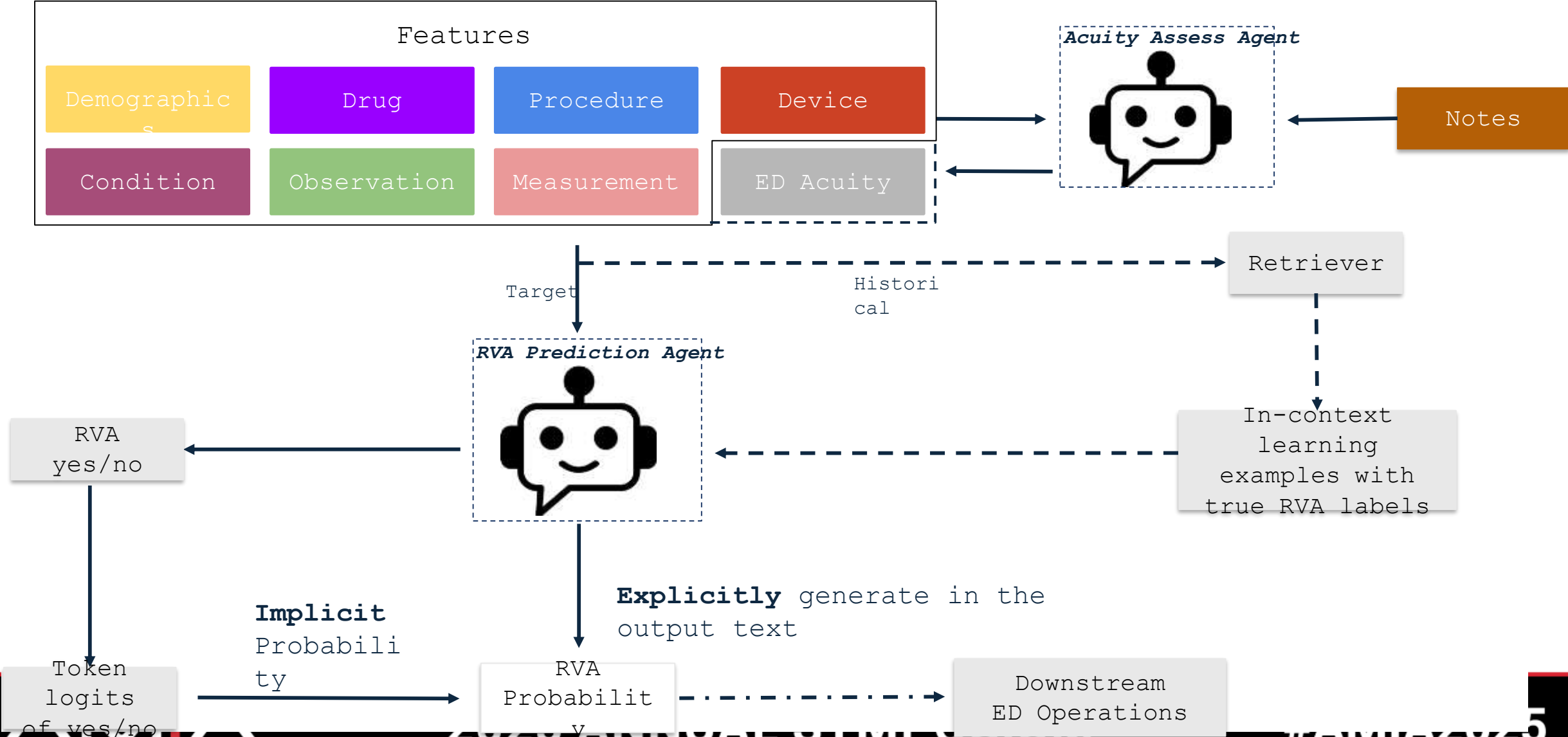
- a. Aske LLM to tell which of two given patients has the higher emergency severity index (ESI) acuity level, based solely on their clinical notes
- b. Zero-shot prompt was employed

4. Hartman, Vince, et al. "Developing and evaluating large language model-generated emergency medicine handoff notes." *JAMA Network Open* 7.12 (2024): e2448723-e2448723.

