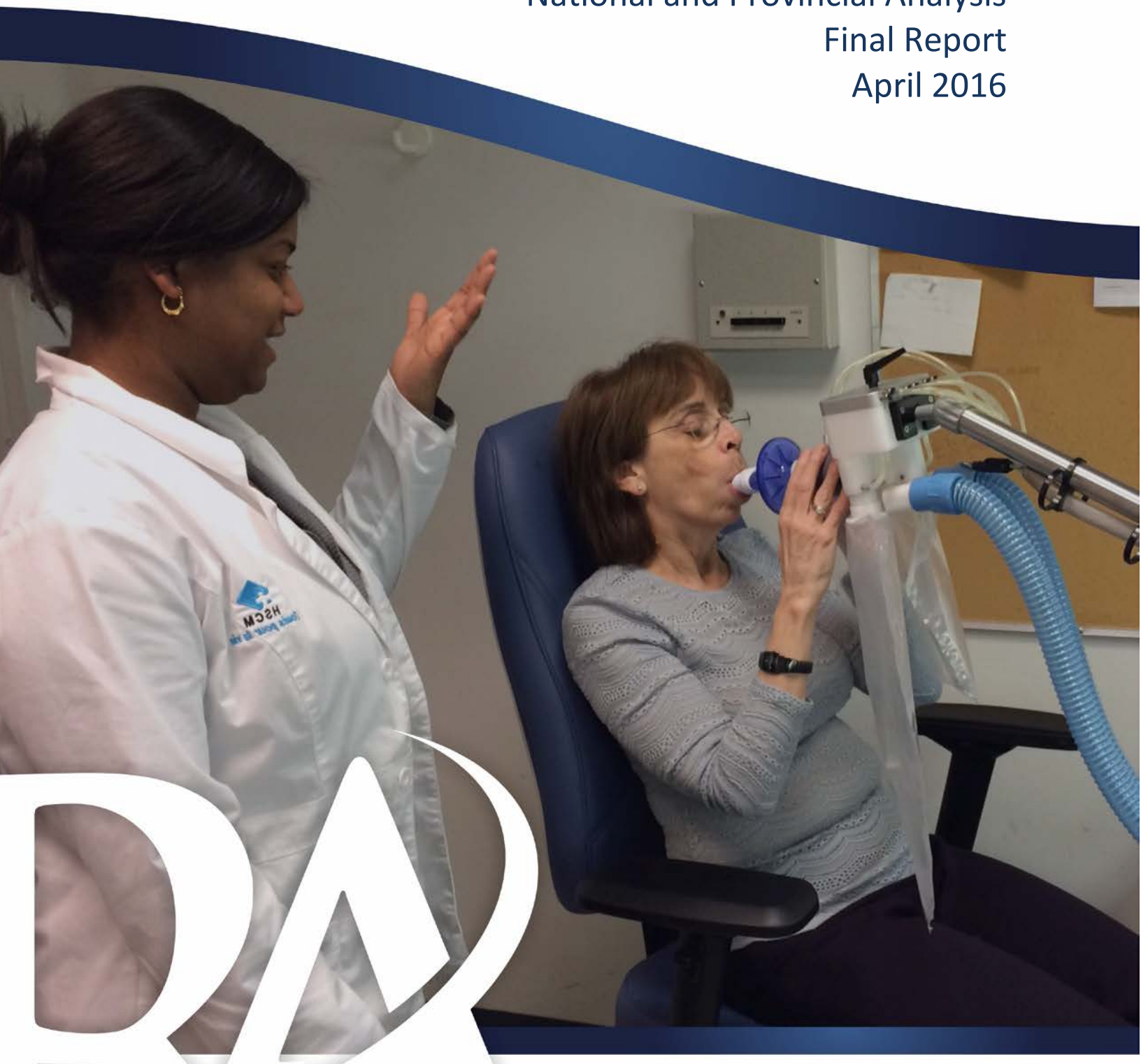
Modelling the INSPIRED COPD Outreach Program™

National and Provincial Analysis

Final Report

April 2016



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RiskAnalytica

About RiskAnalytica

RiskAnalytica provides objective, independent and evidence based analysis dedicated to a comprehensive and collaborative understanding of the short and long term risks and returns behind policy decisions and health and economic outcomes.

RiskAnalytica serves governments, not-for-profits and private organizations that seek a best-of-breed understanding of the issues facing them using expertise combined with a many variable computational socio-economic and population health policy evaluation platform.

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About This Report

This report was prepared by RiskAnalytica on behalf of the Canadian Foundation for Healthcare Improvement (CFHI). CFHI is a not-for-profit organization funded by Health Canada. In keeping with RiskAnalytica's guidelines for funded research, the design and method of research, and the content of this study, were determined solely by RiskAnalytica. The research was conducted by Paul Smetanin, Douglas McNeil, and Charles Burger.

Statistics Canada data and relevant literature was used to inform the computer simulation models used to produce the results of this report.

We would like to thank CFHI staff and external advisors for the work they provided in collecting and interpreting data on the collaboratives.

The interpretation and reporting of the results of the mathematical modelling contained within this report are those of the authors and do not necessarily represent the policy position or the opinion of the Canadian Foundation for Healthcare Improvement or Health Canada. Forecasts and research often involve numerous assumptions and data sources, and are subject to inherent risks and uncertainties. This information is not intended as specific investment, accounting, legal, or tax advice.

The report was written by RiskAnalytica and translated by CFHI.

EXECUTIVE SUMMARY

INTRODUCTION AND SCOPE

The Canadian Foundation for Healthcare Improvement (CFHI) identifies proven innovations and accelerates their spread across Canada by supporting healthcare organizations to adapt, implement, and measure improvements in patient care, population health, and value-for-money. Through its *Spreading Healthcare Innovations Initiative*, CFHI has focused on spreading healthcare delivery practices that address the gaps in the quality of patient care (Canadian Foundation for Healthcare Improvement, 2015). The Initiative spreads proven innovations across Canada through a team-based approach to improvement. It began with two innovations:

(1) The INSPIRED Approaches to COPD: Improving Care and Creating Value Collaborative (the INSPIRED collaborative); and
(2) The Reducing Antipsychotic (AP) Medication Use in Long-Term Care Collaborative.

A third innovation collaborative has just been launched but it is not part of this analysis. This analysis will focus on the innovation that led to the INSPIRED collaborative.

CFHI, in partnership with Boehringer Ingelheim Canada Ltd., led the INSPIRED collaborative involving 19 teams from more than 78 organizations (across acute, community, primary health and home care as well as private industry) from every province in Canada. By educating patients and family members as part of a chronic obstructive pulmonary disease (COPD) action plan and self-management support as well as providing reliable access to out-of-hospital (or post-discharge) clinical assessment and advice, this collaborative has helped reduce the burden on hospital emergency rooms (ER) and inpatient care.

The INSPIRED collaborative is based on the INSPIRED COPD Outreach Program™ (INSPIRED-Halifax) from the Nova Scotia Health Authority in Halifax. **INSPIRED** stands for **I**mplementing a **N**ovel and **S**upportive **P**rogram of **I**ndividualized care for patients and families Living with **RE**spiratory **D**isease. INSPIRED-Halifax is a holistic, proactive, hospital-to-home form of care, providing specialized support to patients and families living with late-stage chronic obstructive pulmonary disease (COPD). Services include self-management education, action plans, psychosocial and spiritual care support, and advance care planning (Rocker & Verma, 'INSPIRED' COPD Outreach Program™: Doing the Right Things Right, 2014).

The purpose of this analysis is to provide an independent evaluation of the potential net benefit and cost effectiveness of CFHI's pan-Canadian expansion of INSPIRED-Halifax. Using RiskAnalytica's Life at Risk simulation platform, as well as evidence collected from INSPIRED-Halifax, a scenario analysis was conducted to evaluate the impact that the program would have on Canada and all ten provinces if it were scaled up.

INSPIRED Program

Over the first five years, an INSPIRED program implemented across Canada (hereafter referred to as the "INSPIRED program") could have an average annual enrollment of 5,800 patients who exhibit similar healthcare utilization patterns to those seen in INSPIRED-Halifax (roughly 0.4% of the patients in Canada with COPD). Over the 30 years of the analysis, the INSPIRED program could have an average annual enrollment of 14,000 patients. Table 1 illustrates the potential healthcare resource prevention due to the INSPIRED program after five years and after 30 years.

Table 1 5-Year and 30-Year Healthcare Resource Utilization Results of the INSPIRED Program

	Average Annual Prevention			Total Prevention		
	ER Visits	Hospitalization	Bed Days	ER Visits	Hospitalization	Bed Days (Millions)
5-Year Results	13,700	8,800	80,500	68,500	44,100	0.4
30-Year Results	33,000	21,300	194,000	992,000	639,000	5.8

After five years, the INSPIRED program could prevent 9% of ER visits, 9% of hospitalizations, and 9% of bed days. After 30 years, the program could prevent 17% of ER visits, 17% of hospitalizations, and 16% of bed days.

The reduction in healthcare utilization will not only alleviate pressure on the healthcare system by freeing up available healthcare resources; it could also translate into a prevention of healthcare costs. After five years, the program could prevent a total of:

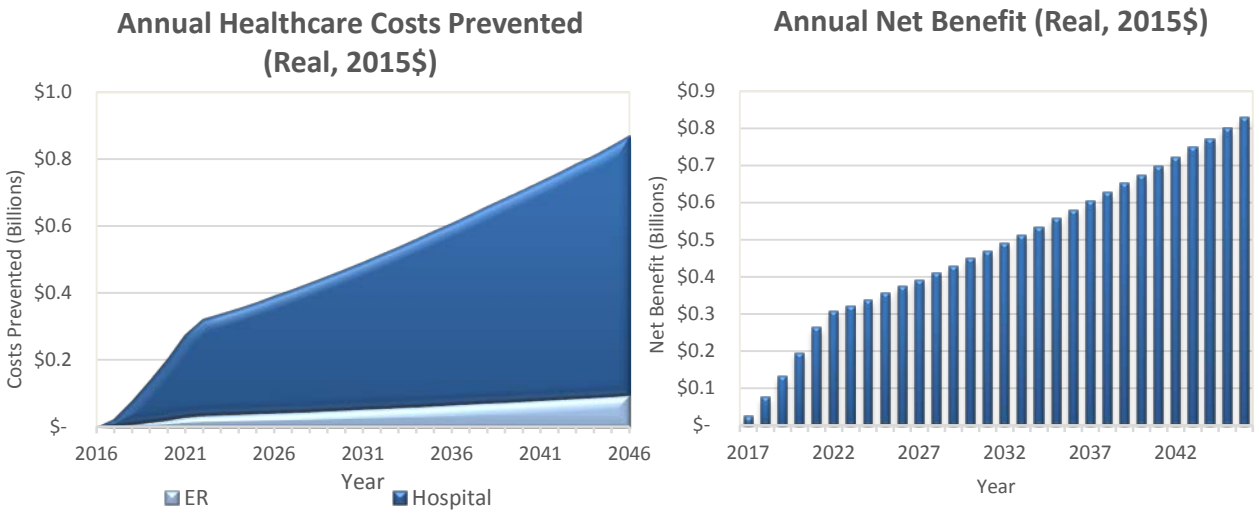
- $79 million in ER costs (Real, 2015$), a 9% reduction; and
- $644 million in hospital costs (Real, 2015$), a 10% reduction.

After 30 years, the program could prevent a total of:

- $1.7 billion in ER costs (Real, 2015$), a 17% reduction; and
- $13.4 billion in hospital costs (Real, 2015$), an 18% reduction.

The left graph in Figure 1 demonstrates the annual healthcare costs prevented across ERs and hospitals.

Figure 1 Annual Healthcare Costs Prevented and Net Benefit (Real, 2015$): INSPIRED Program



The graph on the right of Figure 1 shows the annual net benefit of the INSPIRED program over the next 30 years. Even after five years, there could be an average annual net benefit of $138 million (Real, 2015$), and a cumulative total net benefit over those five years of $688 million (Real, 2015$).

After 30 years, even with an average annual program cost of $24 million (Real, 2015$), the INSPIRED program could achieve an annual average net benefit of $478 million (Real, 2015$), and a total net benefit of $14.3 billion (Real, 2015$) by 2046. For every $1 invested in the INSPIRED program, $21 (Real, 2015$) in healthcare costs could be prevented. Moreover, the average annual net benefit per eligible COPD patient enrolled could amount to $34,000 (Real, 2015$) in costs prevented.

CONCLUSIONS

Over the next 30 years, expanding the INSPIRED program across Canada could reduce healthcare resource utilization; specifically, it could reduce ER and hospital use by a cumulative total of 1.6 million visits. The total costs prevented through a reduction in ER visits and hospitalizations are estimated at $15 billion (Real, 2015$). This could achieve a total net benefit of $14.3 billion (Real, 2015$). A breakdown of the average annual outcomes of the program is shown in Table 2.

Table 2 Summary Results (Average Annual)

Cumulative Impacts	Average Annual	Cumulative Total
Population Enrolled	14,000	-
ER Visits Prevented	33,000	992,000
Hospitalizations Prevented	21,300	639,000
Bed Days Prevented	194,000	5.8 Million
ER Costs Prevented (Millions, Real, 2015$)	55	1,700
Hospital Costs Prevented (Millions, Real, 2015$)	447	13,400
Program Costs (Millions, Real, 2015$)	24	728
Net Benefit (Millions, Real, 2015$)	478	14,300

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1.0 INTRODUCTION

1.1 BACKGROUND

The Canadian Foundation for Healthcare Improvement (CFHI) identifies proven innovations and accelerates their spread across Canada by supporting healthcare organizations to adapt, implement, and measure improvements in patient care, population health, and value-for-money. CFHI supports organizations across Canada to lead, implement, and spread evidence-informed, patient-centred solutions. CFHI is continuing its role as a supporter and collaborator of healthcare innovation through its *Spreading Healthcare Innovations Initiative*. This initiative is focused on spreading healthcare delivery practices that address the gaps in the quality of patient care (Canadian Foundation for Healthcare Improvement, 2015). It is composed initially of two programs:

- INSPIRED Approaches to COPD: Improving Care and Creating Value (the INSPIRED collaborative); and
- Reducing Antipsychotic Medication Use in Long-Term Care

These programs are designed to help teams from healthcare delivery organizations advance innovation to provide care that is more patient- and family-centered, better coordinated, and more efficient. This analysis will focus on the INSPIRED program, a brief description of which is provided below.

