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Early Economic Evaluation of the EMPRSS Electronic Data System for the Reporting and Improvement of Colonoscopy Metrics

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IHE Report

Early Economic Evaluation of the EMPRSS Electronic Data System for the Reporting and Improvement of Colonoscopy Metrics

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Declared Competing Interest of Authors

Competing interest is considered to be financial interest or non-financial interest, either direct or indirect, that would affect the research contained in this report or create a situation in which a person's judgement could be unduly influenced by a secondary interest, such as personal advancement.

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Executive Summary

Colorectal cancer (CRC) is a leading cause of mortality in Canada. 29,600 Canadians were estimated to have been diagnosed with CRC in 2020 and 9,700 died from the disease. It is estimated that 85% of CRCs are the result of the growth of polyps which can potentially be avoidable through colonoscopy.

The EMPRSS reporting system aims to help to improve colonoscopy outcomes by providing endoscopists with timely report cards comparing key metrics to both targets and their peers. Importantly, EMPRSS has the potential to increase the polyp detection rate (PDR) of endoscopists leading to fewer CRCs due to missed polyps becoming cancerous.

This analysis compares the effectiveness of EMPRSS in increasing endoscopist PDR relative to standard colonoscopy. Currently there is no evidence to inform the effectiveness of EMPRSS in increasing endoscopist PDR. Therefore, this analysis represents an early evaluation of the potential of EMPRSS to be cost-effective when compared to standard colonoscopy, its potential to have health benefits, and possibly be cost saving.

A model based economic evaluation was conducted from an Alberta, Canada perspective making extensive use of secondary data sources to parameterize the model. The primary outcome measure was the quality adjusted life year (QALY), which is a composite measure of length and quality of life, where 1 QALY is the equivalent of 1 year lived in perfect health. A 5-year time horizon was adopted.

A case study scenario was implemented making reasonable assumptions about the effectiveness of EMPRSS in increasing endoscopist PDR. This case study considered a scenario where EMPRSS is able to increase the PDR of an endoscopist from the average of 45.7% to 50.6%. Analysis was also conducted to gain insights into the minimum effectiveness necessary for EMPRSS to meet cost-effectiveness criteria. Further sensitivity analysis of key parameter values and a budget impact analysis were also conducted.

Under the case study scenario EMPRSS would provide savings of $74 and an increase in health utility of 0.0002, (valued at $10) on average per patient over a 5-year period. As EMPRSS would provide both cost savings and increased health benefits, it would clearly be cost effective in this scenario. Furthermore, it is estimated that EMPRSS would result in 6 fewer CRCs per 10,000 patients over the 5-year period.

The analysis here demonstrates that EMPRSS has the potential to be cost-effective in improving endoscopists' PDR relative to standard colonoscopy. Future work should establish the effectiveness of EMPRSS in increasing PDR and the level of adherence by endoscopists. As new studies are undertaken the model results here can be updated to reflect this new information.

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1. Project Overview

The Institute of Health Economics (IHE) has been engaged by EMPRSS inc. to conduct an early-stage economic assessment of the Electronic Medical Procedure Reporting System (EMPRSS) for the improvement of important quality metrics in colonoscopy.

The intent of the project is to support an evidence-based approach for health systems to consider adoption of new technologies. This partnership model, where the IHE, informed by input from EMPRSS and interested health systems, has developed an economic model of the value of EMPRSS technology to the healthcare payer to examine the potential cost savings, cost-effectiveness, and additional health outcomes that can be provided by the new technology. As part of this project the IHE will also prepare an Evidence Development Plan that will describe real world data to be collected from initial routine usage of the technology to be used to update the economic model. This is intended to help de-risk investment by pre-defining a plan to validate economic modeling results.

1.1. Condition Overview

Colon polyps are small chunks of cells that form in the lining of the large intestine, protruding into the intestinal canal. Although most polyps are benign and cause no symptoms, adenomatous polyps, or adenomas may be precursors to colorectal cancer (CRC).

Colonoscopy plays an essential role in screening for and removing polyps from the colorectal system. If not discovered and removed, such polyps can become cancerous over time increasing health care costs and mortality. As such, key performance indicators (KPIs) for endoscopists include the adenoma detection rate (ADR) and the polyp detection rate (PDR). Research has shown that the higher the ADR of a physician for a given patient group, the lower the incidence of CRC among those patients[1].

