



# Optimizing Patient-Facing AI Chatbot Questions to Improve Readability and Actionability in Anesthesia Education

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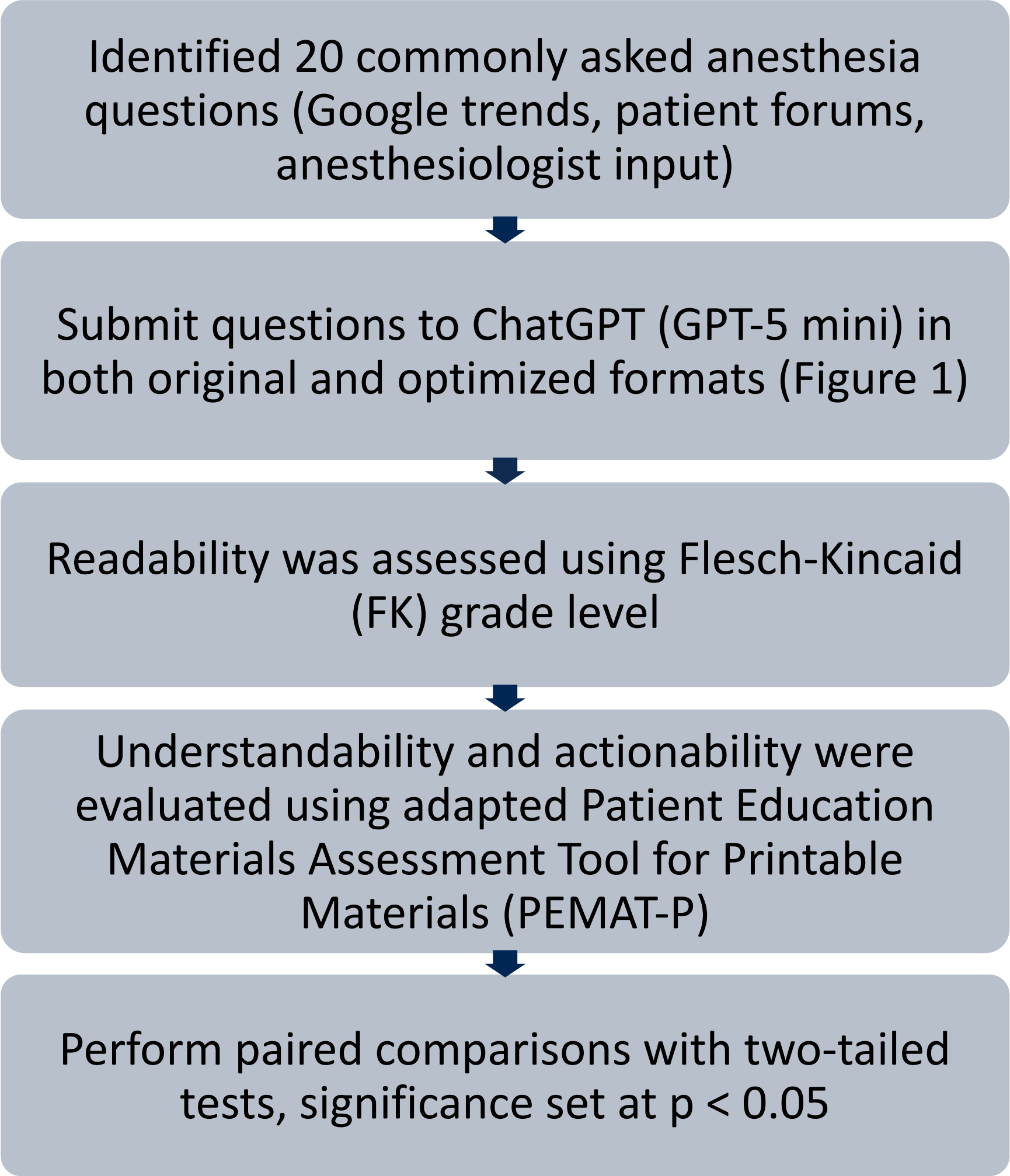
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## Introduction

- In anesthesia, high patient anxiety and limited counseling time increase the need for clear, usable information.
- Artificial intelligence (AI) chatbots (e.g., ChatGPT) are increasingly used for patient anesthesia education.
- Many AI-generated responses exceed the recommended 6th-8th grade reading level for patient education information.<sup>1</sup>
- Responses also often lack actionable guidance for patients.<sup>2</sup>
- This study quantifies how optimizing patient-facing prompts improves readability, understandability, and actionability.