The INSPIRED collaborative is a joint initiative between CFHI and Boehringer Ingelheim Canada Ltd. dedicated to addressing the complex challenges associated with chronic obstructive pulmonary disease (COPD) care. COPD is the leading cause of emergency room (ER) and hospital visits in Canada (Canadian Thoracic Society, 2010). Moreover, it is a leading chronic disease cause of hospital readmission with 18% of COPD patients being readmitted once and 14% being readmitted twice within the year (Canadian Thoracic Society, 2010). In comparison, only 7% of patients admitted to the hospital for hypertension were readmitted once, and 2% were readmitted twice within the year. The INSPIRED collaborative supported 19 teams from more than 78 organizations (across acute, community, primary health and home care as well as private industry) from every province in Canada to reduce the burden on hospital emergency rooms and inpatient care.

The INSPIRED COPD Outreach Program™ (INSPIRED-Halifax) - on which the INSPIRED collaborative is based - aims to provide a more holistic patient care experience by providing specialized care and support to patients and families living with COPD. The program includes self-management education, action plans, psychosocial and spiritual care support, and advance care planning. The program's goal is to ensure the continuation of quality patient care while reducing the reliance on hospital-based care and

containing costs. Initially started at the Queen Elizabeth II Health Sciences Centre (QEII HSC) in Halifax, the INSPIRED-Halifax has shown promising improvements in reducing healthcare resource utilization. After 6 months in the program, COPD patients within the pilot project reduced their ER visits by 60%, had 63% fewer hospital admissions, spent 62% fewer days in the hospital, and reduced the number of COPD patients who are admitted twice or more in six months (Rocker & Verma, 2014).

1.2 Scope of the Analysis

The purpose of this analysis is to provide an independent modelling of the net benefit and cost effectiveness of the proposed Canadian expansion of the INSPIRED-Halifax across the country. In order to create a business case for scale, RiskAnalytica will undertake the analysis with the primary objective of demonstrating how healthcare utilization and intervention costs (e.g. costs of the programs) change in response to the expansion of the programs. Using RiskAnalytica's Life at Risk simulation platform, a model will be generated to evaluate the impact of the original INSPIRED-Halifax program on healthcare resources. This will subsequently provide policy and decision makers with the necessary evidence as well as understanding and insight into the value of CFHI's interest in working with partners to scale these programs.

The impact of expanding the original INSPIRED-Halifax will be evaluated based on the costs and/or costs prevented on healthcare utilization associated with:

- ER Visits
- Hospital Visits
- Hospital Bed Days

This analysis sets out the business case for a potential expansion of these programs for all of Canada, with a focus on the impact of the expanded program on Canada as a whole. Appendix B provides provincial summaries for Ontario, Quebec, British Columbia, Alberta, Manitoba, Nova Scotia, New Brunswick, Prince Edward Island, Saskatchewan, and Newfoundland and Labrador.

2.0 METHODOLOGY

The following section contains details about the methodology of the simulation and the assumptions that were used to generate the model.

2.1 MODEL METHODOLOGY

This analysis was done using a numerical model combining data from several sources:

- Population and demographic projections (including the number of seniors) and future COPD prevalence were taken from the full Life at Risk platform, RiskAnalytica's agent-based, event-driven simulation engine for tracking population health.
- Age and sex-specific data on hospitalizations were taken from the Canadian Institute for Health Information (CIHI);
- Age and sex-specific data on emergency room visits were taken from the National Ambulatory Care Reporting System (NACRS);
- Resident counts for LTC patients across Canada were taken from Statistics Canada; and
- Data on the effects of the INSPIRED-Halifax was provided by the Canadian Foundation for Healthcare Improvement (CFHI).

For each scenario in each program, the relevant population was divided into non-enrolled and enrolled subgroups, where the non-enrolled population generated healthcare events and corresponding costs at the base rate, and the enrolled population at the program intervention rate.

2.2 MODEL ASSUMPTIONS

2.2.1 STATUS QUO

Under the Status Quo (baseline) scenario, there will be no expansion of INSPIRED-Halifax. In this scenario, we assume that COPD patients use the same treatment routes and have the same utilization..

2.2.2 RAMP-UP PERIOD

The ramp-up period takes place during the first five years of the program expansion. At the end of this period, individuals who are eligible for the program will be enrolled. A five-year ramp-up period is used throughout this simulation, with sensitivity analysis conducted in order to measure the impact of the program with a 10-year ramp-up scenario.

2.2.3 PROGRAM COVERAGE

The program coverage fraction is an overall scenario parameter that describes what fraction of the target population is enrolled in the program. It varies from 0 (the base case of no intervention) to 1 (complete coverage). In the complete coverage scenario, everyone who is eligible for the program will be enrolled following the 5-year ramp-up period. Although the results in this report are reported under the assumption of full coverage ("1"), sensitivity analysis was conducted on the program enrollment. Other coverage parameters used in the sensitivity analysis include 0.25, 0.5 and 0.75.

2.2.4 INSPIRED

Prior to simulating the impact of INSPIRED-Halifax in Canada and select provinces, a set of assumptions needed to be made regarding the population that would be impacted by the program, the base rates of healthcare utilization and costs incurred by COPD patients, and intervention rates following program roll-out. These assumptions are outlined below:

2.2.4.1 TARGET POPULATION

- **COPD Population:** We used the Life at Risk projections for the population and expected COPD prevalence (using a value of about 7% for today over the entire population). These projections incorporate the growth in the total number of Canadians and the aging of the population, as well as an expected continued decrease in smoking rates.

  Note, however, that the total number of people with COPD does not actually affect the net benefits of the program: that instead scales with the number of people actually enrolled. While it is believed that COPD is significantly underdiagnosed (Evans, Chen, Camp, Bowie, & McRae, 2014), the fraction of persons with COPD who are both undiagnosed and high-utilizers is likely to be low, and no one who does not have a diagnosis of COPD is eligible for the INSPIRED program in any event.

- **Eligible Population:** This assumption defines the fraction of the COPD population that is eligible to be enrolled in the INSPIRED program. This fraction is somewhat difficult to estimate.

The INSPIRED participants are known to have high utilization rates even among those who are hospitalized, and so their utilization rates cannot be naively extrapolated to the COPD population as a whole. (For example, at 2.4 hospitalizations per year, it takes only 35,000 people to explain all of the expected 85,000 hospitalizations in 2016, leaving no hospitalizations for anyone else.) We also know that the resource utilization is dominated by people at GOLD levels of 3 and 4[1]. GOLD 1 is least severe, while GOLD 4 is the most severe.

We choose to parameterize the problem by the fraction of the total resources consumed by patients who used resources at the same levels seen in data for INSPIRED-Halifax, which we take as 20%, 30%, or 40%. This leads to eligibility fractions of 0.26%, 0.4%, and 0.53% where the denominator is all COPD patients. These are quite small numbers absolutely, but if resource use is dominated by GOLD 3 and 4 patients who account for only 6% (Evans, Chen, Camp, Bowie, & McRae, 2014) of COPD sufferers, this amounts to between 4-9% of the *hospitalized* patients being responsible for roughly 20-40% of the hospitalizations, which is reasonable. The larger the fraction of the total resources we are willing to attribute to people consuming them at rates similar to those seen in the INSPIRED population, the higher the eligibility fraction can become without contradicting published counts.

Note that once we have decided how much of the resource use can be attributed to a population resembling the INSPIRED sample, the eligibility fraction we choose can only affect the program cost (which scales with the number of people), not the total resource use prevented (which is fixed by the total we assume and the fractional decrease observed by the INSPIRED trial). As long as the program cost is much less than the amount saved by avoiding hospitalization and emergency room visitation, which it is, the program will result in a substantial net benefit, independent of the specifics of these assumptions.

[1] GOLD classifications are the guidelines used to describe the severity of chronic obstructive pulmonary disease (COPD). It is based on measurements of airflow using spirometry and is broken down into 4 stages: mild (stage 1), moderate (stage 2), severe (stage 3), and very severe (stage 4). (Global Initiative for Chronic Obstructive Lung Disease, 2015).

2.2.4.2 PROGRAM RATES

The base case rates and the intervention rates describing healthcare utilization and costs are outlined in Table 3. These rates reflect the healthcare utilization and costs of the population with COPD, described in the "Eligible Population" in the section above (Section 2.2.4.1). In the absence of more specific information, we assume that the costs for ER visits, hospital visits, and the program will grow at the standard real, annual rate of 2.5%.

Table 3 INSPIRED Base Case and Program Rates (for INSPIRED-Halifax)

	Base Case Rates	Intervention Rates
Emergency Room Visits (per person per year)[2]	4.1	1.74
Emergency Room Costs (Mittmann, et al., 2008)	$688.21 per visit (2006 CAD$)	
Hospital Visits (per person per year)[3]	2.4	0.88
Hospital Costs (Mittmann, et al., 2008)	$8,669 per visit (2006 CAD$)	
Hospital Length of Stay (Bed days rate per person per year)[4]	23	9.14
Program Costs (per participant)[5]	N/A	$1,068.70

The costs included in the calculation of the INSPIRED program cost (per participant) were site-specific costs and were obtained from Rocker et al., 2015 study (Rocker G. , Verma, Demmons, & Mittmann, 2015). Example of these costs include spiritual care practitioners, respiratory therapist educators, coordinator/evaluators, medical director/respirologists, and program overhead (travel, supplies, etc.) (Rocker G. , Verma, Demmons, & Mittmann, 2015).

[2] Values calculated from the INSPIRED-COPD-Jun2015 PPT, slide 5. $Rate_{Base}$ = (365/178)*2 = 4.1 visits per person per year and $Rate_{Intervention}$ = (154/178)*2 = 1.74

[3] Values taken from the INSPIRED-COPD-Jun2015 PPT, slide 5. $Rate_{Base}$ = (210/178)*2 = 2.4 and $Rate_{Intervention}$ = (79/178)*2 = 0.88 visits per person per year visits per person per year

[4] Values taken from the INSPIRED-COPD-Jun2015 PPT, slide 5. $Rate_{Base}$ = (2044/178)*2 = 23 and $Rate_{Intervention}$ = (813/178)*2 = 9.14 days per person per year.

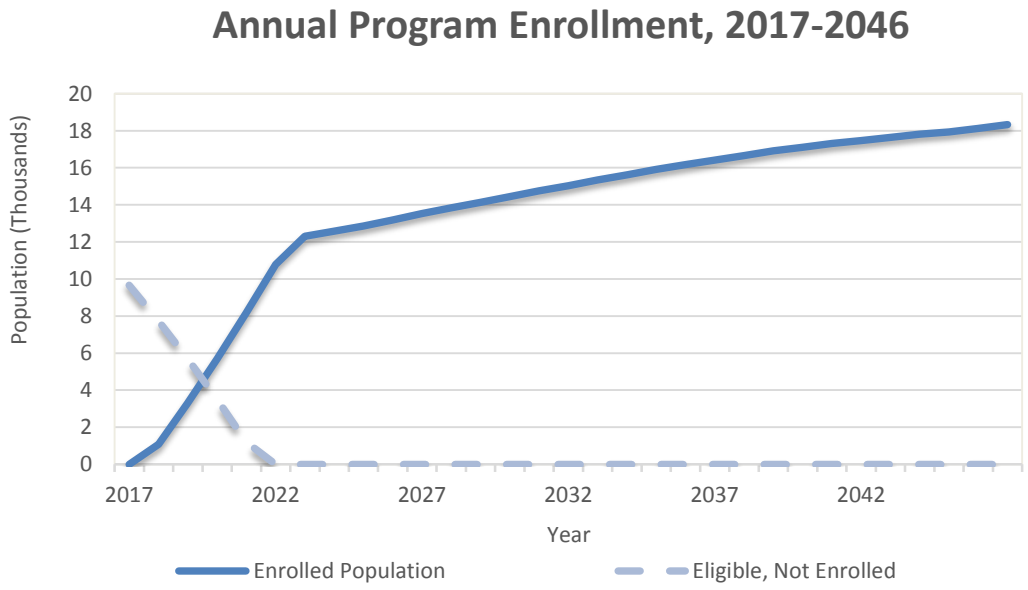
[5] (Rocker G. , Verma, Demmons, & Mittmann, 2015)

3.0 RESULTS – INSPIRED PROGRAM

3.1 PROGRAM ENROLLMENT

The target population for the INSPIRED program represents approximately 0.4% of all COPD patients. The enrollment in the program is shown in Figure 2. The dark blue line represents the enrolled population. The steep increase in enrollment from 2017-2021 represents the 5-year ramp-up period. Enrollment during this period could increase from 1,000 to 10,800. The average annual enrollment during the 5-year ramp-up period could be 5,800. The light blue dashed line represents the population that is eligible but not yet enrolled. By the end of the 5-year ramp-up period, this population reaches zero as all eligible COPD patients going forward will be enrolled. From 2022 onwards, the enrollment begins to increase gradually as the enrolled population reaches a steady state. Over the 30-year analysis period, an annual average of 14,000 COPD patients could be enrolled in the program[6].

Figure 2 Annual INSPIRED Enrollment in Canada



Provincial enrollment varies depending on the population with COPD. As expected, Ontario contains the largest average annual enrollment with just under 5,500 COPD patients enrolled per year over the 30-year timeframe. Prince Edward Island, with the smallest population with COPD, will enroll an average of 60 patients per year over the analysis period.

[6] Under a 10 year ramp-up period, the program will enroll an average of 13,000 COPD patients per year.

3.2 Healthcare Utilization

Table 4 and 0 show the total and average annual healthcare utilization benefits of the INSPIRED program after 5 years and after 30 years. Over the next 5 years, the INSPIRED program could prevent just over 68,500 ER visits, 44,100 hospitalizations, and 401,000 bed days related to COPD. ER visits represent the majority of the healthcare visits prevented by the INSPIRED program at 61%, while hospitalizations represent the other 39%. Over the next 30 years, the INSPIRED program could prevent just under 992,000 ER visits, 639,000 hospitalizations, and 5.8 million bed days related to COPD.

