ABS25-15262. Evaluating a doctor-in-the-loop AI-agent for multiple myeloma chart reviews

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BACKGROUND

Real-World Data (RWD) is increasingly vital in healthcare, enabling personalized care and decision-support tools through derived variables like **lines-of-therapy (LOTs) and treatment outcomes.** However, extracting this data is challenging because it is spread across hundreds of unstructured clinical notes. **The traditional manual chart review process is costly and time-consuming**, creating a major bottleneck in research. To address this, we developed a scalable framework: an **AI Agent with a doctor-in-the-loop** proposed to extract multiple myeloma (MM) lines of therapy and outcomes from electronic health records. **This work summarizes the development and evaluates the performance of this AI agent.**

METHODOLOGY

An **AI Agent with a doctor-in-the-loop** was designed to extract MM LOTs and outcomes. A cohort of 94 randomly selected patients diagnosed with MM since 2022 via Healthtree.

Step 1 - Document Filtering: OpenAI's o4-mini model was used to independently evaluate each clinical note to identify documents relevant to LOT and outcomes.

Step 2 - Data Extraction: Gemini 2.5 PRO (selected for its 1 million token context window) processed the aggregated, relevant documents to extract five key LOT elements:

- Medications, Start/End Dates, Procedures, IMWG Outcomes, and Treatment Status.
- The model also returned database IDs of supporting source documents for traceability.

Step 3 - Validation: Clinicians reviewed the model's output in a structured interface, displaying the extracted values and the original source document texts.

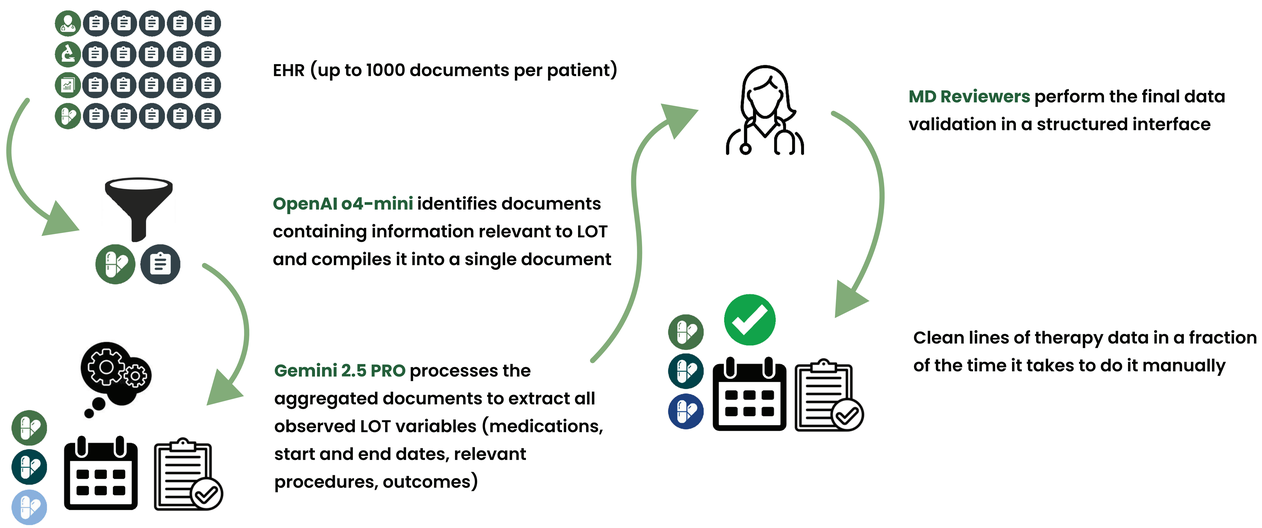
Each element was verified, corrected if needed and model performance was evaluated by calculating element-level accuracy as the percentage of model-generated outputs that matched

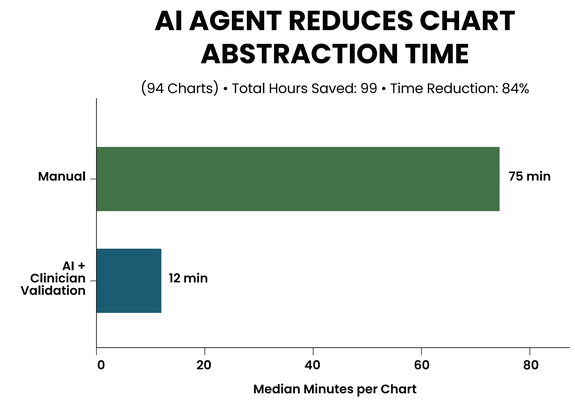
CONCLUSION

This study demonstrates the feasibility of combining frontier LLMs with doctor-in-the-loop validation for the extraction of MM LOTs from unstructured clinical documents.

- The **high fidelity** across the treatment elements analyzed, combined with **rapid clinician validation and document traceability**, positions this approach as a scalable alternative to manual abstraction.
- The **AI Agent addresses long-standing bottlenecks in RWD curation** by offering a reliable, low-burden method for transforming free-text data into structured treatment trajectories.
- This framework has potential applications in trial eligibility matching, retrospective outcomes research, and **real-world clinical decision support** across various EHR systems.

RESULTS





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For more information on clinical research collaboration, please contact research@healthtree.org

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