

Project Title

Routine Adoption and Cost Effectiveness of Artificial Intelligence in Colonoscopy

Project Lead and Members

Project lead: Asst Prof Frederick H Koh

Project members: Asst Prof Foo Fung Joon, Ms Goh Pei Shi, Dr Lin Cui Li

Organisation(s) Involved

Sengkang General Hospital

Healthcare Family Group Involved in this Project

Medical

Applicable Specialty or Discipline

Endoscopy, Gastroenterology

Aims

The team aimed to implement and evaluate the clinical and cost effectiveness of AI in colonoscopy, the first in the Asia Pacific region.

Background

See poster appended/ below

Methods

See poster appended/ below

Results

See poster appended/ below

Lessons Learnt

See poster appended/ below

Conclusion

See poster appended/ below

Project Category

Technology

Digital Health, Artificial Intelligence

Care & Process Redesign

Productivity, Cost Savings

Keywords

Colonoscopy, Detection Rate

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Routine Adoption and Cost Effectiveness of Artificial Intelligence in Colonoscopy

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Background and Problem

Colorectal cancer is **most common cancer in Singapore**



Long window of opportunity for **primary prevention** via **removal of precancerous polyps** during **colonoscopy**

✗ Up to **20-23%** of colonic adenomas are **missed** during colonoscopy

1% increase in adenoma detection rate (ADR) = 3% decrease in colorectal cancer incidence¹



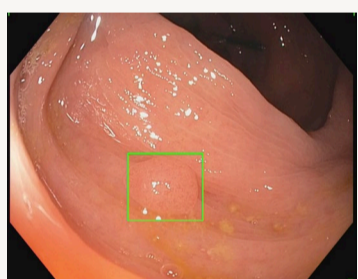
Artificial intelligence (AI) to improve colonoscopy quality and address these gaps

Proposed Solution

Before implementation



1. Gathering **ground feedback and perspectives** from endoscopists and nurses on potential barriers
2. Auditing **baseline ADR**
3. Selecting **artificial intelligence programme**



GI Genius™ Intelligent Endoscopy Module?

- Can be used with current endoscopy devices
- Most well-taught AI with 2.5 million images
- Consistent software updates with subscription model

Implementation

Stepwise implementation with iPARIHS framework

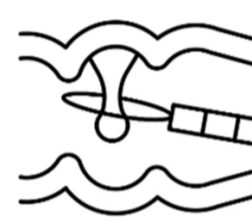
1. Introduced GI Genius to 2 rooms with highest density of early adopters based on pre-implementation feedback
2. In-training provided for nurses
3. Publishing peer-reviewed articles to highlight credibility

Throughout implementation

1. Regular **engagement** with endoscopists and nurses
 - **Feedback to endoscopists** about ADR with device
 - Provide **reminders** to make use of GI Genius
 - **Critical evaluation by end-users** on device
 - Receive feedback on how to improve implementation, data collection and work protocol
2. **Empowering nurses**
 - Highlighting nursing competence with “Champions of AI” title
 - Encouraging others to emulate these champions
3. Evaluation of **financial sustainability**
 - **Decision tree model** was constructed
 - **Incremental Cost Effectiveness Ratio (ICER)** was calculated

Outcomes

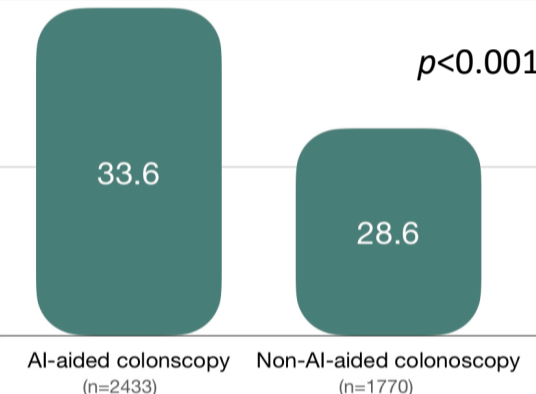
1. Individual Endoscopist performance after 3 months



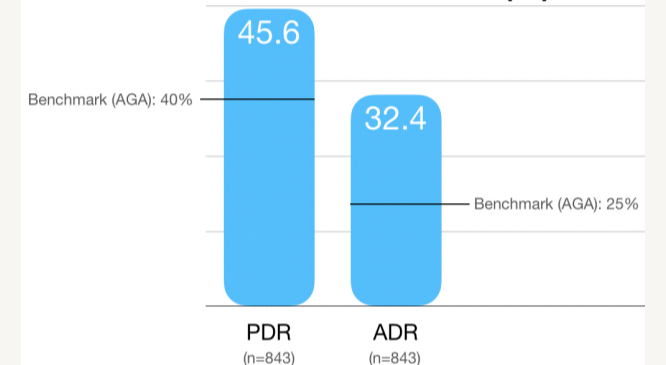
- Median polyp detection rate **improved by 30.4%** ($p=0.02$)
- 13 (72.2%) had an improvement of ADR, with 2 achieving significant improvement

2. Performance after one year

Polypectomy rates (%)



Polyp Detection Rate (%) & Adenoma Detection Rate (%)



AI-aided colonoscopies yielded **significantly higher rates** of polypectomies without increased incidence of complications

AI-aided colonoscopies **performed well against recommended benchmarks** (American Gastroenterology Association)

3. Cost analysis for financial stability

Increase in revenue (due to increased polypectomy rates)	SGD 160,000
Subscription cost (one year)	(-) SGD 120,000
Excess revenue	SGD 40,000

Cost effective: increase in revenue covered subscription cost with an excess
ICER = 0.72 < 1

4. End-user experience for endoscopists

Before
Significant number of endoscopists **did not enjoy the programme** ($p=0.01$) and **did not think it improved colonoscopy quality** ($p=0.03$)

After one year

- **92.6%** of these same endoscopists **enjoyed using the programme**
- **87.2%** are convinced that **the technology has helped improved the quality** of their colonoscopies

Conclusions

Implementation of **AI platform to routine colonoscopy** which :



Cost-effective



Increases polyp detection rates

References:

¹Corley DA, Jensen CD, Marks AR, et al. Adenoma Detection Rate and Risk of Colorectal Cancer and Death. N Engl J Med. 2014;370(14):1298-1306
Images obtained from Canva