Table 4 5-Year INSPIRED Healthcare Utilization Prevented in Canada

	Healthcare Utilization Prevented		
	Total (by 2021)	Average Annual	Proportion of COPD Healthcare Utilization
Emergency Room Visits	68,500	13,700	9%
Hospitalizations	44,100	8,800	9%
Bed Days	402,000	80,500	9%

Table 5 30-Year INSPIRED Healthcare Utilization Prevented in Canada

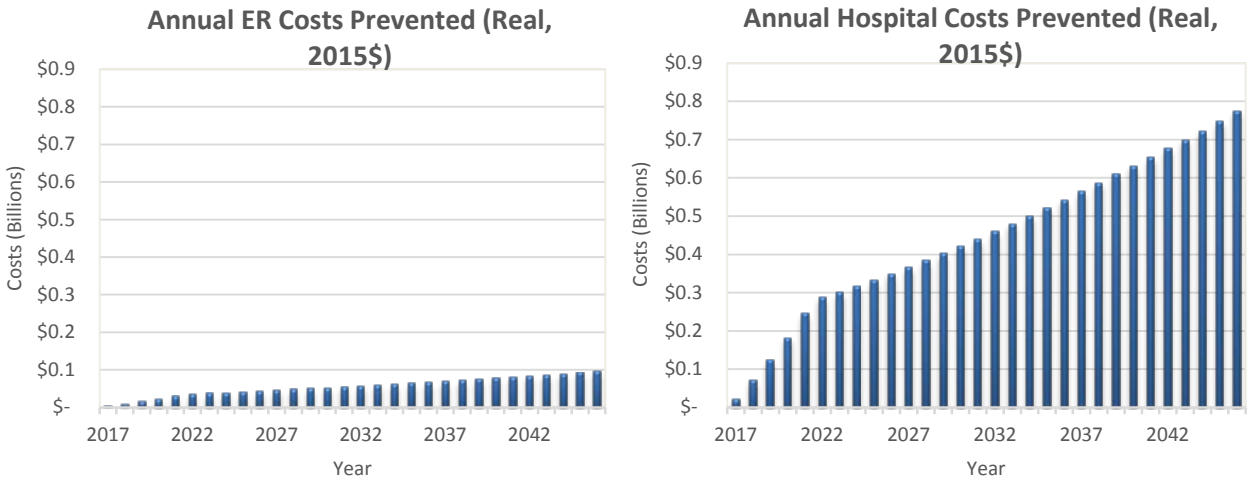
	Healthcare Utilization Prevented		
	Total (by 2046)	Average Annual	Proportion of COPD Healthcare Utilization
Emergency Room Visits	992,000	33,000	17%
Hospitalizations	639,000	21,000	17%
Bed Days	5.8 Million	194,000	16%

Although the population that is eligible for the INSPIRED program represents a very small proportion of the patients with COPD (0.4%), they are considered the highest users of healthcare resources. The utilization of healthcare resources prevented after 5 years and after 30 years by the INSPIRED program represents 9% and 16-17% of COPD resource use, respectively, across ERs and hospitals in Canada. Given that the eligible population represents 0.4% of the COPD population, the program is able to disproportionately prevent healthcare resource use. Over the next 30 years, relative to the population proportions, the proportion of healthcare utilization prevented by the program is 43 times greater.

3.3 Healthcare Utilization Costs

Prevented healthcare utilization could translate into $723 million (Real, 2015$) and $15 billion (Real, 2015$) in prevented healthcare costs over the next five and 30 years, respectively. Figure 3 shows the breakdown of these annual costs prevented by ER (left) and hospital (right).

Figure 3 Annual Healthcare Utilization and Costs Prevented (Real, 2015$) in Canada



The prevented ER visits could result in total ER costs prevented of $79 million (Real, 2015$) by 2021, or an average annual cost prevention of $16 million (Real, 2015$). This is a reduction in ER costs by 9%. Total hospital costs prevented amount to $644 million (Real, 2015$) over the next 5 years, or an average annual cost prevention of $129 million (Real, 2015$). This is a 10% reduction in the hospitalization costs relative to the base case.

After 30 years, the prevented ER visits could result in total ER costs prevented of $1.7 billion (Real, 2015$) by 2046, or an average annual cost prevention of $55 million (Real, 2015$). This is a reduction in ER costs by 17%. Total hospital costs prevented amount to $13.4 billion (Real, 2015$) over the next 30 years, or an average annual cost prevention of $447 million (Real, 2015$). This is an 18% reduction in the hospitalization costs relative to the base case.

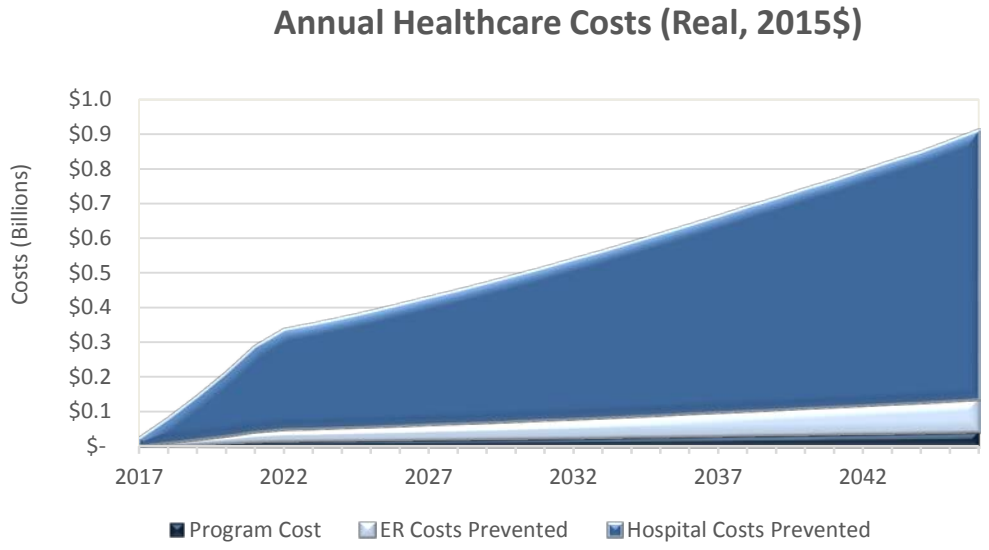
Although the ER visits prevented represented the majority of the healthcare resource use prevented, the opposite is true with respect to healthcare costs due to the much greater of costs of hospitalization; The cost of a hospitalization is approximately $8,669 (2006$) compared to $688.21 (2006 CAD$) for a

visit to an ER (Mittmann, et al., 2008). Hospital-related costs represent 89% of the total healthcare costs prevented, while ER costs prevented represent the other 11%.

3.3.1 NET BENEFIT

Over the next 30 years, the INSPIRED program will prevent a total of 1.6 million healthcare visits, further preventing a total of $15 billion (Real, 2015$) in healthcare costs. The net benefit of the program is calculated by the difference between the healthcare costs prevented and the program costs. At around $1,000 per COPD patient, the INSPIRED program is expected to cost a total of $35 million (Real, 2015$) after the first five years and $728 million (Real, 2015$) over the next 30 years, or an average annual cost of $7 million (Real, 2015$) and $24 million (Real, 2015$), respectively. Figure 4 illustrates the scale of the program costs in relation to the costs prevented by the program; the program costs represent only 5% of the healthcare costs prevented.

Figure 4 Annual Healthcare Costs Prevented/Incurred (Real, 2015$) in Canada

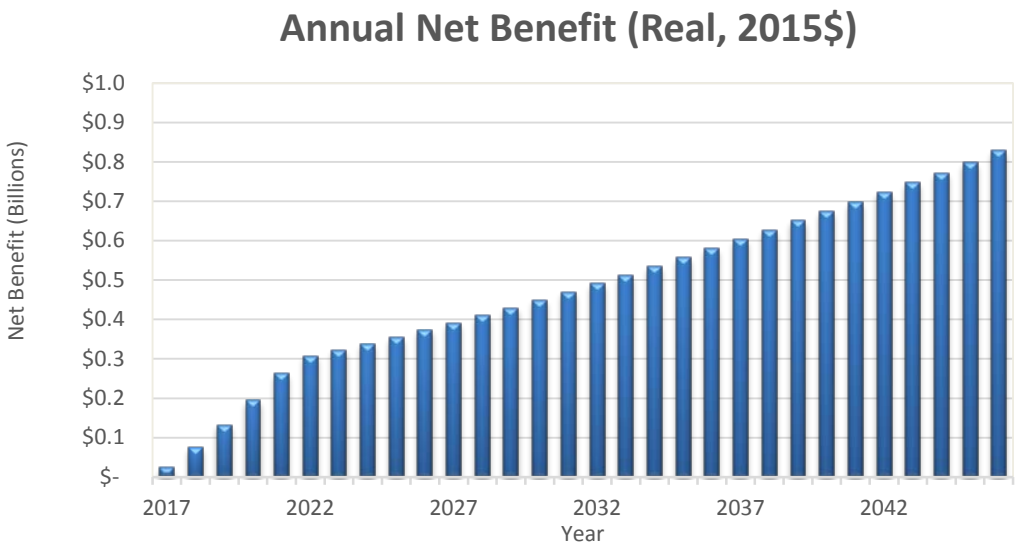


Taking all these factors into consideration, it is estimated that the INSPIRED program will have a total net benefit, over the next 30 years, of $14.3 billion (Real, 2015$) under a 5-year ramp-up period[7]. This is an average annual benefit of $478 million (Real, 2015$). Over the first five years of the INSPIRED program, there could be a total net benefit of $688 million (Real, 2015$), an average annual net benefit of $138 million (Real, 2015$). The annual benefit each year of the program is shown in Figure 5. For

[7] Under a 10 year ramp-up period, the total net benefit from the INSPIRED program is estimated to be $13.6 billion (Real, 2015$), or an average annual net benefit of $453 million (Real, 2015$).

every $1 invested in the INSPIRED program, $21 (Real, 2015$) could be prevented in healthcare utilization costs. Moreover, the average annual net benefit per eligible COPD patient enrolled is $34,000 (Real, 2015$).

Figure 5 Annual INSPIRED Net Benefit (Real, 2015$) in Canada



3.4 PROVINCIAL ANALYSIS

The impact of rolling out INSPIRED-Halifax throughout the following provinces was evaluated: Alberta, British Columbia, Manitoba, New Brunswick, Newfoundland and Labrador, Nova Scotia, Ontario, Prince Edward Island, Quebec, and Saskatchewan. Table 6 provides the summary of the enrollment, healthcare utilization, healthcare costs prevented, program costs, and net benefit across the ten provinces.

Table 6 INSPIRED Provincial Summaries (Annual Averages)

Provinces	Enrollment	Healthcare Utilization		Healthcare Costs Prevented (Millions, Real 2015$)		Program Cost (Millions, Real 2015$)	Net Benefit (Millions, Real 2015$)
		ER	Hospital	ER	Hospital		
Alberta	1,400	3,300	2,100	5.5	45	2.4	48
British Columbia	2,000	4,700	3,000	7.9	63.8	3.5	68
Manitoba	450	1,000	700	1.8	14	0.8	15
New Brunswick	300	740	500	1.2	10	0.5	10.5
Newfoundland and Labrador	200	470	300	0.8	6.3	0.3	6.8
Nova Scotia	400	900	600	1.5	12	0.7	13
Ontario	5,500	13,000	8,300	21	174	9.5	186
Prince Edward Island	60	150	100	0.3	2	0.1	2.2
Quebec	3,400	7,900	5,100	13	107	5.8	114
Saskatchewan	400	900	560	1.5	11.8	0.6	12.6

The biggest impact is seen in Ontario, where an average of 5,500 COPD patients will be enrolled in the program each year, approximately 39% of the national enrollment, producing an average annual net benefit of $186 million (Real, 2015$) over the next 30 years. The smallest impact is seen in Prince Edward Island, where average annual enrollment is 60 COPD patients per year. However, a net benefit of the program is still achieved with average annual value added of $2.2 million (Real, 2015$). It is important to note that every province produces a net benefit from the program over the next 30 years.

3.5 Sensitivity Analysis

Sensitivity analysis was conducted on both the program coverage and the program eligibility. Program coverage was varied from 0.25 to 1 in order to measure the impact of program coverage on the net benefit of the program. Program eligibility was varied from 0.26% to 0.53% in order to see the impact of increasing the proportion of the COPD population that resembles the INSPIRED population.

Table 7 shows how the average annual program enrollment, prevented healthcare utilization, prevented healthcare costs, program costs, and net benefit of the program vary by the ability of the INSPIRED program to enroll all eligible participants. Program eligibility in this analysis is kept at 0.4%. At the lowest program coverage, where only 25% of the eligible population is enrolled in the program, the INSPIRED program still has a net benefit of $119 million (Real, 2015$) annually, over the next 30 years. At a 50% coverage, the program will have an average annual net benefit of $239 million (Real, 2015$).

Table 7 Program Coverage Sensitivity Analysis, Average Annual Results (Real, 2015$)

Coverage	Program Enrollment	ER Visits Prevented	Hospitalizations Prevented	Bed Days Prevented	Healthcare Costs Prevented (Millions, Real, 2015$)	Program Costs (Millions, Real, 2015$)	Net Benefit (Real, 2015$)
0.25	3,500	8,300	5,300	49,000	125	6	119
0.5	7,000	16,500	10,700	97,000	251	12	239
0.75	10,500	25,000	16,000	146,000	376	18	358
1	14,000	33,000	21,000	194,000	502	24	478

Table 8 illustrates how the average annual program enrollment, prevented healthcare utilization, prevented healthcare costs, program costs, and net benefit of the program vary by the size of the COPD population that is eligible for the program. The program coverage in this sensitivity analysis is maintained at 1. The program eligibility value varied from 0.26% to 0.53%. As was mentioned previously, because the eligible population for the INSPIRED program are such high utilizers of healthcare resources, even minimal increases in the eligible population produces a large change in the net benefit of the program. Moreover, their large resource use means that even with only 0.26% of COPD patients being eligible for the program, it still maintains an average annual net benefit of $310 million (Real, 2015$).

