ASSESSING THE ECONOMIC IMPACT AND CLINICAL BENEFITS OF ARTIFICIAL INTELLIGENCE (AI)-ASSISTED COLONOSCOPY USING SIMULATION MODELS: IS AI WORTH THE HYPE?

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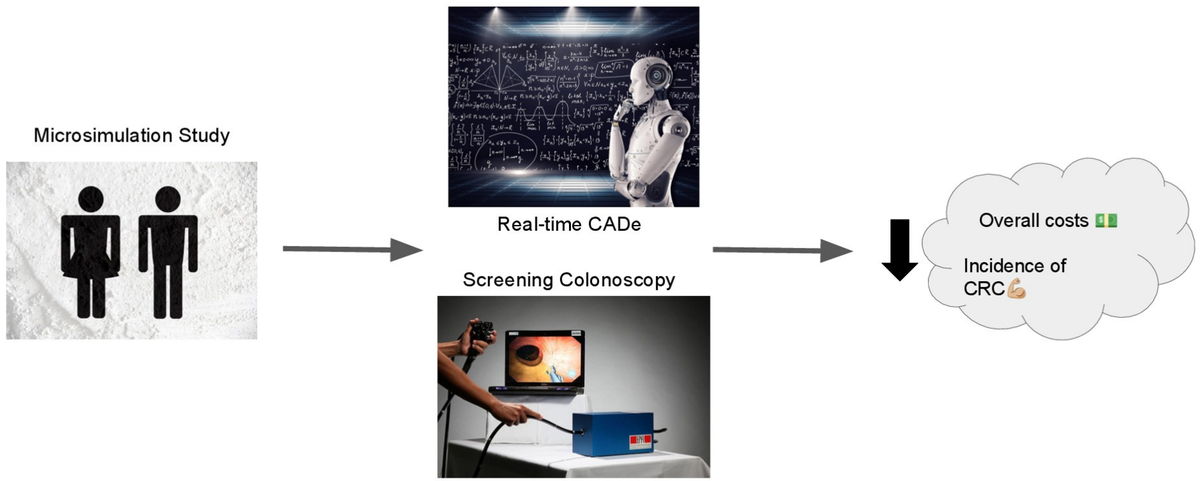
Introduction

- CRC is the third most diagnosed cancer worldwide and the second leading cause of cancer-related deaths.
- The lifetime risk of developing CRC is ~4.1% for men and ~3.9% for women.
- Colonoscopy detects and removes premalignant polyps, preventing CRC development.
- However, miss rates for adenomas are 22-28%, particularly for small or flat lesions.
- AI-based computer-aided detection (CADe) enhances adenoma detection rates (ADR).
- Studies show CADe can increase ADR by up to 20% and reduce adenoma miss rates by 55%.
- Despite benefits, higher procedural costs raise concerns about cost-effectiveness.

P	I	C	O	S
Population	Intervention	Control	Outcome	Study Design
Patients undergoing screening or surveillance colonoscopy for colorectal cancer (CRC) prevention.	Computer-aided detection (CADe) integrated into colonoscopy to enhance adenoma detection rates (ADR).	Standard colonoscopy without AI assistance.	-Cost-effectiveness -Impact on CRC incidence and mortality. -Quality-adjusted life years (QALY).	Systematic review and meta-analysis of simulation models assessing cost-effectiveness

Total studies screened: 557 across 4 databases
Total Studies Included: 5 studies across 5 countries

Outcome	Effect Measure	95% Confidence Interval	p-value	I^2 (%)	Interpretation
Overall Cost Savings	Mean Difference: **–$48.16 USD**	-$58.72 to -$37.61	<0.00001	100	Statistically significant cost savings per patient
Reduction in CRC Incidence	Odds Ratio: **0.93**	0.86 to 0.99	0.03	81	Significant 7% reduction in colorectal cancer (CRC) incidence
CRC Mortality	Odds Ratio: **0.94**	0.88 to 1.01	0.11	52	No significant reduction in mortality; moderate heterogeneity
Quality-Adjusted Life Years	Mean Difference: **+0.01**	-0.01 to 0.03	0.30	52	No significant improvement in QALYs



Discussion

- CADe-assisted colonoscopy is a potential cost-effective strategy despite higher initial costs.
- Demonstrates a significant reduction in CRC incidence but no significant impact on CRC mortality or QALY.
- Long-term healthcare savings outweigh initial investment due to earlier adenoma detection and fewer CRC cases.
- Challenges include higher rates of non-neoplastic polyp resection and real-world variability in outcomes.

References

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