CRCs are one of the leading causes of death in Canada, and many are avoidable. 29,600 Canadians are estimated to have been diagnosed with CRC in 2020 and 9,700 died from the disease[2]. It is estimated that 85% of CRCs are the result of the growth of polyps and could be potentially avoided through colonoscopy[3].

1.2. Patient Cohort

The patient cohort considered in this analysis are all patients receiving a colonoscopy in Alberta. During future data collection activities, the model will be informed by data gathered on patients receiving colonoscopy in specific Canadian jurisdictions including rural regions. There are around 102,406 colonoscopies performed in Alberta annually[4].

1.3. Technology Overview

The EMPRSS reporting system provides endoscopists with timely report cards comparing their colonoscopy related KPIs to their peers as well suggested benchmarks. This self-reporting and feedback has the potential to improve KPIs due to monitoring alone and can also prompt improvements from additional training and understanding.

1.4. Technology Value Proposition

By improving the quality of colonoscopies with EMPRSS has the potential to:

- Increase the Polyp Detection Rate (PDR) and Adenoma Detection Rate (ADR), thereby decreasing the incidence of future CRCs.

2. Model Structure and Description

This analysis utilizes a decision tree and Markov model to represent the care path for patients receiving a colonoscopy and their subsequent health state, shown in Figures 1 and 2 below.

Figure 1: Model Structure

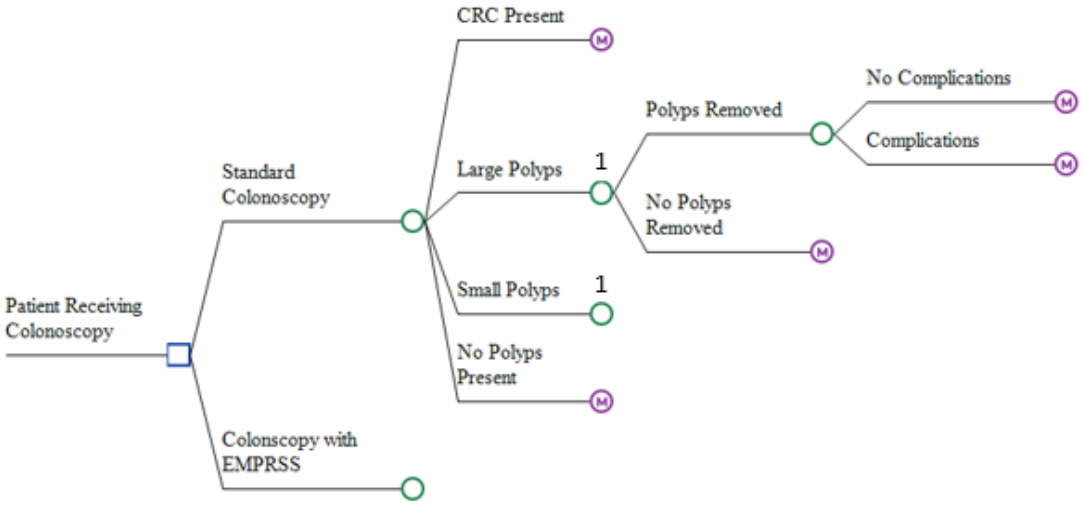


Figure 1 shows the decision tree component of the model. The model is read from left to right beginning at the square, which represents a decision node. In this case, the choice of EMPRSS or standard colonoscopy. The circles represent chance nodes, where one or more events can occur.

Patients undergoing a colonoscopy may have no polyps, small polyps, large polyps, or CRC. Patients with no polyps are considered healthy and require no further treatment. Patients with CRC are correctly diagnosed and begin treatment based on its degree of progression.

Patients who have small or large polyps may be correctly identified and have their polyps removed with a polypectomy based on the PDR of the endoscopist. A polypectomy may result in complications.

The numbers represent arms where the pathways of the model are repeated. The Ms represent the Markov model which is shown in Figure 2.