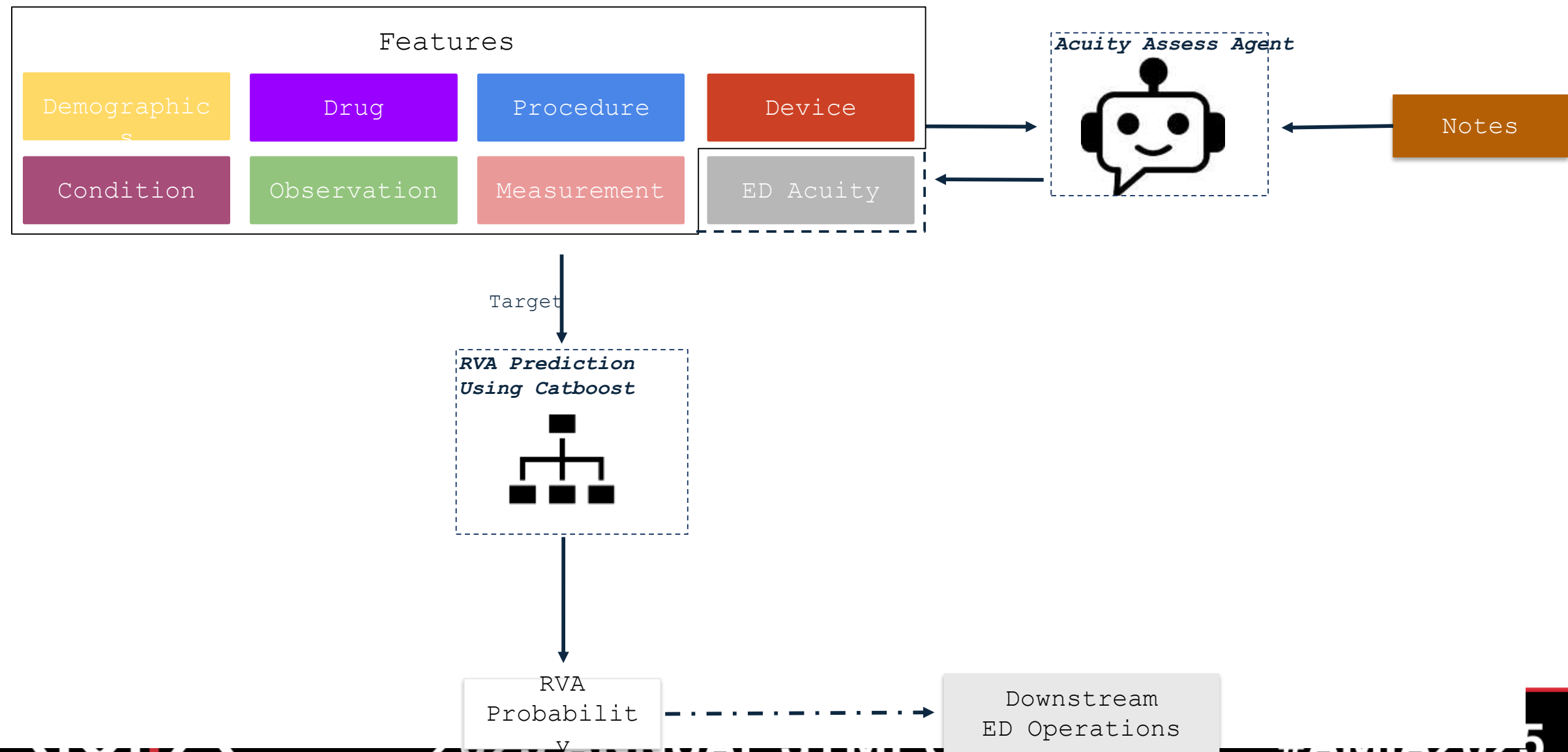
5. Williams, Christopher YK, et al. "Evaluating large language models for drafting emergency department encounter summaries." *PLOS digital health* 4.6 (2025): e0000899.



