

Resources for Use of LLM and AI in Quality Improvement and Patient Safety

Provided by Jim Barry March 2025 for the “AI Hands On Workshop”

Outline:

- 1) Presentation on Large Language Models (LLMs) that will include background and information on what is known about LLMs in healthcare currently
- 2) We will go over simple, yet powerful prompting approaches to leverage the use of LLMs in your quality improvement projects

Instructions:

1-Please come prepared with an LLM (any of these: ChatGPT, Claude, Gemini, Perplexity) on your computer. These ones listed are free, but usually require an email to create an account. In order to practice these prompts, you should have access an LLM. You can copy and modify the prompts below to enter into the LLM to focus on your problem.

2-Also come with a problem you are trying to solve as you will be able to work through this problem using the series of prompts (i.e discharge education, NEC, CLABSI, handoffs...).

3-If possible also have a HIPPA compliant datafile that you could upload and analyze. (i.e. NEC data)

Publications (resources):

- 1-Aschenbrenner; [Situational Awareness](#).
- 2- Bedi JAMA 2024; [LLM use in Healthcare](#).
- 3-Bradshaw 2025: [LLM Primer for Physicians](#).

Videos (resources):

Series from 3Blue1Brown:

[Basic LLM](#)

[LLM Transformer architecture](#)

Eric Topol youtube on AI in healthcare: https://www.youtube.com/watch?v=1l5LY7wI_Xc

Prompting:

1 Role/Tone/Context/Action/Output (RTCAO)

-You need to provide the models with a set of directions.

- **Example Prompt:**

“You are a healthcare quality improvement expert. Maintain a professional and solutions-focused tone. The context is a hospital aiming to reduce preventable readmissions within 30 days of discharge. The action is to analyze current discharge education practices and recommend process improvements. Provide a structured executive summary with actionable insights.”

2 Flipped Interaction

You have the model ask you questions which will help it answer your primary question.

- **Example Prompt:**

“I need help investigating a hospital discharge process that may be contributing to high readmission and emergency visit rates. Instead of providing direct answers, ask me structured questions that will help uncover the root causes and gaps in our process.”

3 Cognitive Verifier

You have the model break down your problem into a series of smaller problems by asking you a series of questions.

- **Example Prompt:**

“I need your help problem solving. Please take questions or problems and subdivide them into a series of individual questions or sub problems that could be useful in answering the overall question or in solving the overall problem.”

4 Ensemble learning

You have the model use a variety of different resources to answer your query.

- **Example Prompt:**

“You are a team of diverse healthcare experts brainstorming ways to improve hospital discharge education to reduce 30-day readmissions. Generate multiple perspectives from the following roles:

- *A nurse specializing in patient education*
- *A health literacy expert*
- *A hospital administrator focused on workflow efficiency*
- *A patient advocate with firsthand experience*
- *A data analyst reviewing readmission trends*
- *A quality improvement specialist applying Lean methodologies*

Each role should suggest 2-3 unique strategies to improve the discharge education process. Provide a consolidated summary of the most promising ideas.”

AND ANOTHER WAY to DO ENSEMBLE LEARNING

You use the same query. But take the output from one model and put it into another model that is a bit different and as it to refine your output, add further insight, or identify gaps in the output

ChatGPT: Foundational model trained on general data.

Claude: Foundational model trained on general data.

Open Evidence: A large language model trained on medical literature.

Perplexity a model that focuses on research and information retrieval using webpages and publications

5 Chain Of Thought reasoning

You have the model generate a step-by-step reasoning process output before arriving at a final answer or decision.

- **Example Prompt:**

“You are a healthcare executive assistant skilled in summarizing quality improvement projects. Follow this step-by-step reasoning before writing the executive summary:

- 1. Identify the main problem we are addressing.*
- 2. Summarize key data insights that highlight the scope of the issue.*
- 3. List the top solutions proposed based on our findings.*
- 4. Summarize how AI or QI methodologies are being used to improve outcomes.*
- 5. Provide a concise summary that could be used in a hospital leadership report.*

Here is the information: [Insert project details].”

***** For this section, you could upload HIPPA compliant data to use.*****

6 Data Analysis

- **Example Prompt:**

“You are a healthcare data analyst. I have hospital readmission data with variables such as age, gender, race, economic status, mental health issues, and complex health conditions. Identify the top factors correlated with 30-day readmission rates. Provide key insights in a structured format with bullet points.”

7 Exploring Statistical Associations

- **Example Prompt:**

“You are a healthcare statistician. Using my dataset on hospital readmissions, perform a statistical correlation analysis between different variables (age, race, economic status, mental health status, etc.) and 30-day readmission rates. Summarize findings in plain language, highlighting any strong correlations or surprising trends.”

8 Data Visualizations

- **Example Prompt:**

“You are a data visualization expert. I need to present hospital readmission rates based on multiple patient factors (age, race, economic status, health conditions). Recommend the best types of charts (bar, scatter, line, heatmap, etc.) to visualize these trends effectively. Explain why each choice is suitable”.

9 Data Storytelling

- **Example Prompt:**

“You are a healthcare data visualization expert. I need to present hospital readmission data to two different audiences:

- *Frontline clinicians who need actionable solutions*
 - *Hospital executives who want high-level trends*
 - *Generate two versions of the same visualization—one optimized for each audience. Explain the differences in approach.”*
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Always Happy to chat:

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