Table 8 Program Eligibility Sensitivity Analysis, Average Annual Results (Real, 2015$)

Eligibility	Program Enrollment	ER Visits prevented	Hospitalizations Prevented	Bed Days Prevented	Healthcare Costs Prevented (Millions, Real, 2015$)	Program Costs (Millions, Real, 2015$)	Net Benefit (Millions, Real, 2015$)
0.26%	9,100	21,500	13,800	126,000	326	16	310
0.4%	14,000	33,000	21,000	194,000	502	24	478
0.53%	18,600	44,000	28,000	257,000	665	32	633

Table 9 shows the possible average annual net benefit of the INSPIRED program when we vary both the program coverage (0.25, 0.50, 0.75, and 1) and the program eligibility (0.26%, 0.4%, and 0.53%). At the lowest parameters, a 25% coverage and 0.26% eligibility, the program still maintains a substantial average annual net benefit of $78 million (Real, 2015$). At the highest possible coverage (100%) and eligibility (0.53%), the program has potential annual net benefits of $633 million (Real, 2015$). At a 50% coverage and 0.4% eligibility, the program has an average annual net benefit of $239 million (Real, 2015$).

Table 9 Program Coverage and Eligibility Sensitivity Analysis, Average Annual Results (Real, 2015$)

Net Benefit (Millions, Real, 2015$)	Program Coverage			
Eligibility	0.25	0.5	0.75	1
0.26%	78	155	233	310
0.4%	119	239	358	478
0.53%	158	316	475	633

4.0 CONCLUSIONS

The purpose of this report was to estimate the potential impact of expanding the INSPIRED-Halifax program to all eligible patients across Canada – beyond its initial expansion by the Canadian Foundation for Healthcare Improvement's Spreading Healthcare Innovations Initiative. INSPIRED targets high-utilization COPD patients. The program has shown substantial increases in the cost effectiveness of treatment delivery and deserve further study.

After the first five years, the INSPIRED program could have an average annual enrollment of 5,800 COPD patients. This could results in a prevention of 68,500 ER visits, 44,100 hospitalizations, and 402,000 bed days related to COPD. This could translate into a healthcare cost prevention of $79 million (Real, 2015$) in ER costs and $644 million (Real, 2015$) in hospital costs by 2021. By 2021, the INSPIRED program could achieve a total net benefit of $688 million (Real, 2015$), an average annual net benefit of $138 million (Real, 2015$) over those five years.

Over the next 30 years, the INSPIRED program could have an average annual enrollment of 14,000 COPD patients if extend across Canada. Although the enrolled population only represents 0.4% of the total COPD population in Canada, it represents just over 30% of the utilization of COPD patients. By focusing on this small population, over the next 30 years, the INSPIRED program could prevent 16-17% of COPD-related ER visits, hospitalizations, and bed days. This represents a total of 992,000 ER visits, 639,000 hospitalizations, and 5.8 million bed days. This reduction in healthcare resource utilization could prevent a total of $15 billion (Real, 2015$) in healthcare costs over the next 30 years. This is an average annual cost prevention of $502 million (Real, 2015$). Even with an average annual program cost of $24 million (Real, 2015$) (approximately $1,000 per participant enrolled), the INSPIRED program could have a total net benefit of $14.3 billion (Real, 2015$) by 2046 (average annual benefit of $478 million (Real, 2015$)). For each $1 invested in the INSPIRED program, $21 (Real, 2015$) in healthcare costs can be prevented. The average annual net benefit for each eligible COPD participant enrolled is $34,000 (Real, 2015$).

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B. INSPIRED PROVINCIAL ANALYSIS

B.1. ALBERTA

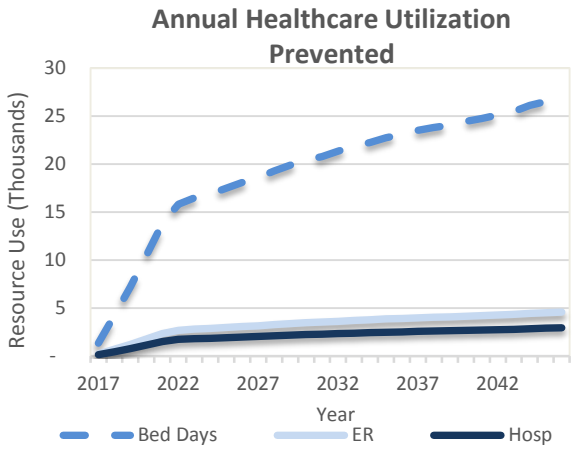
Over the first five years, the INSPIRED approach to COPD care could have an average annual enrollment of 540 patients who exhibit similar healthcare utilization patterns to those seen in the INSPIRED-Halifax program (roughly 0.4% of the patients with COPD). Over the 30 years of the analysis, the INSPIRED program could have an average annual enrollment of 1,400 COPD patients in Alberta. Table 10 illustrates the healthcare resource prevention due to the INSPIRED program after five years and after 30 years.

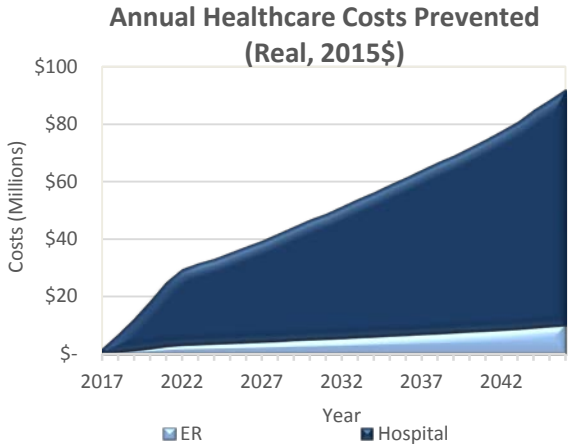
Table 10 5-Year and 30-Year Healthcare Resource Utilization Results of the INSPIRED Program in Alberta

	Average Annual Prevention			Total Prevention		
	ER Visits	Hospitalization	Bed Days	ER Visits	Hospitalization	Bed Days
5-Year Results	1,300	800	7,400	6,300	4,100	37,000
30-Year Results	3,300	2,100	19,400	99,000	64,000	583,000

The left graph in Figure 6 shows the potential reduction in healthcare utilization across ERs, hospitals, and bed days in Alberta. After five years, the INSPIRED program could prevent 9% of ER visits, 9% of hospitalizations, and 9% of bed days. After 30 years, the program could prevent 17% of ER visits, 17% of hospitalizations, and 16% of bed days.

Figure 6 Annual Healthcare Utilization and Costs (Real, 2015$) Prevented in Alberta





The reduction in COPD-related healthcare utilization could translate into a reduction in healthcare costs. The graph on the right of Figure 6 illustrates the reduction in healthcare costs across the ER and hospitals due to the INSPIRED program. Over the next 5 years, the INSPIRED program in Alberta could prevent a total of:

- $7 million (Real, 2015$) in COPD-related ER costs (an average annual prevention of $1.5 million (Real, 2015$)), an reduction of 9%; and
- $59 million (Real, 2015$) in COPD-related hospital costs (an average annual prevention of $12 million (Real, 2015$)), a reduction of 10%.

Over the next 30 years, the INSPIRED program in Alberta is expected to prevent a total of:

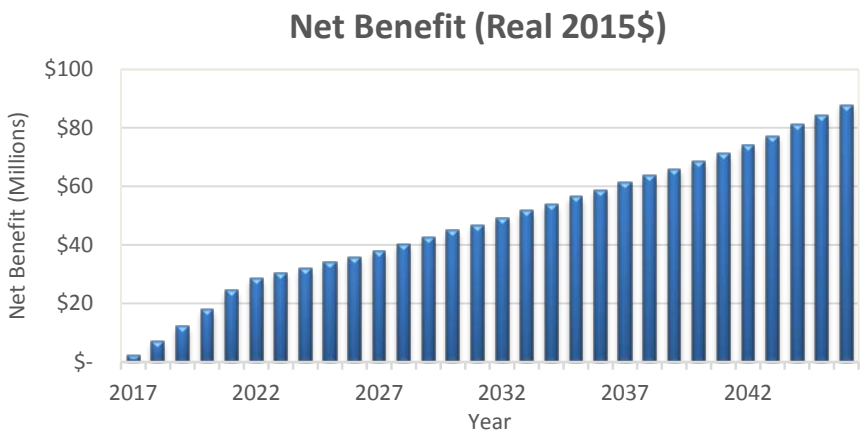
- $166 million (Real, 2015$) in COPD-related ER costs (an average annual prevention of $6 million (Real, 2015$)), a reduction of 17%; and
- $1.35 billion (Real, 2015$) in COPD-related hospital costs (an average annual prevention of $45 million (Real, 2015$)), a reduction of 18%.

The healthcare costs prevented in Alberta represent 10% of the healthcare costs prevented by the INSPIRED program in Canada.

Figure 7 shows the annual net benefit of the program in Alberta. Over the next five years, the INSPIRED program could have a total net benefit of $64 million (Real, 2015$) in Alberta. This is an average annual net benefit of $13 million (Real, 2015$). Over the next 30 years, the INSPIRED program could have a total net benefit of $1.4 billion (Real, 2015$) and an average annual net benefit of $48 million (Real, 2015$) in Alberta[8].

[8] Under a 10-year ramp-up period, the total net benefit of the INSPIRED program in Alberta could be $1.37 billion (Real, 2015$), an average annual net benefit of $46 million (Real, 2015$), over the next 30 years.

Figure 7 Annual Net Benefit (Real, 2015$) in Alberta



For every $1 invested in the INSPIRED program in Alberta, $21 (Real, 2015$) are saved in healthcare utilization costs. Moreover, the average annual net benefit per eligible COPD patient enrolled is $34,000 (Real, 2015$).

SENSITIVITY ANALYSIS

Sensitivity analysis was conducted on both program coverage and program eligibility. Program coverage was varied from 0.25 to 1 in order to measure the impact of coverage on the net benefit of the program. Program eligibility was varied from 0.26% to 0.53% in order to assess the impact of increasing the proportion of the patients with COPD that resemble the INSPIRED population.

Table 11 shows the possible average annual net benefit of the INSPIRED program in Alberta when we vary both program coverage (0.25, 0.50, 0.75, and 1) and program eligibility (0.26%, 0.4%, and 0.53%). At the lowest parameters, a 25% coverage and a 0.26% eligibility, the program could have a substantial average annual net benefit of $8 million (Real, 2015$). At the highest possible coverage (100%) and eligibility (0.53%), the program has potential annual net benefits of $64 million (Real, 2015$). At a 50% coverage and 0.4% eligibility, the INSPIRED program in Alberta could have an average annual net benefit of $24 million (Real, 2015$).

Table 11 Program Coverage and Eligibility Sensitivity Analysis (Average Annual) in Alberta

Net Benefit (Millions, Real, 2015$)	Program Coverage			
Eligibility	0.25	0.5	0.75	1
0.26%	8	16	24	31
0.4%	12	24	36	48
0.53%	16	32	48	64

CONCLUSION

Over the next five years, the INSPIRED program in Alberta is expected to enroll an annual average 540 COPD patients. Over the next 30 years, the INSPIRED program is expected to have an average annual enrollment of 1,400 COPD patients in Alberta. Table 12 shows the five-year and 30-year average annual and cumulative total results of the INSPIRED program in Alberta. For every $1 invested in the INSPIRED program in Alberta, $21 (Real, 2015$) are saved in healthcare utilization costs. Moreover, the average annual net benefit per eligible COPD patient enrolled is $34,000 (Real, 2015$).

Table 12 Average Annual and Cumulative Total Results after 5- and 30-years of the INSPIRED Program in Alberta

	Average Annual Results		Cumulative Total Results	
	5-Years	30-Years	5-Years	30-Years
Healthcare Utilization Prevented (ER visits and Hospitalizations)	2,100	5,400	10,400	163,000
Healthcare Costs Prevented (Millions, Real, 2015$)	13.5	51	66	1,500
Program Cost (Millions, Real, 2015$)	0.7	3	2	73
Net Benefit (Millions, Real, 2015$)	13	48	64	1,400

B.2. BRITISH COLUMBIA (BC)

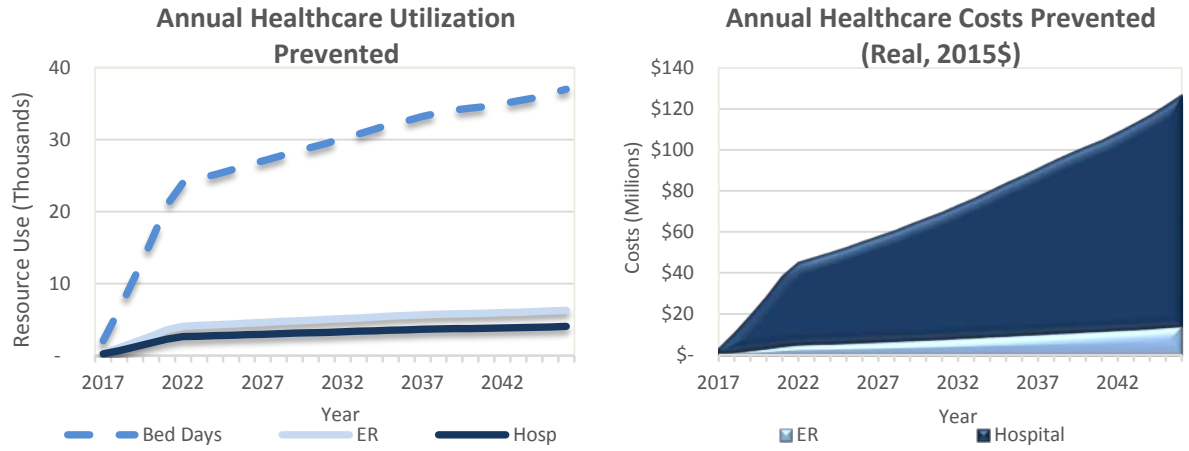
Over the first five years, the INSPIRED approach to COPD care could have an average annual enrollment of 800 patients who exhibit similar healthcare utilization patterns to those seen in the INSPIRED-Halifax program (roughly 0.4% of the patients with COPD). Over the 30 years of the analysis, the INSPIRED program could have an average annual enrollment of 2,000 COPD patients in British Columbia. Table 13 illustrates the healthcare resource prevention due to the INSPIRED program after five years and after 30 years.