Figure 2: Markov Model

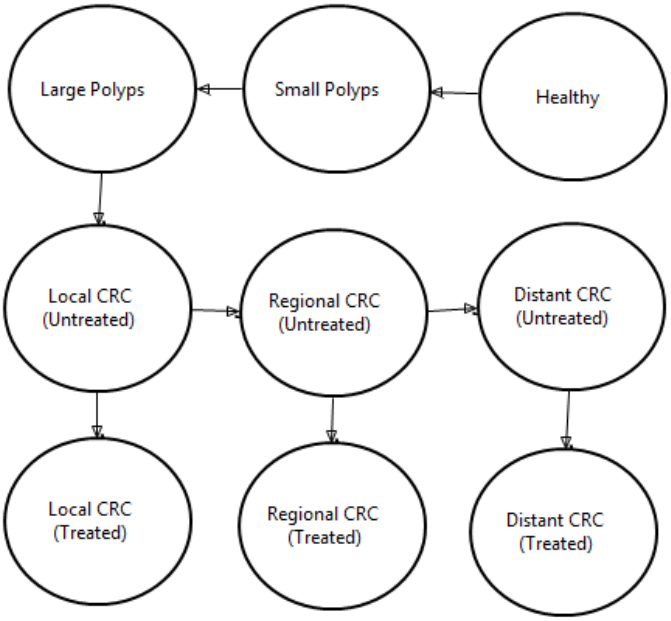


Figure 2 shows the possible health states that a patient may occupy after the reference colonoscopy. Patients occupy each health state for a set period and then transition to connected health states may occur over time based on transition probabilities informed by the literature.

Patients who have polyps may eventually develop CRC if the polyps are not discovered and removed. Patients who do not have polyps or have had a polypectomy are considered healthy, though they may develop polyps over time. Once CRC develops, it remains untreated until the patient becomes symptomatic and undergoes another colonoscopy. Patients may experience mortality at any point during the model at different probabilities based on their health state (not shown).

This model uses one month cycles and considers costs and health effects accrued over a 5-year period.

3. Model Parameterization and Assumptions

3.1. Standard Care

The prevalence of polyps and CRC in an average risk patient group over the age of 50 are shown in table 1 below.

The prevalence of polyps in the average patient over 50 years of age is estimated based on the prevalence of adenomas for the same patients. A meta-analyses by Heitman et. al. (2009)[5] found a pooled estimate of 30.2% prevalence of adenomas in average risk patients over the age of 50. A retrospective study comparing the correlation between the ADR and PDR for endoscopists that examine average risk patients found that to achieve benchmark ADR targets, PDRs should be greater by a factor of 1.6[6]. Using these values, a prevalence of adenomas of 30.2% implies that there is a prevalence of polyps of 54.4% in an average risk patient group. The prevalence of CRC is taken from Heitman et. al. (2009).

Table 1: Prevalence

Variable	Value	Source
Prevalence of polyps in average patient 50+	54.4%	[5]
Prevalence of CRC in average patient 50+	0.3%	[5]

The PDRs in Table 2 are calculated based on an analysis of the sensitivity of colonoscopy in detecting polyps by Lin et. al. (2016)[7]. The study finds a range of 0.75 to 0.93. These values are multiplied by the prevalence of polyps in Table 1 to establish a high value and low value for the PDR of endoscopists for average risk patients. The mid value is calculated as the average of the high and low value. This analysis will assume that the average endoscopist not using EMPRSS will achieve a mid range PDR of 45.7%.

Table 2: Polyp Detection Rates

Variable		
High PDR	50.6%	[7]
Mid PDR	45.7%	[7]
Low PDR	40.8%	[7]

PDR = Polyp Detection Rate

Transition probabilities describing the movement between health states (Figure 2) are taken from Barichello et. al. (2019)[3] which examines the cost-effectiveness of various colorectal screening strategies in the Alberta context. Transition probabilities between healthy and small polyp, small and large polyps, and large polyps and local CRC were calibrated by the authors to reproduce the age-specific prevalence and CRC incidence in Alberta. The probability of experiencing a complication is applied only to patients receiving a polypectomy. This is a conservative assumption for this model as EMPRSS is likely to result in more polypectomies but fewer colonoscopies overall.

