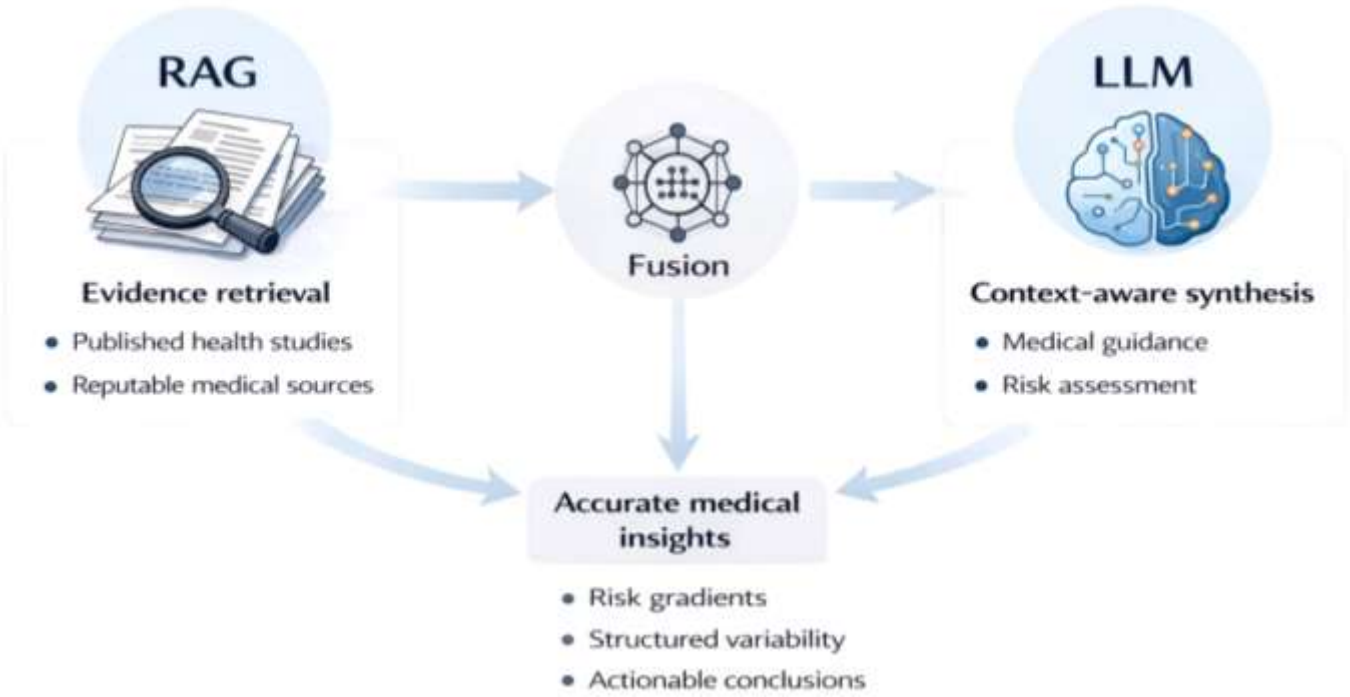
Evaluation Framework for Medical and Research Applications



Question

1. **Is "sounding right" enough in high-stakes domains?**
2. Where Are We Now?
3. If conclusions agree, does the reasoning still matter?
4. How much does retrieval alone improve accuracy?

Why Research & Medical Use case ?

- Failure cost increases across domains.