Table 13 5-Year and 30-Year Healthcare Resource Utilization Results of the INSPIRED Program in BC

	Average Annual Prevention			Total Prevention		
	ER Visits	Hospitalization	Bed Days	ER Visits	Hospitalization	Bed Days
5-Year Results	2,000	1,200	11,200	9,600	6,200	56,200
30-Year Results	4,700	3,000	28,000	141,000	91,000	830,000

The left graph in Figure 8 shows the potential reduction in healthcare utilization across ERs, hospitals, and bed days in British Columbia. After five years, the INSPIRED program could prevent 9% of ER visits, 9% of hospitalizations, and 9% of bed days. After 30 years, the program could prevent 17% of ER visits, 17% of hospitalizations, and 16% of bed days.

Figure 8 Annual Healthcare Utilization and Costs (Real, 2015$) Prevented in BC



The reduction in COPD-related healthcare utilization could translate into a reduction in healthcare costs. The graph on the right of Figure 8 illustrates the reduction in healthcare costs across the ER and hospitals due to the INSPIRED program. Over the next 5 years, the INSPIRED program in British Columbia could prevent a total of:

- $11 million (Real, 2015$) in COPD-related ER costs (an average annual prevention of $2 million (Real, 2015$)), an reduction of 9%; and
- $90 million (Real, 2015$) in COPD-related hospital costs (an average annual prevention of $18 million (Real, 2015$)), a reduction of 10%.

Over the next 30 years, the INSPIRED program in British Columbia is expected to prevent a total of:

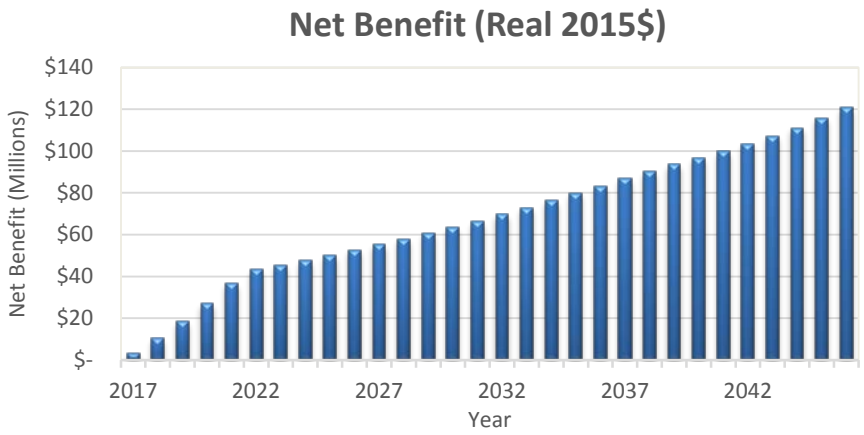
- $236 million (Real, 2015$) in COPD-related ER costs (an average annual prevention of $8 million (Real, 2015$)), a reduction of 17%; and
- $1.9 billion (Real, 2015$) in COPD-related hospital costs (an average annual prevention of $64 million (Real, 2015$)), a reduction of 18%.

The healthcare costs prevented in British Columbia represent 14% of the healthcare costs prevented by the INSPIRED program in Canada.

Figure 9 shows the annual net benefit of the program in British Columbia. Over the next five years, the INSPIRED program could have a total net benefit of $96 million (Real, 2015$) in British Columbia. This is an average annual net benefit of $19 million (Real, 2015$). Over the next 30 years, the INSPIRED program could have a total net benefit of $2 billion (Real, 2015$) and an average annual net benefit of $68 million (Real, 2015$) in British Columbia[9].

[9] Under a 10-year ramp-up period, the total net benefit of the INSPIRED program in British Columbia could be $1.9 billion (Real, 2015$), an average annual net benefit of $65 million (Real, 2015$), over the next 30 years.

Figure 9 Annual Net Benefit (Real, 2015$) in BC



For every $1 invested in the INSPIRED program in British Columbia, $21 (Real, 2015$) are saved in healthcare utilization costs. Moreover, the average annual net benefit per eligible COPD patient enrolled is $34,000 (Real, 2015$).

SENSITIVITY ANALYSIS

Sensitivity analysis was conducted on both program coverage and program eligibility. Program coverage was varied from 0.25 to 1 in order to measure the impact of coverage on the net benefit of the program. Program eligibility was varied from 0.26% to 0.53% in order to assess the impact of increasing the proportion of the patients with COPD that resemble the INSPIRED population.

Table 14 shows the possible average annual net benefit of the INSPIRED program in British Columbia when we vary both program coverage (0.25, 0.50, 0.75, and 1) and program eligibility (0.26%, 0.4%, and 0.53%). At the lowest parameters, a 25% coverage and a 0.26% eligibility, the program could have a substantial average annual net benefit of $11 million (Real, 2015$). At the highest possible coverage (100%) and eligibility (0.53%), the program has potential annual net benefits of $90 million (Real, 2015$). At a 50% coverage and 0.4% eligibility, the INSPIRED program in British Columbia could have an average annual net benefit of $34 million (Real, 2015$).

Table 14 Program Coverage and Eligibility Sensitivity Analysis (Average Annual) in BC

Net Benefit (Millions, Real, 2015$)	Program Coverage			
Eligibility	0.25	0.5	0.75	1
0.26%	11	22	33	44
0.4%	17	34	51	68
0.53%	23	45	68	90

B.3. MANITOBA

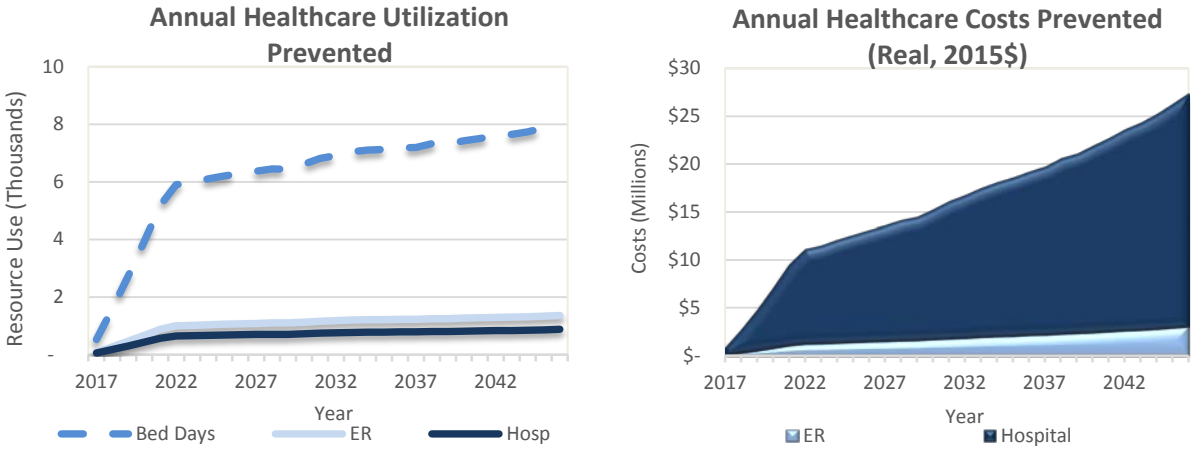
Over the first five years, the INSPIRED approach to COPD care could have an average annual enrollment of 200 patients who exhibit similar healthcare utilization patterns to those seen in the INSPIRED-Halifax program (roughly 0.4% of the patients with COPD). Over the 30 years of the analysis, the INSPIRED program could have an average annual enrollment of 450 COPD patients in Manitoba. Table 15 illustrates the healthcare resource prevention due to the INSPIRED program after five years and after 30 years.

Table 15 5-Year and 30-Year Healthcare Resource Utilization Results of the INSPIRED Program in Manitoba

	Average Annual Prevention			Total Prevention		
	ER Visits	Hospitalization	Bed Days	ER Visits	Hospitalization	Bed Days
5-Year Results	500	300	2,800	2,400	1,500	14,000
30-Year Results	1,000	700	6,300	32,000	21,000	188,000

The left graph in Figure 10 shows the potential reduction in healthcare utilization across ERs, hospitals, and bed days in Manitoba. After five years, the INSPIRED program could prevent 9% of ER visits, 9% of hospitalizations, and 9% of bed days. After 30 years, the program could prevent 17% of ER visits, 17% of hospitalizations, and 16% of bed days.

Figure 10 Annual Healthcare Utilization and Costs (Real, 2015$) Prevented in Manitoba



The reduction in COPD-related healthcare utilization could translate into a reduction in healthcare costs. The graph on the right of Figure 10 illustrates the reduction in healthcare costs across the ER and hospitals due to the INSPIRED program. Over the next 5 years, the INSPIRED program in Manitoba could prevent a total of:

- $3 million (Real, 2015$) in COPD-related ER costs (an average annual prevention of $550,000 (Real, 2015$)), an reduction of 9%; and
- $22 million (Real, 2015$) in COPD-related hospital costs (an average annual prevention of $4.5 million (Real, 2015$)), a reduction of 10%.

Over the next 30 years, the INSPIRED program in Manitoba is expected to prevent a total of:

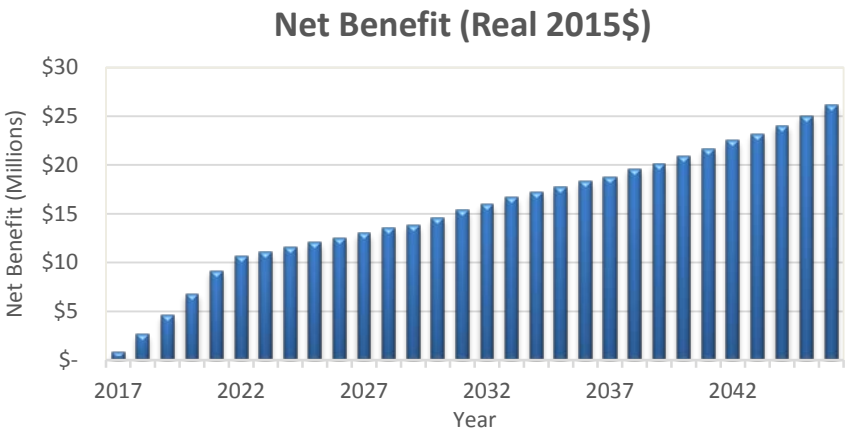
- $53 million (Real, 2015$) in COPD-related ER costs (an average annual prevention of $2 million (Real, 2015$)), a reduction of 17%; and
- $430 million (Real, 2015$) in COPD-related hospital costs (an average annual prevention of $14 million (Real, 2015$)), a reduction of 18%.

The healthcare costs prevented in Manitoba represent 3% of the healthcare costs prevented by the INSPIRED program in Canada.

Figure 11 shows the annual net benefit of the program in Manitoba. Over the next five years, the INSPIRED program could have a total net benefit of $24 million (Real, 2015$) in Manitoba. This is an average annual net benefit of $5 million (Real, 2015$). Over the next 30 years, the INSPIRED program could have a total net benefit of $460 million (Real, 2015$) and an average annual net benefit of $15 million (Real, 2015$) in Manitoba[10].

[10] Under a 10-year ramp-up period, the total net benefit of the INSPIRED program in Manitoba could be $434 million (Real, 2015$), an average annual net benefit of $14 million (Real, 2015$), over the next 30 years.

Figure 11 Annual Net Benefit (Real, 2015$) in Manitoba



For every $1 invested in the INSPIRED program in Manitoba, $21 (Real, 2015$) are saved in healthcare utilization costs. Moreover, the average annual net benefit per eligible COPD patient enrolled is $34,000 (Real, 2015$).

SENSITIVITY ANALYSIS

Sensitivity analysis was conducted on both program coverage and program eligibility. Program coverage was varied from 0.25 to 1 in order to measure the impact of coverage on the net benefit of the program. Program eligibility was varied from 0.26% to 0.53% in order to assess the impact of increasing the proportion of the patients with COPD that resemble the INSPIRED population.

Table 16 shows the possible average annual net benefit of the INSPIRED program in Manitoba when we vary both program coverage (0.25, 0.50, 0.75, and 1) and program eligibility (0.26%, 0.4%, and 0.53%). At the lowest parameters, a 25% coverage and a 0.26% eligibility, the program could have a substantial average annual net benefit of $3 million (Real, 2015$). At the highest possible coverage (100%) and eligibility (0.53%), the program has potential annual net benefits of $20 million (Real, 2015$). At a 50% coverage and 0.4% eligibility, the INSPIRED program in Manitoba could have an average annual net benefit of $8 million (Real, 2015$).

Table 16 Program Coverage and Eligibility Sensitivity Analysis (Average Annual) in Manitoba

Net Benefit (Millions, Real, 2015$)	Program Coverage			
Eligibility	0.25	0.5	0.75	1
0.26%	3	5	8	10
0.4%	4	8	12	15
0.53%	5	10	15	20

CONCLUSION

Over the next five years, the INSPIRED program in Manitoba is expected to enroll an annual average 200 COPD patients. Over the next 30 years, the INSPIRED program is expected to have an average annual enrollment of 450 COPD patients in Manitoba. Table 17 shows the five-year and 30-year average annual and cumulative total results of the INSPIRED program in Manitoba. For every $1 invested in the INSPIRED program in Manitoba, $21 (Real, 2015$) are saved in healthcare utilization costs. Moreover, the average annual net benefit per eligible COPD patient enrolled is $34,000 (Real, 2015$).