Table 3: Transition Probabilities

Variable		
Mortality – Treated Local CRC	0.0174	[3]
Mortality – Treated Regional CRC	0.086	"
Mortality – Treated Distant CRC	0.175	"
Mortality – Untreated Local CRC	0.02	"
Mortality – Untreated Regional CRC	0.10	
Transition from Healthy to Small Polyp	0.011	"
Transition from Small to Large Polyp	0.015	"

Transition from Large Polyp to Local CRC	0.05	"
Transition from Local to Regional CRC	0.22	
Transition from Regional to Distant CRC	0.50	
Probability Local CRC becomes Symptomatic	0.17	
Probability Regional CRC becomes Symptomatic	0.22	
Probability Distant CRC becomes Symptomatic	0.50	
Probability of complication during small Polypectomy	0.001	"
Probability of complication during Large Polypectomy	0.07	"

Annual Probabilities; CRC = colorectal cancer

Costs are taken from Barichello et. al. (2019)[3] and inflated to 2021 Canadian dollars using the Bank of Canada Inflation Calculator (*https://www.bankofcanada.ca/rates/related/inflation-calculator/*).

Table 4: Costs

Variable		
Colonoscopy	$1,032	[3]
Small Polypectomy	$177	"
Large Polypectomy	$676	"
Complication	$8,474	"
Local Cancer Year 1 Year 2 Year 3 Year 4 Year 5	 $24,927 $11,014 $3,311 $1,092 $3,022	"
Regional Cancer Year 1 Year 2 Year 3 Year 4 Year 5	 $32,447 $21,850 $6,750 $6,810 $7,457	"
Distant Cancer Year 1 Year 2 Year 3 Year 4 Year 5	 $30,510 $26,145 $13,786 $8,018 $5,549	"

Costs in 2021 Canadian Dollars

Health utility decrements for CRC are taken from Barichello et. al. (2019)[3] and applied to the health utility for the average individual of the same age from Guertin et. al. (2018)[8].

Table 5: Health Utilities

Variable		
Health Utility for average individual	0.84	8
Utility Decrement – Local CRC	-0.10	3
Utility Decrement – Regional CRC	-0.20	"
Utility Decrement – Distant CRC	-0.24	"

3.2. Measure of Technology Effectiveness

The effectiveness of EMPRSS is based on its ability to increase the PDR of endoscopists from a mid to high level of detection based on the values shown in Table 2. This effectiveness is in turn influenced by the adherence of the endoscopist to EMPRSS. This model assumes that if EMPRSS is not used during a colonoscopy the cost is incurred but the patient receives no benefit in terms of a higher PDR.

4. Analysis

4.1. Method

This model-based early economic evaluation utilizes the primary outcome of the quality-adjusted life year (QALY), where the QALY is a composite measure of length and quality of life such that one QALY is equal to one year lived in perfect health.

Other outcomes included in this analysis are mortality and CRCs.

The results are presented using the incremental cost-effectiveness ratio, which is defined as the difference in the costs of the two strategies divided by the difference in their outcomes, and the net monetary benefit (NMB), which is defined for each intervention as follows:

NMB = QALYs * willingness-to-pay (WTP) for a QALY – cost of the intervention

This analysis uses a WTP for a QALY of $50,000 and both costs and health utilities are discounted at an annual rate of 1.5% as recommended by the Canadian Agency for Drugs and Technologies in Health (CADTH). The maximum cost-effective price is the maximum price that can be charged and still achieve cost-effectiveness and is calculated at the maximum cost when the difference in the NMB of the new strategy and standard care is equal to zero.

4.2. Case Study

The case study assumes that EMPRSS is able to improve endoscopist PDRs from mid-level to high so that at least one polyp is removed from 50.6% of patients instead of 45.7%. It is also possible that EMPRSS can improve the performance of low-detector endoscopists to mid or high level. Given

the model structure and assumptions that inform it, however, the results are informed by the absolute improvement in PDR and not the beginning value, so the ability of EMPRSS to improve outcomes is adequately informed by this analysis.

AS EMPRSS is not yet commercially available, it does not have an established price. Popular apps in use by clinicians can have a range of prices and usually charge an annual or monthly fee[9]. The price of EMPRSS will be set at $3,000 a year and it will be used in 220 colonoscopies a year in the case study. Adherence is set to 64%.