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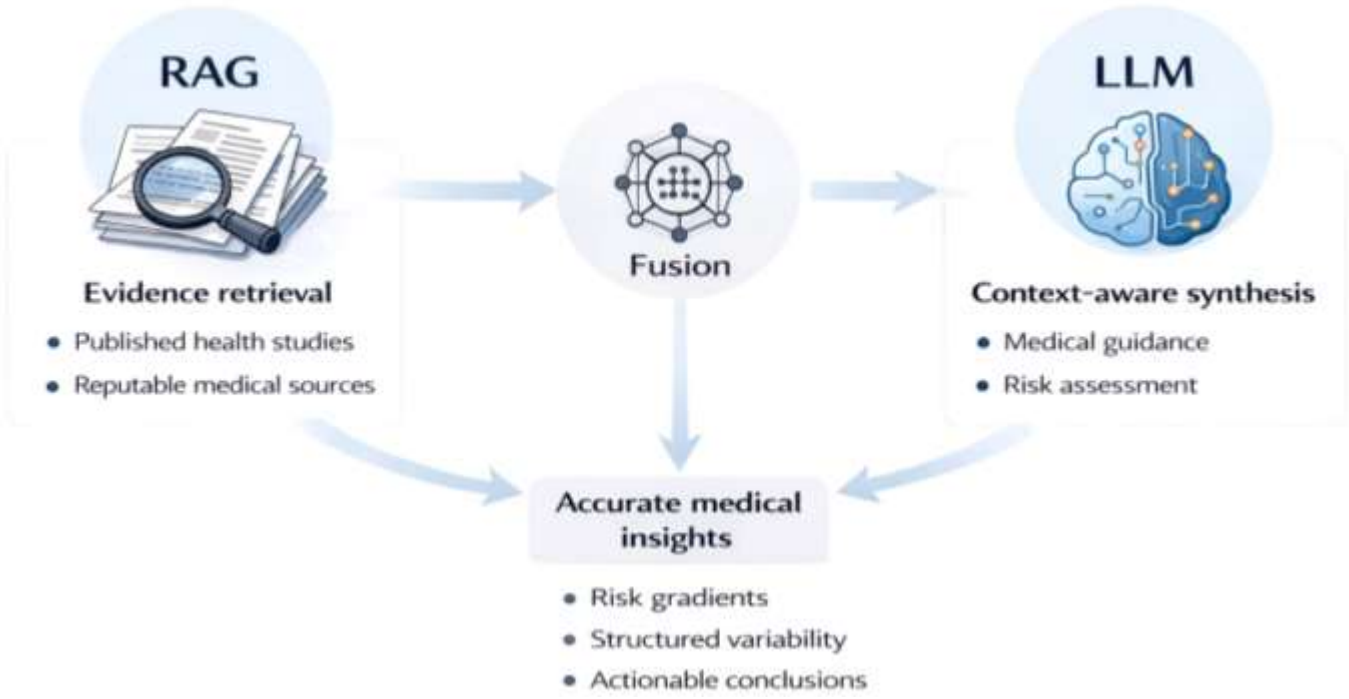

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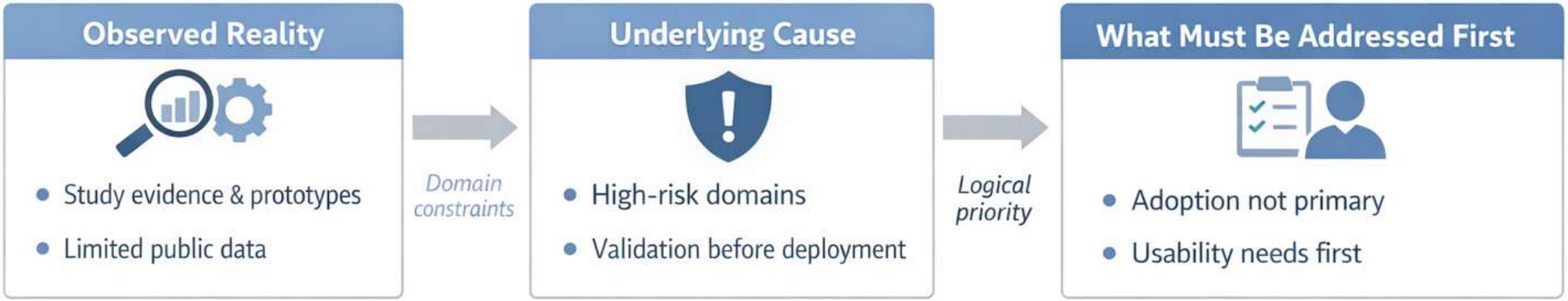
Why isn't this widely used yet?



> Given limited real-world deployment, this work focuses on clarifying what is necessary before adoption.