Table 17 Average Annual and Cumulative Total Results after 5- and 30-years of the INSPIRED Program in Manitoba

	Average Annual Results		Cumulative Total Results	
	5-Years	30-Years	5-Years	30-Years
Healthcare Utilization Prevented (ER visits and Hospitalizations)	800	1,700	3,900	53,000
Healthcare Costs Prevented (Millions, Real, 2015$)	5	16	25	483
Program Cost (Millions, Real, 2015$)	0.2	0.8	1	23
Net Benefit (Millions, Real, 2015$)	5	15	24	460

B.4. New Brunswick

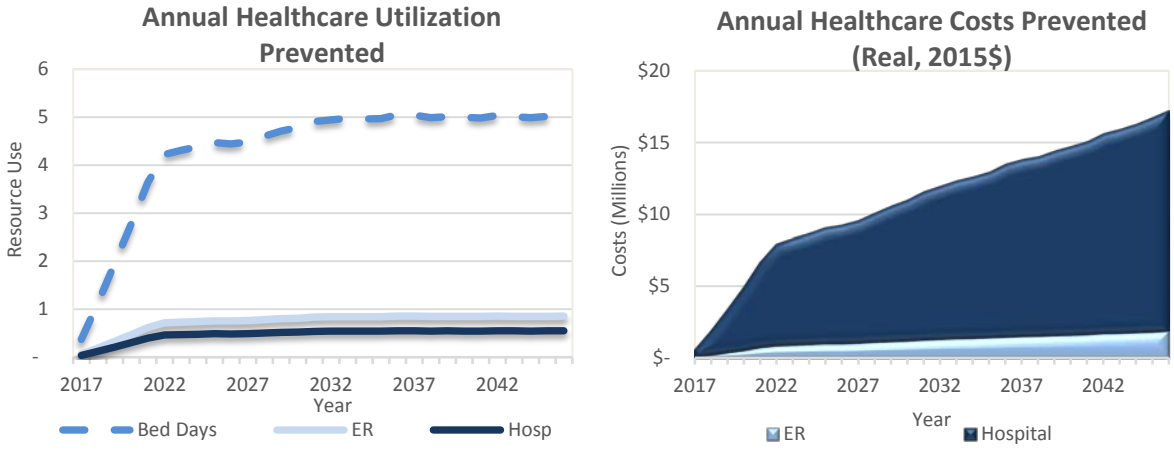
Over the first five years, the INSPIRED approach to COPD care could have an average annual enrollment of 140 patients who exhibit similar healthcare utilization patterns to those seen in the INSPIRED-Halifax program (roughly 0.4% of the patients with COPD). Over the 30 years of the analysis, the INSPIRED program could have an average annual enrollment of 300 COPD patients in New Brunswick. Table 18 illustrates the healthcare resource prevention due to the INSPIRED program after 5 years and after 30 years.

Table 18 5-Year and 30-Year Healthcare Resource Utilization Results of the INSPIRED Program in New Brunswick

	Average Annual Prevention			Total Prevention		
	ER Visits	Hospitalization	Bed Days	ER Visits	Hospitalization	Bed Days
5-Year Results	340	200	2,000	1,700	1,100	9,900
30-Year Results	740	500	4,300	22,000	14,000	130,000

The left graph in Figure 12 shows the potential reduction in healthcare utilization across ERs, hospitals, and bed days in New Brunswick. After 5 years, the INSPIRED program could prevent 9% of ER visits, 9% of hospitalizations, and 9% of bed days. After 30 years, the program could prevent 17% of ER visits, 17% of hospitalizations, and 16% of bed days.

Figure 12 Annual Healthcare Utilization and Costs (Real, 2015$) Prevented in New Brunswick



The reduction in COPD-related healthcare utilization would translate into a reduction in healthcare costs. The graph on the right of Figure 12 illustrates the reduction in healthcare costs across the ER and hospitals due to the INSPIRED program. Over the next 5 years, the INSPIRED program in New Brunswick could prevent a total of:

- $2 million (Real, 2015$) in COPD-related ER costs (an average annual prevention of $400,000 (Real, 2015$)), an reduction of 9%; and
- $16 million (Real, 2015$) in COPD-related hospital costs (an average annual prevention of $3 million (Real, 2015$)), a reduction of 10%.

Over the next 30 years, the INSPIRED program in New Brunswick is expected to prevent a total of:

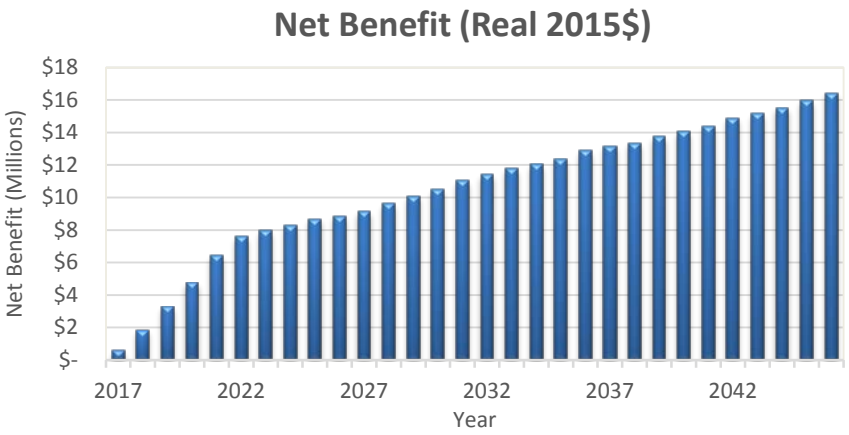
- $36 million (Real, 2015$) in COPD-related ER costs (an average annual prevention of $1.2 million (Real, 2015$)), a reduction of 17%; and
- $296 million (Real, 2015$) in COPD-related hospital costs (an average annual prevention of $10 million (Real, 2015$)), a reduction of 18%.

The ER and hospital costs prevented in New Brunswick represent 2% of the total ER and hospital costs prevented by the INSPIRED program in Canada.

Figure 13 shows the annual net benefit of the program. Over the next 5 years, the INSPIRED program could have a total net benefit of $17 million (Real, 2015$) in New Brunswick. This is an average annual net benefit of $3 million (Real, 2015$). Over the next 30 years, the INSPIRED program could have a total net benefit of $316 million (Real, 2015$) and an average annual net benefit of $10.5 million (Real, 2015$) in New Brunswick[11].

[11] Under a 10-year ramp-up period, the total net benefit of the INSPIRED program in New Brunswick could be $298 million (Real, 2015$), an average annual net benefit of $10 million (Real, 2015$), over the next 30 years.

Figure 13 Annual Net Benefit (Real, 2015$) in New Brunswick



For every $1 invested in the INSPIRED program in New Brunswick, $21 (Real, 2015$) are saved in healthcare utilization costs. Moreover, the average annual net benefit per eligible COPD patient enrolled is $34,000 (Real, 2015$).

SENSITIVITY ANALYSIS

Sensitivity analysis was conducted on both program coverage and program eligibility. Program coverage was varied from 0.25 to 1 in order to measure the impact of coverage on the net benefit of the program. Program eligibility was varied from 0.26% to 0.53% in order to assess the impact of increasing the proportion of the patients with COPD that resemble the INSPIRED population.

Table 19 shows the possible average annual net benefit of the INSPIRED program in New Brunswick when we vary both program coverage (0.25, 0.50, 0.75, and 1) and program eligibility (0.26%, 0.4%, and 0.53%). At the lowest parameters, a 25% coverage and a 0.26% eligibility, the program could have a substantial average annual net benefit of $2 million (Real, 2015$). At the highest possible coverage (100%) and eligibility (0.53%), the program has potential annual net benefits of $14 million (Real, 2015$). At a 50% coverage and 0.4% eligibility, the INSPIRED program in New Brunswick could have an average annual net benefit of $5 million (Real, 2015$).

Table 19 Program Coverage and Eligibility Sensitivity Analysis (Average Annual) in New Brunswick

Net Benefit (Millions, Real, 2015$)	Program Coverage			
Eligibility	0.25	0.5	0.75	1
0.26%	2	3	5	7
0.4%	3	5	8	10.5
0.53%	4	7	11	14

CONCLUSION

Over the next 5 years, the INSPIRED program in New Brunswick is expected to enroll an annual average 140 COPD patients. Over the next 30 years, the INSPIRED program is expected to have an average annual enrollment of 300 COPD patients in New Brunswick. Table 20 shows the five-year and 30-year average annual and cumulative total results of the INSPIRED program in New Brunswick. For every $1 invested in the INSPIRED program in New Brunswick, $21 (Real, 2015$) are saved in healthcare utilization costs. Moreover, the average annual net benefit per eligible COPD patient enrolled is $34,000 (Real, 2015$).

Table 20 Average Annual and Cumulative Total Results after 5- and 30-years of the INSPIRED Program in New Brunswick

	Average Annual Results		Cumulative Total Results	
	5-Years	30-Years	5-Years	30-Years
Healthcare Utilization Prevented	540	1,240	2,800	26,000
Healthcare Costs Prevented (Millions, Real, 2015$)	3.4	11.2	18	332
Program Cost (Millions, Real, 2015$)	0.2	0.5	0.9	16
Net Benefit (Millions, Real, 2015$)	3.4	10.5	17	316

B.5. Newfoundland and Labrador

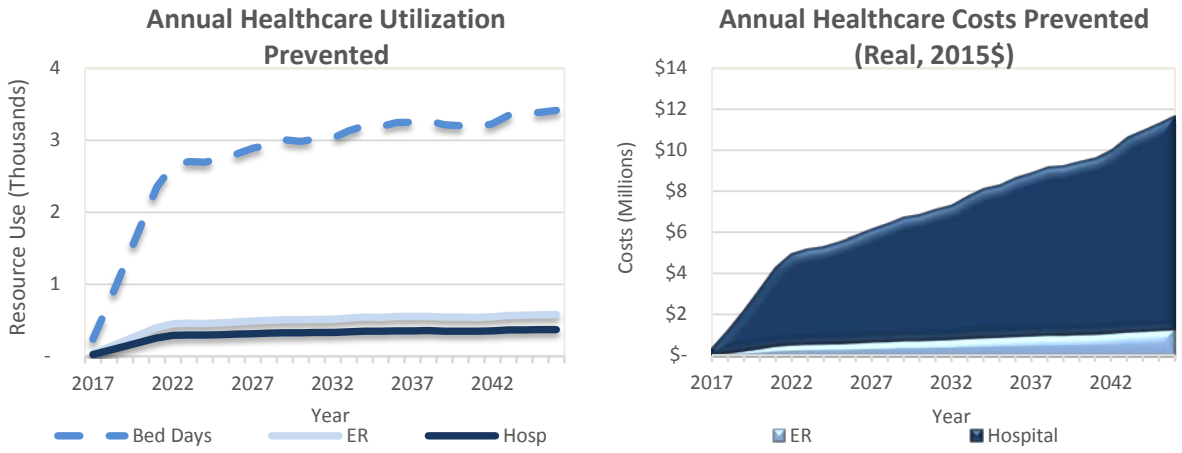
Over the first five years, the INSPIRED approach to COPD care could have an average annual enrollment of 100 patients who exhibit similar healthcare utilization patterns to those seen in the INSPIRED-Halifax program (roughly 0.4% of the patients with COPD). Over the 30 years of the analysis, the INSPIRED program could have an average annual enrollment of 200 COPD patients in Newfoundland and Labrador. Table 21 illustrates the healthcare resource prevention due to the INSPIRED program after five years and after 30 years.

Table 21 5-Year and 30-Year Healthcare Resource Utilization Results of the INSPIRED Program in Newfoundland and Labrador

	Average Annual Prevention			Total Prevention		
	ER Visits	Hospitalization	Bed Days	ER Visits	Hospitalization	Bed Days
5-Year Results	220	140	1,300	1,100	700	6,400
30-Year Results	470	300	2,800	14,000	9,200	84,000

The left graph in Figure 14 shows the potential reduction in healthcare utilization across ERs, hospitals, and bed days in Newfoundland and Labrador. After five years, the INSPIRED program could prevent 9% of ER visits, 9% of hospitalizations, and 9% of bed days. After 30 years, the program could prevent 17% of ER visits, 17% of hospitalizations, and 16% of bed days.

Figure 14 Annual Healthcare Utilization and Costs (Real, 2015$) Prevented in Newfoundland and Labrador



The reduction in COPD-related healthcare utilization could translate into a reduction in healthcare costs. The graph on the right of Figure 14 illustrates the reduction in healthcare costs across the ER and hospitals due to the INSPIRED program. Over the next 5 years, the INSPIRED program in Newfoundland and Labrador could prevent a total of:

- $1.3 million (Real, 2015$) in COPD-related ER costs (an average annual prevention of $254,000 (Real, 2015$)), an reduction of 9%; and
- $10.3 million (Real, 2015$) in COPD-related hospital costs (an average annual prevention of $2 million (Real, 2015$)), a reduction of 10%.

Over the next 30 years, the INSPIRED program in Newfoundland and Labrador is expected to prevent a total of:

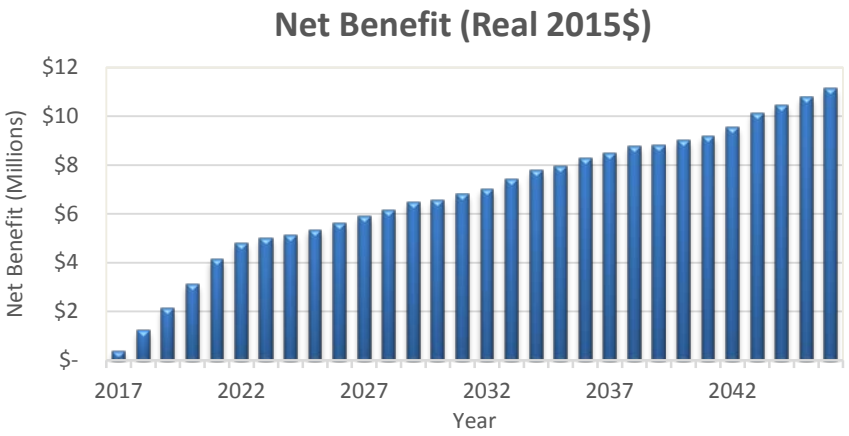
- $23 million (Real, 2015$) in COPD-related ER costs (an average annual prevention of $782,000 (Real, 2015$)), a reduction of 17%; and
- $190 million (Real, 2015$) in COPD-related hospital costs (an average annual prevention of $6.3 million (Real, 2015$)), a reduction of 18%.

The healthcare costs prevented in Newfoundland and Labrador represent 1.4% of the healthcare costs prevented by the INSPIRED program in Canada.