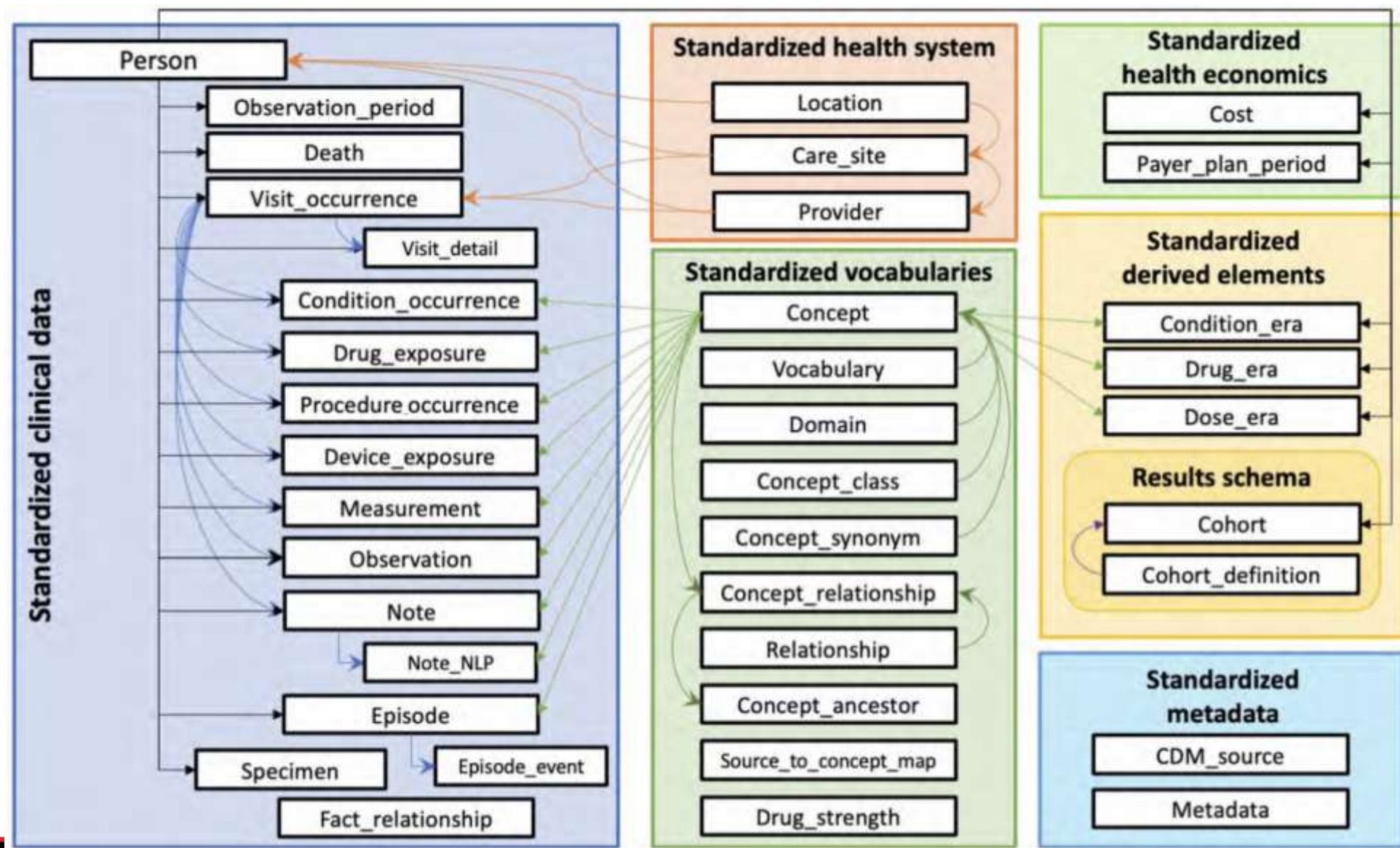
LLM for Predicting RVA in Emergency Department