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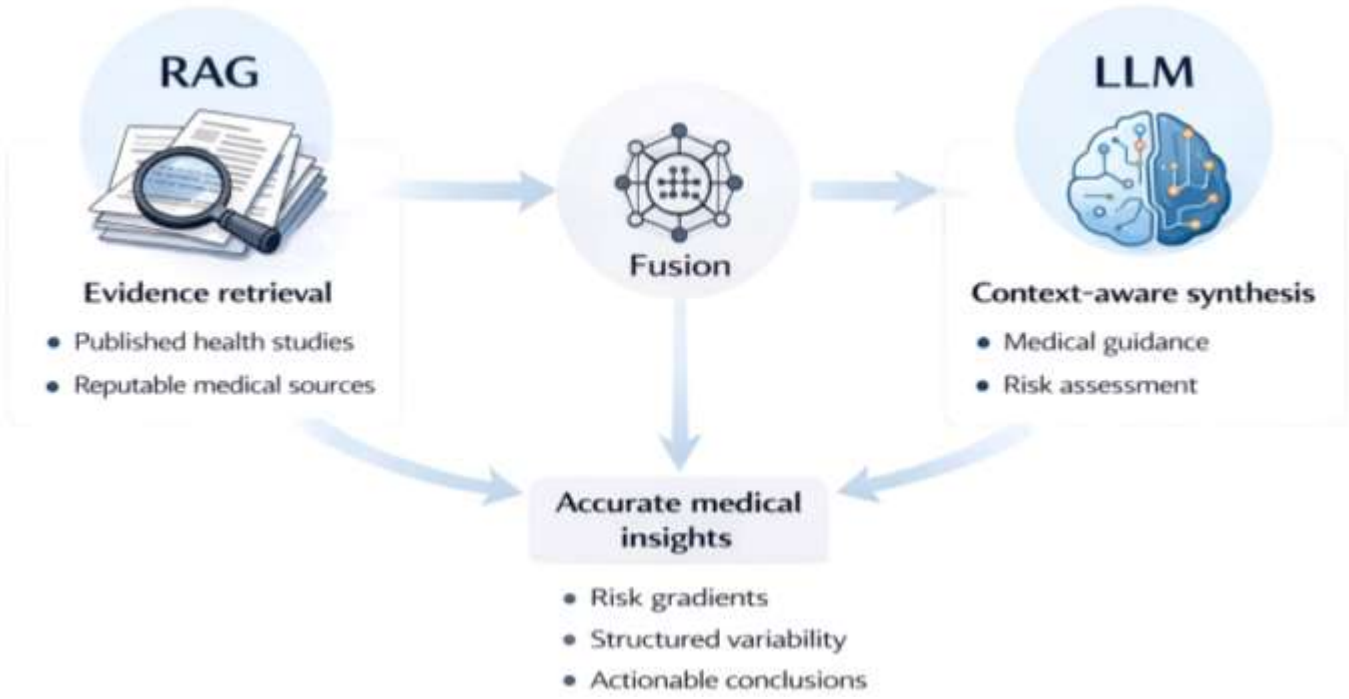

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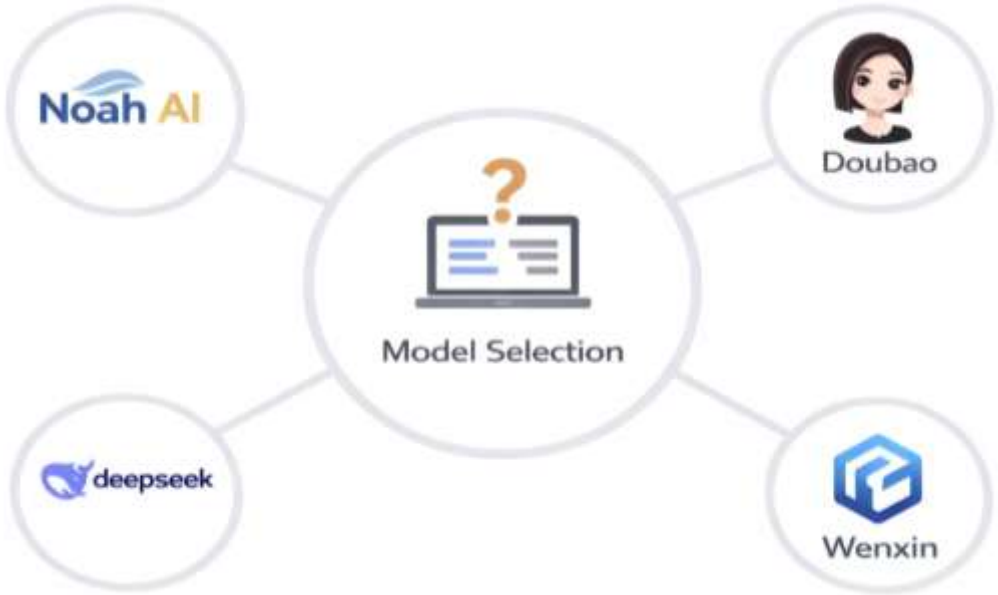
Question