Figure 15 shows the annual net benefit of the program in Newfoundland and Labrador. Over the next five years, the INSPIRED program could have a total net benefit of $11 million (Real, 2015$) in Newfoundland and Labrador. This is an average annual net benefit of $2 million (Real, 2015$). Over the next 30 years, the INSPIRED program could have a total net benefit of $203 million (Real, 2015$) and an average annual net benefit of $7 million (Real, 2015$) in Newfoundland and Labrador[12].

[12] Under a 10-year ramp-up period, the total net benefit of the INSPIRED program in Newfoundland and Labrador could be $192 million (Real, 2015$), an average annual net benefit of $6 million (Real, 2015$), over the next 30 years.

Figure 15 Annual Net Benefit (Real, 2015$) in Newfoundland and Labrador



For every $1 invested in the INSPIRED program in Newfoundland and Labrador, $21 (Real, 2015$) are saved in healthcare utilization costs. Moreover, the average annual net benefit per eligible COPD patient enrolled is $34,000 (Real, 2015$).

SENSITIVITY ANALYSIS

Sensitivity analysis was conducted on both program coverage and program eligibility. Program coverage was varied from 0.25 to 1 in order to measure the impact of coverage on the net benefit of the program. Program eligibility was varied from 0.26% to 0.53% in order to assess the impact of increasing the proportion of the patients with COPD that resemble the INSPIRED population.

Table 22 shows the possible average annual net benefit of the INSPIRED program in Newfoundland and Labrador when we vary both program coverage (0.25, 0.50, 0.75, and 1) and program eligibility (0.26%, 0.4%, and 0.53%). At the lowest parameters, a 25% coverage and a 0.26% eligibility, the program could have a substantial average annual net benefit of $400,000 (Real, 2015$). At the highest possible coverage (100%) and eligibility (0.53%), the program has potential annual net benefits of $2.9 million (Real, 2015$). At a 50% coverage and 0.4% eligibility, the INSPIRED program in Newfoundland and Labrador could have an average annual net benefit of $1.1 million (Real, 2015$).

Table 22 Program Coverage and Eligibility Sensitivity Analysis (Average Annual) in Newfoundland and Labrador

Net Benefit (Millions, Real, 2015$)	Program Coverage			
Eligibility	0.25	0.5	0.75	1
0.26%	1.1	2.2	3.3	4.4
0.4%	1.7	3.4	5	6.8
0.53%	2.2	4.5	6.7	9

CONCLUSION

Over the next five years, the INSPIRED program in Newfoundland and Labrador is expected to enroll an annual average 100 COPD patients. Over the next 30 years, the INSPIRED program is expected to have an average annual enrollment of 200 COPD patients in Newfoundland and Labrador. Table 23 shows the five-year and 30-year average annual and cumulative total results of the INSPIRED program in Newfoundland and Labrador. For every $1 invested in the INSPIRED program in Newfoundland and Labrador, $21 (Real, 2015$) are saved in healthcare utilization costs. Moreover, the average annual net benefit per eligible COPD patient enrolled is $34,000 (Real, 2015$).

Table 23 Average Annual and Cumulative Total Results after 5- and 30-years of the INSPIRED Program in Newfoundland and Labrador

	Average Annual Results		Cumulative Total Results	
	5-Years	30-Years	5-Years	30-Years
Healthcare Utilization Prevented (ER visits and Hospitalizations)	360	770	1,800	23,200
Healthcare Costs Prevented (Millions, Real, 2015$)	2.3	7.1	12	213
Program Cost (Millions, Real, 2015$)	0.1	0.3	1	10
Net Benefit (Millions, Real, 2015$)	2.2	6.8	11	203

B.6. Nova Scotia

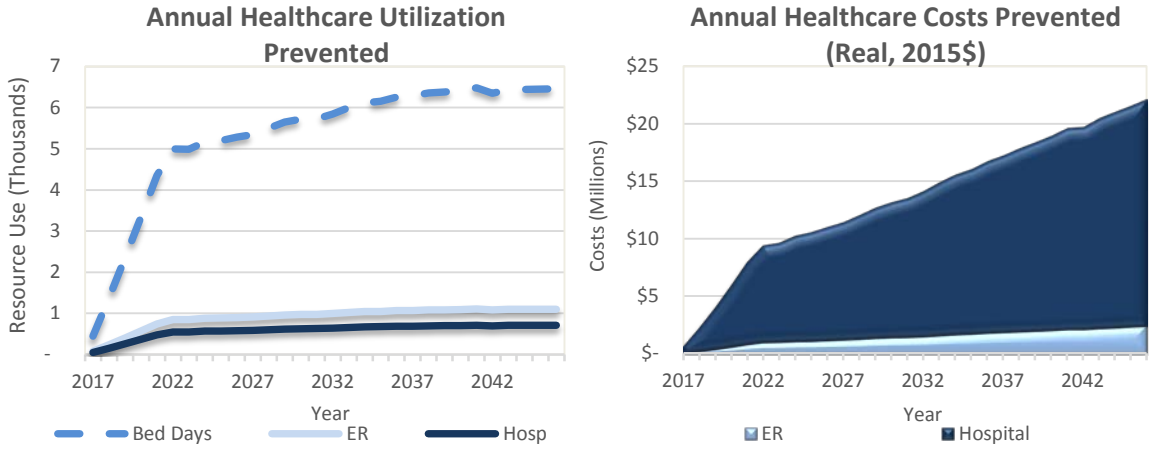
Over the first five years, the INSPIRED approach to COPD care could have an average annual enrollment of 170 patients who exhibit similar healthcare utilization patterns to those seen in the INSPIRED-Halifax program (roughly 0.4% of the patients with COPD). Over the 30 years of the analysis, the INSPIRED program could have an average annual enrollment of 400 COPD patients in Nova Scotia. Table 24 illustrates the healthcare resource prevention due to the INSPIRED program after five years and after 30 years.

Table 24 5-Year and 30-Year Healthcare Resource Utilization Results of the INSPIRED Program in Nova Scotia

	Average Annual Prevention			Total Prevention		
	ER Visits	Hospitalization	Bed Days	ER Visits	Hospitalization	Bed Days
5-Year Results	400	260	2,400	2,000	1,300	11,900
30-Year Results	900	600	5,300	27,200	17,500	160,000

The left graph in Figure 16 shows the potential reduction in healthcare utilization across ERs, hospitals, and bed days in Nova Scotia. After five years, the INSPIRED program could prevent 9% of ER visits, 9% of hospitalizations, and 9% of bed days. After 30 years, the program could prevent 17% of ER visits, 17% of hospitalizations, and 16% of bed days.

Figure 16 Annual Healthcare Utilization and Costs (Real, 2015$) Prevented in Nova Scotia



The reduction in COPD-related healthcare utilization could translate into a reduction in healthcare costs. The graph on the right of Figure 16 illustrates the reduction in healthcare costs across the ER and hospitals due to the INSPIRED program. Over the next 5 years, the INSPIRED program in Nova Scotia could prevent a total of:

- $2.3 million (Real, 2015$) in COPD-related ER costs (an average annual prevention of $467,000 (Real, 2015$)), an reduction of 9%; and
- $19 million (Real, 2015$) in COPD-related hospital costs (an average annual prevention of $3.8 million (Real, 2015$)), a reduction of 10%.

Over the next 30 years, the INSPIRED program in Nova Scotia is expected to prevent a total of:

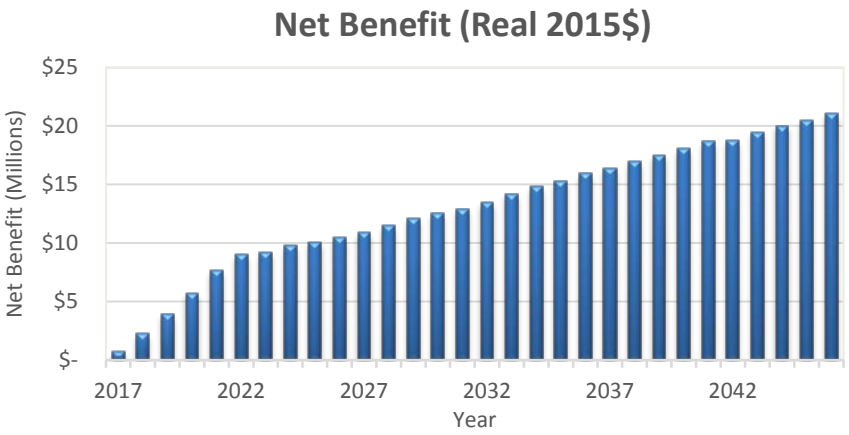
- $45 million (Real, 2015$) in COPD-related ER costs (an average annual prevention of $1.5 million (Real, 2015$)), a reduction of 17%; and
- $365 million (Real, 2015$) in COPD-related hospital costs (an average annual prevention of $12.2 million (Real, 2015$)), a reduction of 18%.

The healthcare costs prevented in Nova Scotia represent 3% of the healthcare costs prevented by the INSPIRED program in Canada.

Figure 17 shows the annual net benefit of the program in Nova Scotia. Over the next five years, the INSPIRED program could have a total net benefit of $20 million (Real, 2015$) in Nova Scotia. This is an average annual net benefit of $4 million (Real, 2015$). Over the next 30 years, the INSPIRED program could have a total net benefit of $390 million (Real, 2015$) and an average annual net benefit of $13 million (Real, 2015$) in Nova Scotia[13].

[13] Under a 10-year ramp-up period, the total net benefit of the INSPIRED program in Nova Scotia could be $368 million (Real, 2015$), an average annual net benefit of $12 million (Real, 2015$), over the next 30 years.

Figure 17 Annual Net Benefit (Real, 2015$) in Nova Scotia



For every $1 invested in the INSPIRED program in Nova Scotia, $21 (Real, 2015$) are saved in healthcare utilization costs. Moreover, the average annual net benefit per eligible COPD patient enrolled is $34,000 (Real, 2015$).

SENSITIVITY ANALYSIS

Sensitivity analysis was conducted on both program coverage and program eligibility. Program coverage was varied from 0.25 to 1 in order to measure the impact of coverage on the net benefit of the program. Program eligibility was varied from 0.26% to 0.53% in order to assess the impact of increasing the proportion of the patients with COPD that resemble the INSPIRED population.

Table 25 shows the possible average annual net benefit of the INSPIRED program in Nova Scotia when we vary both program coverage (0.25, 0.50, 0.75, and 1) and program eligibility (0.26%, 0.4%, and 0.53%). At the lowest parameters, a 25% coverage and a 0.26% eligibility, the program could have a substantial average annual net benefit of $2.1 million (Real, 2015$). At the highest possible coverage (100%) and eligibility (0.53%), the program has potential annual net benefits of $17.2 million (Real, 2015$). At a 50% coverage and 0.4% eligibility, the INSPIRED program in Nova Scotia could have an average annual net benefit of $6.5 million (Real, 2015$).

Table 25 Program Coverage and Eligibility Sensitivity Analysis (Average Annual) in Nova Scotia

Net Benefit (Millions, Real, 2015$)	Program Coverage			
Eligibility	0.25	0.5	0.75	1
0.26%	2.1	4.2	6.3	8.5
0.4%	3.3	6.5	9.8	13
0.53%	4.3	8.6	13	17.2

CONCLUSION

Over the next five years, the INSPIRED program in Nova Scotia is expected to enroll an annual average 170 COPD patients. Over the next 30 years, the INSPIRED program is expected to have an average annual enrollment of 400 COPD patients in Nova Scotia. Table 26 shows the five-year and 30-year average annual and cumulative total results of the INSPIRED program in Nova Scotia. For every $1 invested in the INSPIRED program in Nova Scotia, $21 (Real, 2015$) are saved in healthcare utilization costs. Moreover, the average annual net benefit per eligible COPD patient enrolled is $34,000 (Real, 2015$).

Table 26 Average Annual and Cumulative Total Results after 5- and 30-years of the INSPIRED Program in Nova Scotia

	Average Annual Results		Cumulative Total Results	
	5-Years	30-Years	5-Years	30-Years
Healthcare Utilization Prevented (ER visits and Hospitalizations)	660	1,500	3,300	44,700
Healthcare Costs Prevented (Millions, Real, 2015$)	4.2	13.7	21	410
Program Cost (Millions, Real, 2015$)	0.2	0.7	1	20
Net Benefit (Millions, Real, 2015$)	4	13	20	390

B.7. ONTARIO

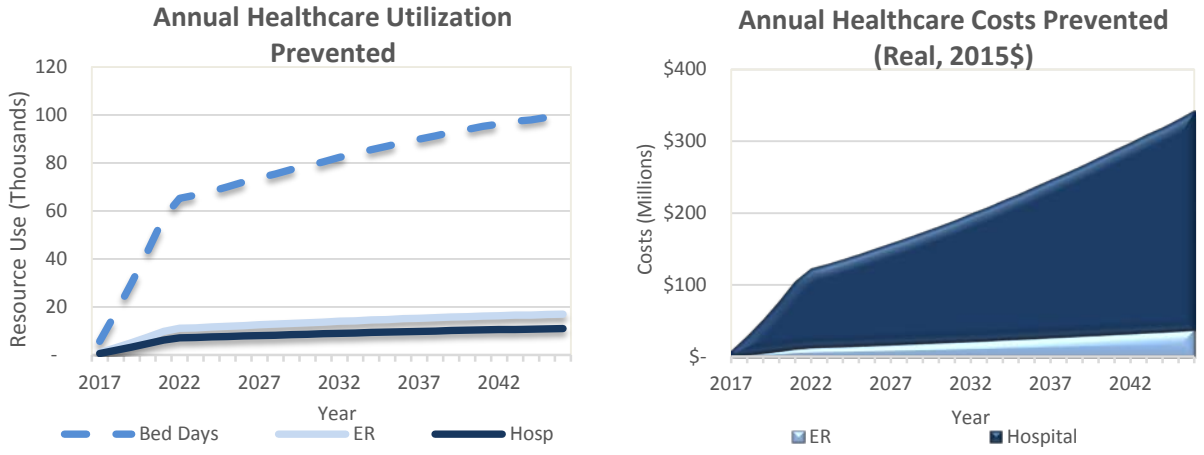
Over the first five years, the INSPIRED approach to COPD care could have an average annual enrollment of 2,200 patients who exhibit similar healthcare utilization patterns to those seen in the INSPIRED-Halifax program (roughly 0.4% of the patients with COPD). Over the 30 years of the analysis, the INSPIRED program could have an average annual enrollment of 5,500 COPD patients in Ontario. Table 27 illustrates the healthcare resource prevention due to the INSPIRED program after 5 years and after 30 years.