4.3. Sensitivity Analysis

The sensitivity analysis examines the effect of changing key parameters on the conclusions drawn from the model. These key parameters are as follows:

- Effectiveness of EMPRSS in increasing endoscopist PDR.
- Price of EMPRSS.
- Level of adherence to EMPRSS by endoscopists.

4.4. Budget Impact Analysis

This analysis examines the budget impact to the health care payer of introducing EMPRSS in Alberta to all patients undergoing a colonoscopy. The costs of EMPRSS are estimated over a 5-year period assuming that 102,406 patients present each year in Alberta for colonoscopy.

5. Results

The results start by describing the headline results obtained from the analysis. These same results are then considered in more detail through a description of the results obtained from the case study, minimum effectiveness analysis, sensitivity analysis, and budget impact analysis.

5.1. Headline Results

In the case study scenario that makes reasonable assumptions about the effectiveness of EMPRSS in increasing endoscopist's PDR and adherence over a 5-year period:

- EMPRSS would be cost saving, reducing the average cost per patient by $74 compared to standard colonoscopy.
- EMPRSS would result in an incremental average health benefit per patient of 0.0002 QALYs, which has a value of $10 per patient.
- EMPRSS would clearly be cost-effective relative to standard colonoscopy as it reduces costs and increases patient health.
- EMPRSS would lead to 6 fewer CRCs per 10,000 patients relative to standard colonoscopy.
- EMPRSS would remain cost-effective at lower values of effectiveness as measured using PDR and adherence relative to the case study. The price of EMPRSS of $3000 annually is significantly lower than the maximum cost-effective price.

- When applied to 102,406 colonoscopies in Alberta per year, EMPRSS has the potential to provide total budgetary savings of more than $7 million compared to standard colonoscopy over a 5-year period.

5.2. Case Study Analysis

Using a 5-year time horizon the results of the case study analysis are shown in Table 6 below. The average discounted cost for a patient receiving a colonoscopy with EMPRSS is $74 dollars lower than a standard colonoscopy and the average health benefit per patient is 0.0002 QALYs greater, which at a WTP of $50,000 per QALY has a value of $10. Since colonoscopy with EMPRSS is both less costly and results in greater health benefits it dominates standard colonoscopy in the case study.

Table 6: Case Study Cost-Effectiveness Results

	Avg. Cost Per Patient	Incremental Costs	Avg. QALYs per Patient	Incremental QALYs	ICER
EMPRSS	$5,559	-$74	4.1469	0.0002	Dominant
Usual Care	$5,633		4.1467		

Table 7 shows a breakdown of the health outcome impact of EMPRSS colonoscopy compared with colonoscopy alone for 10,000 colonoscopies. EMPRSS would have a positive health impact by reducing the number of CRCs and the number of deaths.

Table 7: Case Study Health Outcome Impact

Health Impact Over 5-year Period (Per 10,000 colonoscopies)	Standard Care	EMPRSS Case Study	Incremental Effect
CRCs	17	11	-6
Deaths	243	243	0
Quality Adjusted Life Years	41,469	41,467	2.58
Value of Quality Adjusted Life Years at $50,000			$129,179

Table 8 shows the cost impact of EMPRSS colonoscopy compared with standard colonoscopy for 10,000 patients. Using EMPRSS results in fewer colonoscopies overall as fewer are needed for subsequent CRC diagnosis; however, the total cost is higher. This is because more EMPRSS colonoscopies result in polypectomies due to the higher PDR. This is also why the cost of complications is higher for EMPRSS. However, the increased costs due to colonoscopies and complications (and EMPRSS itself) are more than offset by cost savings due to lower treatment costs as a result of fewer cancers.