- ✓ Differences in residents' physical health status after COVID-19 infection: a comparison between those who were infected and those who were not.

Result

- ✓ There **is no substantive contradiction** in conclusions across the four models.



Shared conclusion:

COVID-19–infected residents consistently show worse post-acute physical health outcomes (e.g., fatigue, respiratory symptoms, reduced functional capacity), while non-infected residents are mainly affected by indirect pandemic effects.

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Evidence Anchoring Comparison (Traceability)

Traceable evidence

- Explicit study linkage
- Quantified outcomes (RR / *excess %*)
- Claim → Paragraph → Publication

Traceable evidence

Plausible but unverifiable

- Authority-style language
- Vague quantifiers (*"studies suggest..."*)
- No direct citations

Plausible but unverifiable

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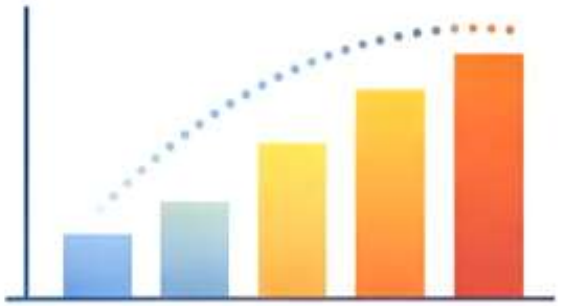
Evidence Anchoring Comparison (Traceability)

Structured variability

- Subgroup differentiation
- Time & severity thresholds
- Explicit uncertainty separation



Risk-weighted evidence

Flattened story–flattened

- Collapses into “all infected”
- No uncertainty separation
- Smooth but misleading coherence

Oversimplified narrative

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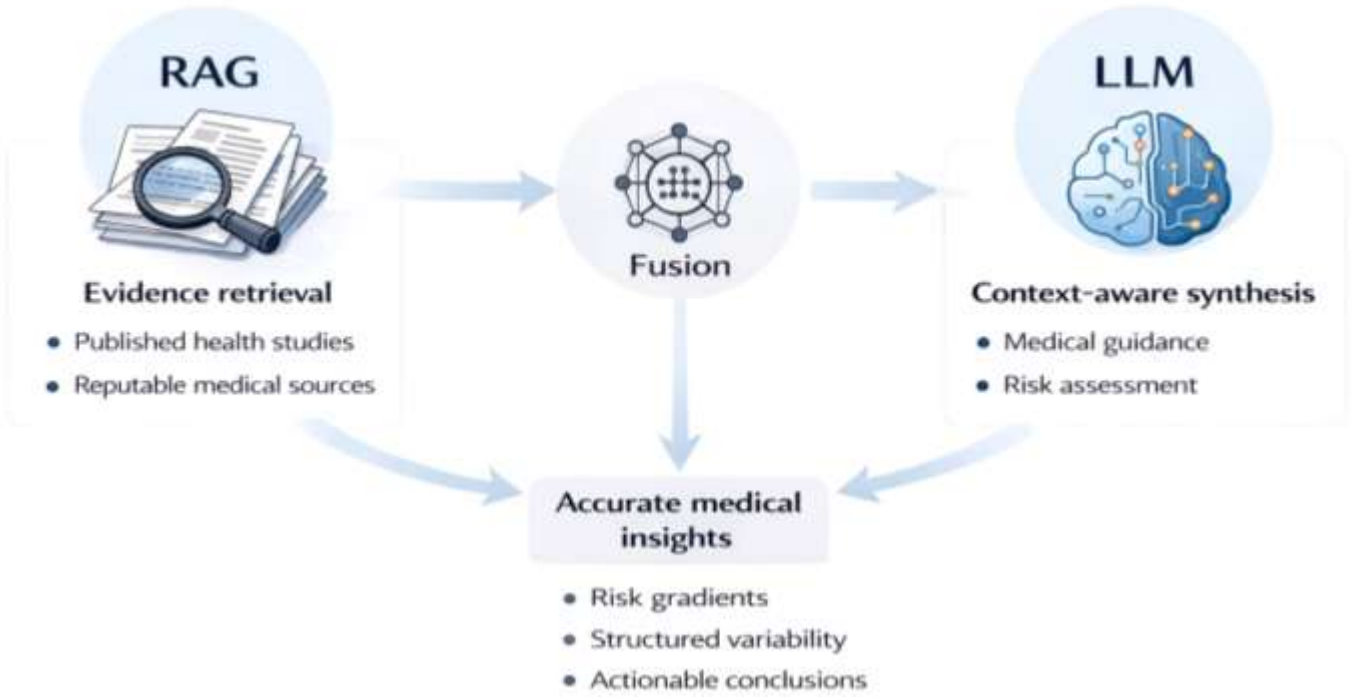