## Methods



## Example Anesthesia Question Optimization

| Original Question              | Optimized Question                                                                                                                 |
|--------------------------------|------------------------------------------------------------------------------------------------------------------------------------|
| What is general anesthesia?    | Can you explain general anesthesia in plain language and include what a patient should ask or know before surgery?                 |
| Will I wake up during surgery? | Is it possible to wake up during surgery? Explain in simple language and include what a patient should ask or know before surgery. |
| Can I refuse anesthesia?       | Can a patient refuse anesthesia? Explain in plain language and include what a patient should ask or know before surgery.           |

Figure 1. Example of original versus optimized patient-facing anesthesia questions using plain language prompts.

## Results

### Prompt Optimization Improves All Measured Outcomes

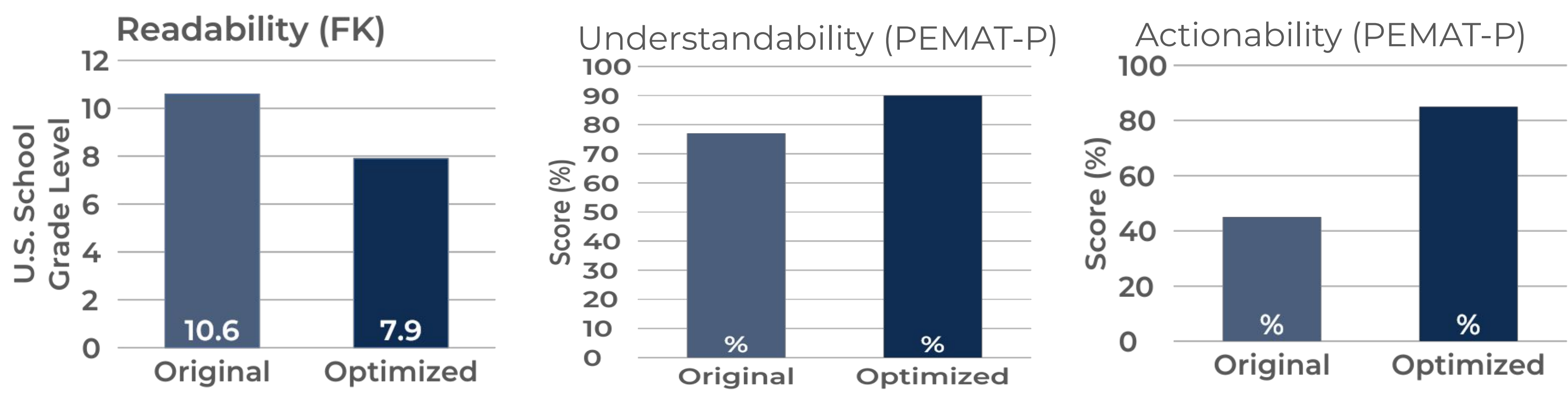


Figure 2. All 20 optimized patient-centered prompts were associated with lower Flesch-Kincaid grade levels and higher PEMAT-P understandability and actionability scores compared with original prompts (all  $p < 0.001$ ).

## Key Findings

- **Readability** improved from grade level 10.6 → 7.9 ( $p < 0.001$ ).
- **Understandability** improved from 77% → 90% ( $p < 0.001$ ).
- **Actionability** improved from 45% → 85% ( $p < 0.001$ ).
- Improvements were consistent across all 20 questions.
- No optimized prompt performed worse than original.

## Conclusions

- Small prompt changes significantly improve AI-generated anesthesia education.
- Plain language and patient-centered cues enhance readability, understanding, and actionability.
- The greatest improvement is in actionability.
- Focusing on prompt design, rather than the AI itself, improves patient understanding in anesthesia-related questions.

## Discussion

### Educational Applications

- Teach patients to ask clear, specific, plain-language questions.
- Include prompts that request actionable guidance (“what should I ask or do?”).
- Use structured tools (checklists/worksheets) to improve AI use.
- Can be implemented in clinic visits, pre-op counseling, or patient education sessions.

### Patient AI Prompt Checklist:

- ✓ Use **plain language**
- ✓ Ask for **simple explanations**
- ✓ Include **actionable guidance**
- ✓ Keep the question **specific**
- ✓ Avoid or explain **medical jargon**

### Implications & Future Directions

- AI prompt optimization is a practical, scalable way to improve patient education.
- Simple changes in question phrasing significantly enhance the usability of AI-generated information.
- Structured, patient-centered prompts should be incorporated into clinical AI.
- Future work should focus on implementing prompt optimization in clinical practice, including developing patient education tools, prompt libraries, and strategies to teach patients and clinicians how to use AI effectively.