Table 8: Case Study Cost Impact

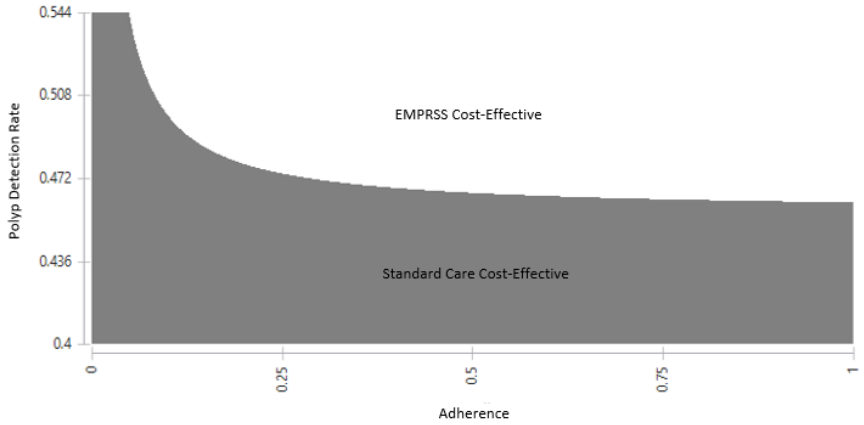
Cost Impact Over 5-year Period (for 10,000 patients)	Standard Care		EMPRSS		Incremental Cost	
	Cases	Cost	Cases	Cost	Cases	Cost

Colonoscopy (including polypectomies)	10,006	$11,145,501	10,004	$11,199,862	-2	$54,361
Complications	18	$153,058	19	$163,570	1	$10,513
Treatment	17	$45,032,356	11	$44,092,162	-6	-$940,194
EMPRSS				$68,207		$68,207
	Standard Care		EMPRSS		Total Incremental Costs	
Total Cost	$56,330,914		$55,523,769		-$807,145	

5.3. Minimum Effectiveness Analysis

Figure 3 shows two-way sensitivity analysis with the impact of the variation of PDR and adherence by endoscopists to EMPRSS on the cost-effectiveness of EMPRSS. If endoscopists using EMPRSS can achieve higher PDRs, then EMPRSS can be cost-effective even at low levels of adherence. Correspondingly, small improvements in the PDR over standard colonoscopy require a high level of adherence in order for EMPRSS to be cost-effective.

Figure 3: Minimum Effectiveness Results

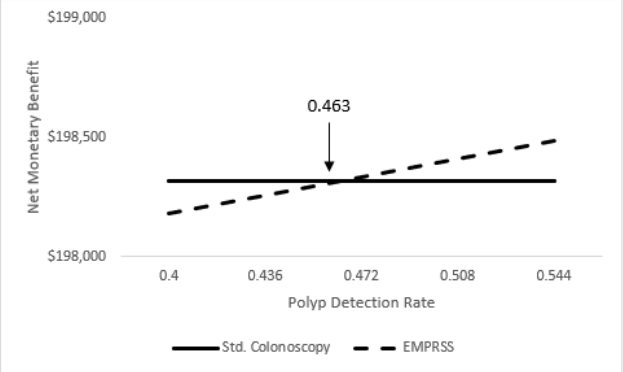


5.4. Sensitivity Analysis

5.4.1. Polyp Detection Rate

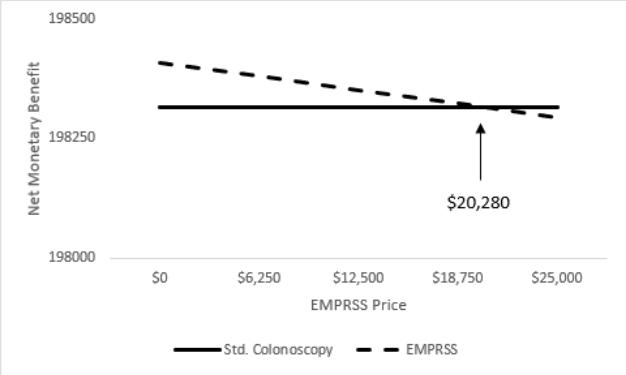
Figure 4 shows that EMPRSS can be cost-effective even with small improvements in the average PDR. The minimum PDR for EMPRSS to be cost-effective is 0.4683 only slightly above the value estimated for the average endoscopist of 0.457. This is due to the relatively low cost of EMPRSS per colonoscopy and the high potential cost of future CRCs which EMPRSS can reduce.