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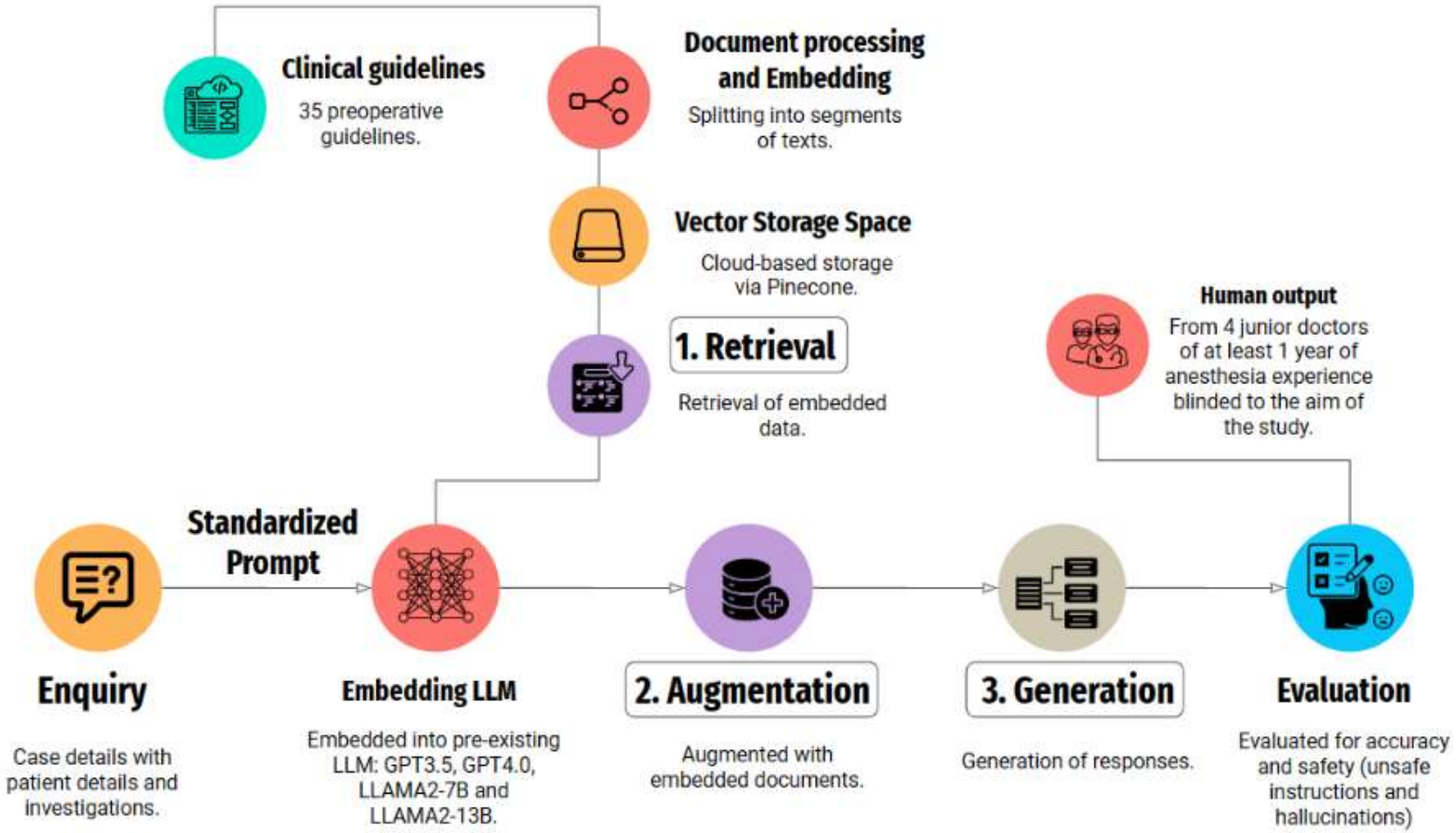
Quantitative Evidence: Experimental Setup for Evaluating RAG



