# MedAI: Addressing Healthcare Burnout with AI-Powered Solution


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## Problems - Why we care

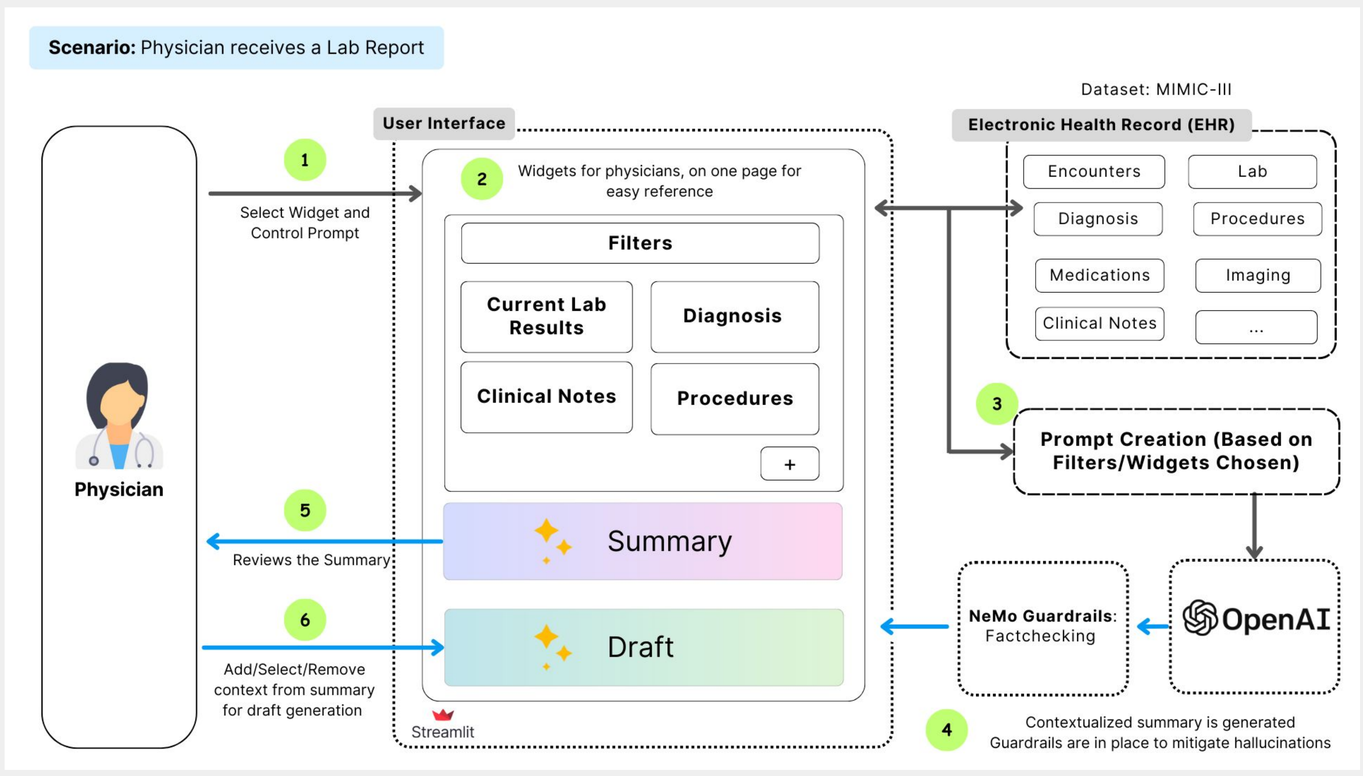
1. Physician burnout is a critical issue, with 54% of doctors facing this challenge. Administrative burdens such as Charting are a major contributor, consuming 1-2 hours of a physician's day. This detracts from direct patient care and negatively impacts outcomes.
2. Currently, physicians are required to manually navigate through different sources of information and read all the reports before decision-making. However, not all information is relevant and time is limited.

## Relevant NLP Tasks and Challenges

- **Tasks**
  - Information Retrieval: Retrieve relevant documents given context and natural language prompt
  - Summarization: summarize relevant retrieved documents
- **Challenges**
  - Relevance
  - Long history of reports

## Methodology

- **Data**
  - MIMIC-III clinical notes from patients who stayed in critical care units of the Beth Israel Deaconess Medical Center between 2001 and 2012
- **Technology Stack**
  - LangChain
  - Streamlit
- **LLMs**
  - OpenAI's GPT-3.5-turbo-16k
  - Anthropic's Claude-2
  - Meta's Llama2
- **LLM Details and Techniques**
  - **Temperatures**
    - 0, 0.3 0.5, 0.7
  - **Prompt Engineering**
    - Experimented with prompt templates based on task, audience, output format, location of information, verbosity
  - **Retrieval Augmented Generation(RAG)**




## Results

### Original Notes

LABORATORY DATA: Laboratory data revealed the following:wbc White count 13.5, hematocrit of 35.4, platelet count of 507. Sodium 133 and 7.3 potassium; however the sample was hemolyzed. Chloride 97, bicarbonate 26, BUN and creatinine 26 and 0.6, glucose 101. PT was 12, PTT 28.1, INR 1. The urinalysis was significant for 30 white blood cells, few bacteria, 6 to 10 epithelial cells.

DISCHARGE MEDICATIONS:
1. Atrovent two puffs q.i.d.
2. Colace 100 mg PO b.i.d.
3. Senna one to two tablets PO t.i.d.

**Prompt:** 'Write a summary of the lab report for the patient'

**Prompt:** 'Task 3: List All Active Medications for the Patient, Including Dosage and Intake Instructions. Provide the Source of This Information'

**1) Understanding of medical concepts/acronyms**

**2) Suggesting units, normal range :**

**3) Understand semantic differences of prompts instructions**

**Output:**

"Admission Labs:
- WBC: 4.6 **(normal)**
- RBC: 3.03 **(low)** …

Chemistry Panel:
- Sodium: 133 **mmol/L** **(normal range: 135-145 mmol/L)**
- Potassium: 7.3 **mmol/L** **(normal range: 3.5-5.0 mmol/L)..."**

Lab Results:
- **'wbc': 'White Blood Cell'**

**"Task 3:**

**Active medications:**

**1. Atrovent - 2 puffs q.i.d. (inhaler)**

**2. Colace - 100 mg PO b.i.d. (by mouth, twice a day)**

**3. Senna - 1 to 2 tablets PO t.i.d. (by mouth, three times a day)"**

Medications:
- **'t.i.d.': 'three times a day'**

## Future Work

- **Named Entity Recognition**
- **Relationship Extraction and Resolution**
- **Quantitative Evaluations**
- **Guardrails (Hallucinations, Fact Checking)**