Figure 4: Sensitivity to the Polyp Detection Rate



5.4.1. Price of EMPRSS

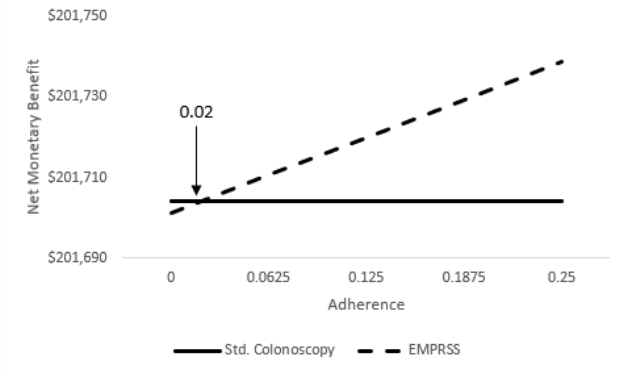
If EMPRSS can achieve the effectiveness assumed in the case study, the price of $3000 annually is well below the maximum cost-effective price of $20,280.



5.4.3. Adherence

Figure 5 shows that EMPRSS can remain cost-effective at low levels of adherence due to its low price per colonoscopy.

Figure 5: Sensitivity to Adherence



5.5. Budget Impact Analysis

Table 9 shows budget impact of EMPRSS colonoscopy over standard colonoscopy over a 5-year time horizon for the case study scenario. EMPRSS incurs large costs in the first year due to an increase in polypectomies but begins to achieve cost savings in the second year due to a reduction in CRCs. In the case study scenario EMPRSS could result in cost savings of more than 7 million dollars when applied to all colonoscopies in Alberta.

Table 9: Budget Impact by Year

Year	Standard Colonoscopy	EMPRSS Colonoscopy	Incremental Effect
1	$207,964,136	$209,990,662	$2,026,527
2	$94,453,755	$93,989,285	-$464,470
3	$90,238,457	$88,872,621	-$1,365,836
4	$88,303,905	$85,557,250	-$2,746,655
5	$88,462,424	$83,916,895	-$4,545,528
Totals	Standard Colonoscopy	EMPRSS Colonoscopy	Incremental Effect
Colonoscopy (including polypectomies)	$114,134,577	$114,691,900	$557,322
Complications	$1,567,401	$1,675,055	$107,655
Treatment	$453,720,699	$444,563,119	-$9,157,580
EMPRSS	$0	$1,396,951	$1,396,951
Total	$569,422,677	$562,326,713	-$7,095,964

Note: for 102,406 colonoscopy patients in year 1

6. Discussion

Using a decision tree and Markov model this analysis has examined the potential for EMPRSS to be cost-effective when used to improve the detection of polyps during colonoscopy. A case study and minimum effectiveness analysis were conducted to understand the impact of EMPRSS on costs and patient outcomes. Various sensitivity analyses and a budget impact analysis were also conducted.

Under the case study scenario in which reasonable assumptions were made regarding the potential impact of EMPRSS on the polyp detection rate (PDR) of endoscopists, it was found that EMPRSS has the potential to reduce costs and improve patient health over a 5-year period. On average, EMPRSS would save $74 per patient and increase health utility by 0.0002 QALYs which has a value of $10 per patient. Using EMPRSS would clearly be cost-effective in the case study scenario as it would result in cost savings and increased health benefits. Over a 5-year period EMPRSS would result in 6 fewer colorectal cancers and 1 fewer death per 10,000 patients.

This compares with a previous report by IHE that found that if EMPRSS can increase all mid-level endoscopists in Alberta to high-detector endoscopists than it can avoid as many as 55 CRCs a year. The early report was based on a headroom analysis and covered the patient's lifetime-horizon. The

current report is focused more narrowly on a five-year period and provides a more conservative estimate of the potential benefits of EMPRSS. The two reports use different methods and time horizons but are focused on the same patient group and technology. They represent different lenses through which to view the potential benefits of EMPRSS and both show positive results in terms of cost savings and fewer CRCs.

The results of the minimum effectiveness analysis and sensitivity analysis show that EMPRSS remains cost-effective at lower levels of adherence and effectiveness at increasing PDR. This analysis shows that the price of $3000 used in the case study is well below the estimated maximum cost-effective price. If EMPRSS were used for all of the estimated 102,406 colonoscopies annually in Alberta, the model estimates that the health care system would save more than $7M over a 5-year period.