LLM for Predicting RVA in Emergency Department



Data: OMOP Common Data Model

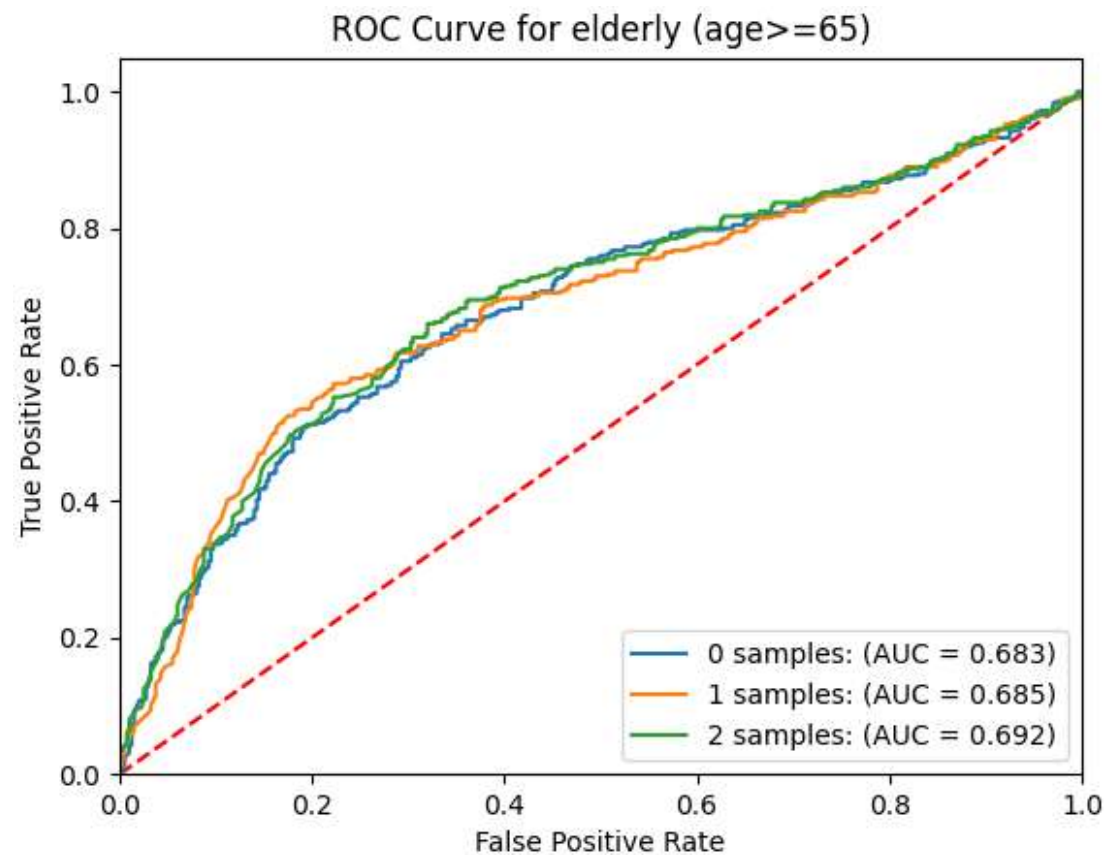
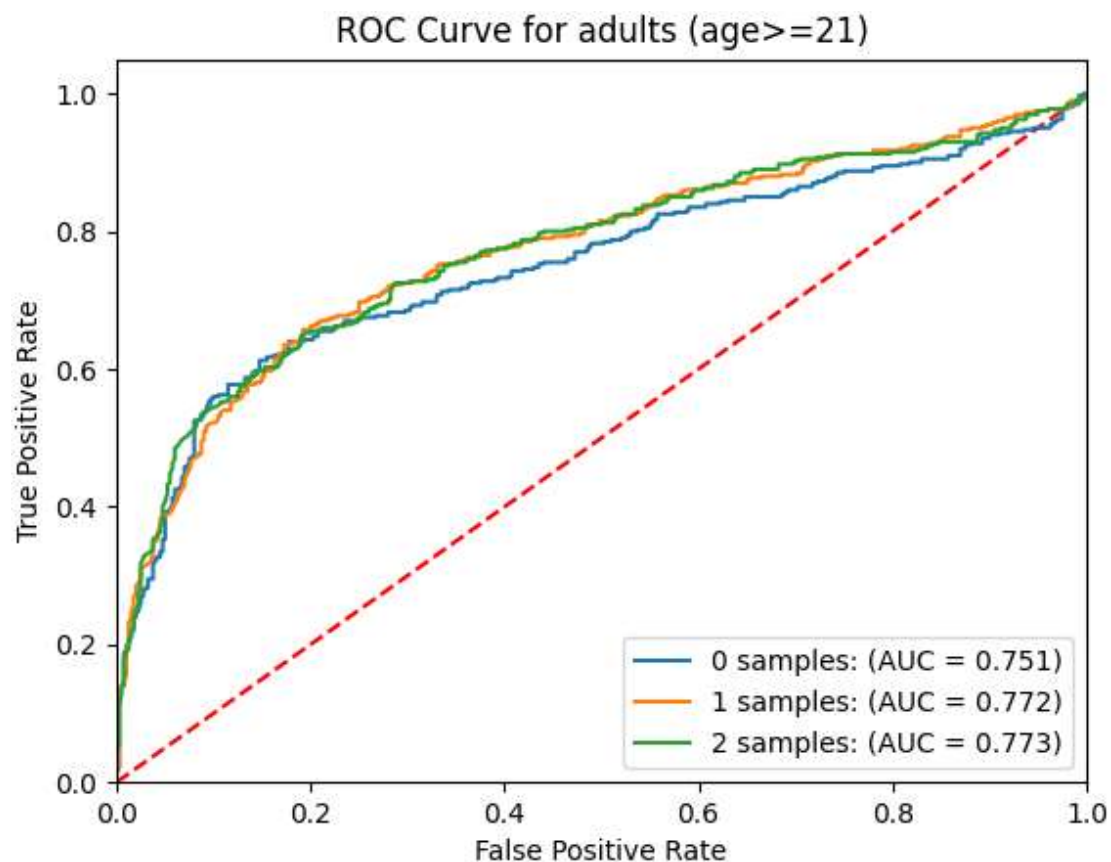


Results



Preliminary Results of Prediction (Qwen3-8B)

500 patients with/without RVA each, for adults and elderly





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Acknowledgment

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Questions?



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