

## **Development and Validation of a Machine Learning Model for Automated Workplace-Based Assessment of Resident Clinical Reasoning Documentation**

Diagnostic errors annually contribute to 17% of adverse hospital events and 10% of patient deaths. Premature closure and failure to establish a sufficient differential diagnosis are major sources of diagnostic error.

It was anticipated that the advent of the electronic health record (EHR) would help decrease diagnostic errors by fostering thoughtful assessments in a centralized place. However, since EHR implementation, there has been a decline in documentation quality including documentation of clinical reasoning (CR). A contributing factor to the decline is trainees receive infrequent feedback on notes, partly due to faculty time limitations.

In this project, we aim to develop and validate a machine learning (ML) model for automated workplace-based assessment (WBA) of CR documentation. Previously we developed an innovative WBA using ML and natural language processing for formative feedback on medicine residents' CR documentation.

We are seeking funding to support two subsequent aims: (1) improving the ML model to provide more specific feedback; and (2) generating additional validity evidence to support use of the WBA in summative assessment. To demonstrate generalizability, we will conduct these aims in parallel at two institutions.

Our current ML model has high performance but provides only dichotomous output, rating notes as low- or high-quality CR documentation. To generate more specific feedback, we will label a dataset of notes using a human assessment rubric we developed and validated in prior phases of this work, and train new ML models to provide feedback. We will gather validity evidence for the new ML model using Messick's framework.

After sufficient validity evidence is collected, this novel WBA can be integrated into CR competency-based assessment programs to help facilitate achievement of the sub-competency "appropriate utilization and completion of health records." Our multi-site collaboration will also generate a process for implementation to facilitate dissemination of this tool across EHRs.