Although this report focuses on the detection of polyps as a proxy for detecting adenomas, EMPRSS has the ability to record the ADR directly. This model can be adjusted to include ADRs directly depending on the availability of data.

EMPRSS offers further benefits to endoscopists that were not considered in this analysis. EMPRSS has the potential to improve patient comfort and well-being as well as increasing the availability of data regarding colonoscopy. EMPRSS also has the potential to offer increased benefits in rural areas where endoscopists may not have access to the same resources as in cities. This study examined costs from the perspective of the health care payer and so only included health care cost savings and not personal expenses related to the treatment of CRC nor costs like insurance and increased sick days. While it is the case that these wider societal costs are not considered by the health care provider when making adoption decisions, this report should still be seen as a conservative evaluation of the potential value of EMPRSS.

Although, as stated above, the maximum cost-effective price of EMPRSS is much higher than the price used in the case study analysis, it is important to recognize that there are many important factors that go into pricing a technology. In this case, the low barriers to entry for any similar product along with heavy competition in the field of technologies for health improvement suggest that competitive pricing may be necessary for adoption.

The results here demonstrate that EMPRSS has the potential to be cost-effective for endoscopists performing colonoscopies in Alberta if it can show sufficient adherence and effectiveness in increasing endoscopist PDR.

7. Conclusion

The analysis here demonstrates that EMPRSS has the potential to be cost-effective when used to improve the PDR of endoscopists for colonoscopy. Further work should establish the effectiveness of EMPRSS at improving endoscopist PDR as well as the level of adherence of endoscopists to the technology. As new studies are undertaken to inform these values, these model results can be updated to reflect this new information.

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Appendix: Additional Case Study

The following case study is based on information from EMPRSS regarding more appropriate pricing and adherence by endoscopists. In a study of endoscopists in the North Zone of Alberta, EMPRSS found a rate of voluntary adherence of 64% with endoscopists performing an average of 220 colonoscopies a year. EMPRSS also indicated it would be interested in testing the price of EMPRSS at a price of $1500 a year.

Table A1 shows the effect on the cost-effectiveness of EMPRSS in this scenario. EMPRSS continues to be cost saving and provides additional health benefits over standard care, though the size of the cost savings is reduced as the price of EMPRSS increases.

Table A1: Cost-Effectiveness Results at $1500

	Avg. Cost Per Patient	Incremental Costs	Avg. QALYs per Patient	Incremental QALYs	ICER
EMPRSS	$5,552	-$81	4.1469	0.0002	Dominant
Usual Care	$5,633		4.1467		

As shown in table A3, EMPRSS continues to provide health benefits in terms of greater QALYs and fewer CRCs, though the impact is somewhat reduced by the lower adherence used in this scenario.

Table A3: Health Outcome Impact

Health Impact Over 5-year Period (Per 10,000 colonoscopies)	Standard Care	EMPRSS Case Study	Incremental Effect
CRCs	17	11	-6
Deaths	243	243	0
Quality Adjusted Life Years	41,469	41,467	2.58
Value of Quality Adjusted Life Years at $50,000			$129,179

In terms of the budget impact, EMPRSS continues to be cost saving over a 5-year period. If it is priced at $1500 a year, EMPRSS will save $8,265,654 over a 5-year period.

Table A4: Budget Impact by Year and Category at $1500

Year	Standard Colonoscopy	EMPRSS Colonoscopy	Incremental Effect
1	$207,964,136	$209,292,432	$1,328,296
2	$94,453,755	$93,989,258	-$464,497
3	$90,238,457	$88,872,573	-$1,365,884
4	$88,303,905	$85,557,178	-$2,746,727
5	$88,462,424	$83,916,799	-$4,545,624
Totals	Standard Colonoscopy	EMPRSS Colonoscopy	Incremental Effect

Colonoscopy (including polypectomies)	$114,134,577	$114,691,900	$557,322
Complications	$1,567,401	$1,675,055	$107,655
Treatment	$453,720,699	$444,563,119	-$9,157,580
EMPRSS	$0	$698,475	$698,475
Total	$569,422,677	$561,628,240	-$7,794,437