Source: Ke et al., 2024

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Quantitative Results: Accuracy Comparison (LLM vs. RAG)

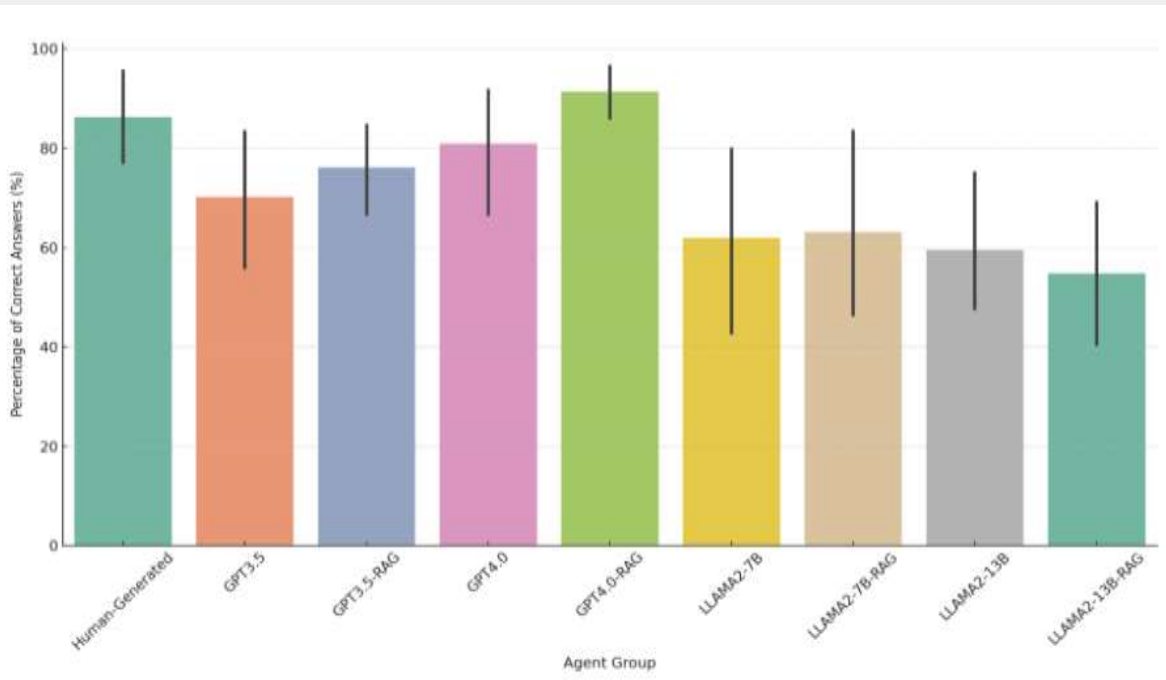

Figure 2: Percentage of accurate answers across the different groups.

Retrieval consistently improves answer accuracy.

- Standalone LLM ≈ 80% accuracy
- LLM + RAG ≈ 91% accuracy
- Comparable to junior doctors

→ Accuracy gains are attributable to retrieval alone.

Source: Ke et al., 2024

Summary

- In high-stakes domains, reliability matters more than plausibility.
- Models may agree on conclusions, but differ in epistemic standards.
- RAG doesn’ t change answers — it makes reasoning accountable.