Table 27 5-Year and 30-Year Healthcare Resource Utilization Results of the INSPIRED Program in Ontario

	Average Annual Prevention			Total Prevention		
	ER Visits	Hospitalization	Bed Days	ER Visits	Hospitalization	Bed Days
5-Year Results	5,200	3,400	31,000	26,000	17,000	154,000
30-Year Results	13,000	8,300	76,000	386,000	248,000	2.3 Million

The left graph in Figure 18 shows the potential reduction in healthcare utilization across ERs, hospitals, and bed days in Ontario. After 5 years, the INSPIRED program could prevent 9% of ER visits, 9% of hospitalizations, and 9% of bed days. After 30 years, the program could prevent 17% of ER visits, 17% of hospitalizations, and 16% of bed days.

Figure 18 Annual Healthcare Utilization and Costs (Real, 2015$) Prevented in Ontario



The reduction in COPD-related healthcare utilization could translate into a reduction in healthcare costs. The graph on the right of Figure 18 illustrates the reduction in healthcare costs across the ER and hospitals due to the INSPIRED program. Over the next 5 years, the INSPIRED program in Ontario could prevent a total of:

- $30 million (Real, 2015$) in COPD-related ER costs (an average annual prevention of $6 million (Real, 2015$)), an reduction of 9%; and
- $246 million (Real, 2015$) in COPD-related hospital costs (an average annual prevention of $49 million (Real, 2015$)), a reduction of 10%.

Over the next 30 years, the INSPIRED program in Ontario is expected to prevent a total of:

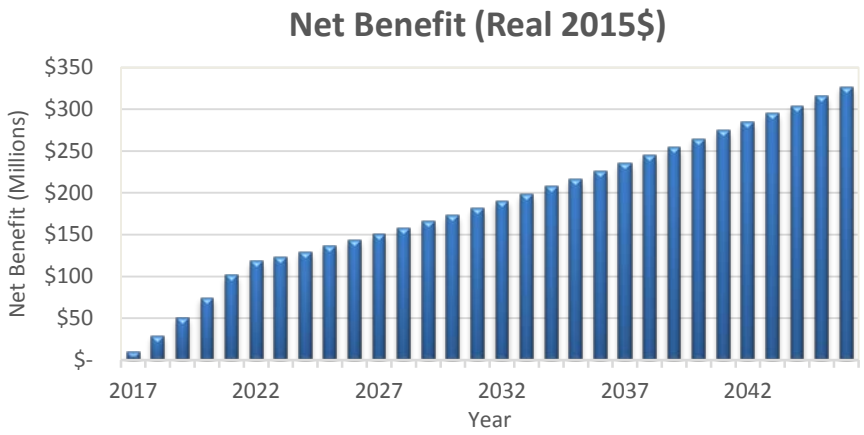
- $643 million (Real, 2015$) in COPD-related ER costs (an average annual prevention of $21 million (Real, 2015$)), a reduction of 17%; and
- $5.2 billion (Real, 2015$) in COPD-related hospital costs (an average annual prevention of $174 million (Real, 2015$)), a reduction of 18%.

The healthcare costs prevented in Ontario represent 39% of the healthcare costs prevented by the INSPIRED program in Canada.

Figure 19 shows the annual net benefit of the program in Ontario. Over the next 5 years, the INSPIRED program could have a total net benefit of $263 million (Real, 2015$) in Ontario. This is an average annual net benefit of $53 million (Real, 2015$). Over the next 30 years, the INSPIRED program could have a total net benefit of $5.6 billion (Real, 2015$) and an average annual net benefit of $186 million (Real, 2015$) in Ontario[14].

[14] Under a 10-year ramp-up period, the total net benefit of the INSPIRED program in Ontario could be $5.3 billion (Real, 2015$), an average annual net benefit of $176 million (Real, 2015$), over the next 30 years.

Figure 19 Annual Net Benefit (Real, 2015$) in Ontario



For every $1 invested in the INSPIRED program in Ontario, $21 (Real, 2015$) are saved in healthcare utilization costs. Moreover, the average annual net benefit per eligible COPD patient enrolled is $34,000 (Real, 2015$).

SENSITIVITY ANALYSIS

Sensitivity analysis was conducted on both program coverage and program eligibility. Program coverage was varied from 0.25 to 1 in order to measure the impact of coverage on the net benefit of the program. Program eligibility was varied from 0.26% to 0.53% in order to assess the impact of increasing the proportion of the patients with COPD that resemble the INSPIRED population.

Table 28 shows the possible average annual net benefit of the INSPIRED program in Ontario when we vary both program coverage (0.25, 0.50, 0.75, and 1) and program eligibility (0.26%, 0.4%, and 0.53%). At the lowest parameters, a 25% coverage and a 0.26% eligibility, the program could have a substantial average annual net benefit of $30 million (Real, 2015$). At the highest possible coverage (100%) and eligibility (0.53%), the program has potential annual net benefits of $246 million (Real, 2015$). At a 50% coverage and 0.4% eligibility, the INSPIRED program in Ontario could have an average annual net benefit of $93 million (Real, 2015$).

Table 28 Program Coverage and Eligibility Sensitivity Analysis (Average Annual) in Ontario

Net Benefit (Millions, Real, 2015$)	Program Coverage			
Eligibility	0.25	0.5	0.75	1
0.26%	30	60	91	121
0.4%	47	93	139	186
0.53%	62	123	185	246

CONCLUSION

Over the next 5 years, the INSPIRED program in Ontario is expected to enroll an annual average 2,200 COPD patients. Over the next 30 years, the INSPIRED program is expected to have an average annual enrollment of 5,500 COPD patients in Ontario. Table 29 shows the five-year and 30-year average annual and cumulative total results of the INSPIRED program in Ontario. For every $1 invested in the INSPIRED program in Ontario, $21 (Real, 2015$) are saved in healthcare utilization costs. Moreover, the average annual net benefit per eligible COPD patient enrolled is $34,000 (Real, 2015$).

Table 29 Average Annual and Cumulative Total Results after 5- and 30-years of the INSPIRED Program in Ontario

	Average Annual Results		Cumulative Total Results	
	5-Years	30-Years	5-Years	30-Years
Healthcare Utilization Prevented (ER visits and Hospitalizations)	8,600	21,300	43,000	634,000
Healthcare Costs Prevented (Millions, Real, 2015$)	55	195	276	5,900
Program Cost (Millions, Real, 2015$)	2	9	13	284
Net Benefit (Millions, Real, 2015$)	53	186	263	5,600

B.8. PRINCE EDWARD ISLAND (PEI)

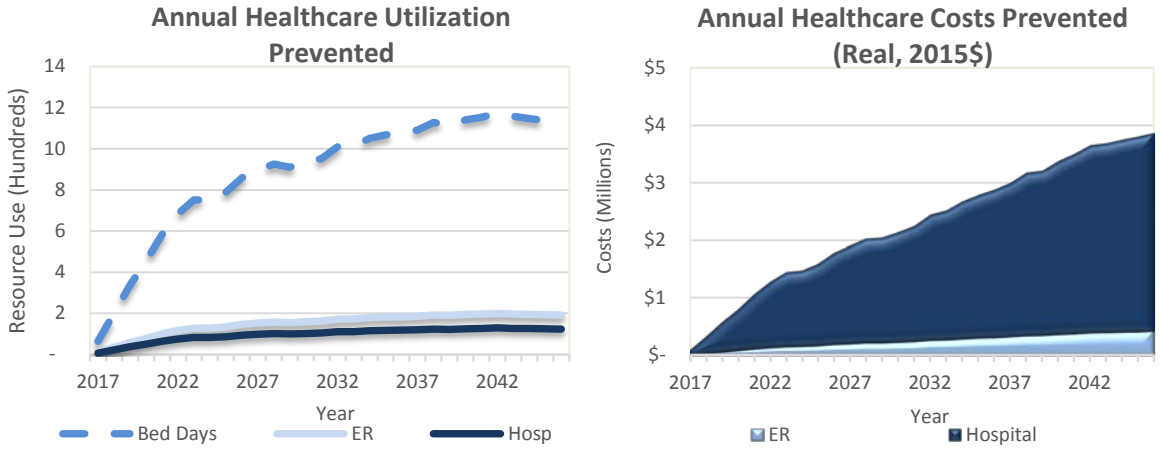
Over the first five years, the INSPIRED approach to COPD care could have an average annual enrollment of 20 patients who exhibit similar healthcare utilization patterns to those seen in the INSPIRED-Halifax program (roughly 0.4% of the patients with COPD). Over the 30 years of the analysis, the INSPIRED program could have an average annual enrollment of 60 COPD patients in Prince Edward Island. Table 30 illustrates the healthcare resource prevention due to the INSPIRED program after five years and after 30 years.

Table 30 5-Year and 30-Year Healthcare Resource Utilization Results of the INSPIRED Program in PEI

	Average Annual Prevention			Total Prevention		
	ER Visits	Hospitalization	Bed Days	ER Visits	Hospitalization	Bed Days
5-Year Results	60	40	330	280	180	1,600
30-Year Results	150	100	900	4,500	2,900	26,700

The left graph in Figure 20 shows the potential reduction in healthcare utilization across ERs, hospitals, and bed days in Prince Edward Island. After five years, the INSPIRED program could prevent 9% of ER visits, 9% of hospitalizations, and 9% of bed days. After 30 years, the program could prevent 17% of ER visits, 17% of hospitalizations, and 16% of bed days.

Figure 20 Annual Healthcare Utilization and Costs (Real, 2015$) Prevented in PEI



The reduction in COPD-related healthcare utilization could translate into a reduction in healthcare costs. The graph on the right of Figure 20 illustrates the reduction in healthcare costs across the ER and hospitals due to the INSPIRED program. Over the next 5 years, the INSPIRED program in Prince Edward Island could prevent a total of:

- $322,000 (Real, 2015$) in COPD-related ER costs (an average annual prevention of $65,000 (Real, 2015$)), an reduction of 9%; and
- $2.6 million (Real, 2015$) in COPD-related hospital costs (an average annual prevention of $523,000 (Real, 2015$)), a reduction of 10%.

Over the next 30 years, the INSPIRED program in Prince Edward Island is expected to prevent a total of:

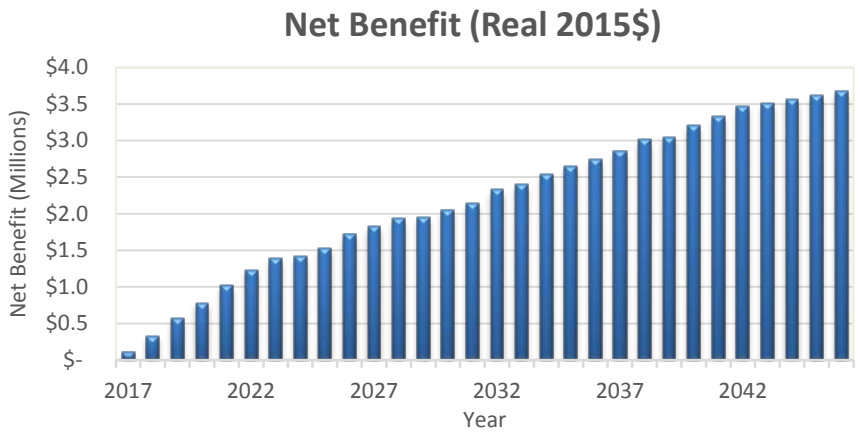
- $7.6 million (Real, 2015$) in COPD-related ER costs (an average annual prevention of $253,000 (Real, 2015$)), a reduction of 17%; and
- $61.7 million (Real, 2015$) in COPD-related hospital costs (an average annual prevention of $2 million (Real, 2015$)), a reduction of 18%.

The healthcare costs prevented in Prince Edward Island represent 0.5% of the healthcare costs prevented by the INSPIRED program in Canada.

Figure 21 shows the annual net benefit of the program in Prince Edward Island. Over the next five years, the INSPIRED program could have a total net benefit of $2.8 million (Real, 2015$) in Prince Edward Island. This is an average annual net benefit of $559,000 (Real, 2015$). Over the next 30 years, the INSPIRED program could have a total net benefit of $66 million (Real, 2015$) and an average annual net benefit of $2.2 million (Real, 2015$) in Prince Edward Island[15].

[15] Under a 10-year ramp-up period, the total net benefit of the INSPIRED program in Prince Edward Island could be $63 million (Real, 2015$), an average annual net benefit of $2 million (Real, 2015$), over the next 30 years.

Figure 21 Annual Net Benefit (Real, 2015$) in PEI



For every $1 invested in the INSPIRED program in Prince Edward Island, $21 (Real, 2015$) are saved in healthcare utilization costs. Moreover, the average annual net benefit per eligible COPD patient enrolled is $34,000 (Real, 2015$).

SENSITIVITY ANALYSIS

Sensitivity analysis was conducted on both program coverage and program eligibility. Program coverage was varied from 0.25 to 1 in order to measure the impact of coverage on the net benefit of the program. Program eligibility was varied from 0.26% to 0.53% in order to assess the impact of increasing the proportion of the patients with COPD that resemble the INSPIRED population.

Table 31 shows the possible average annual net benefit of the INSPIRED program in Prince Edward Island when we vary both program coverage (0.25, 0.50, 0.75, and 1) and program eligibility (0.26%, 0.4%, and 0.53%). At the lowest parameters, a 25% coverage and a 0.26% eligibility, the program could have a substantial average annual net benefit of $400,000 (Real, 2015$). At the highest possible coverage (100%) and eligibility (0.53%), the program has potential annual net benefits of $2.9 million (Real, 2015$). At a 50% coverage and 0.4% eligibility, the INSPIRED program in Prince Edward Island could have an average annual net benefit of $1.1 million (Real, 2015$).

Table 31 Program Coverage and Eligibility Sensitivity Analysis (Average Annual) in PEI

Net Benefit (Millions, Real, 2015$)	Program Coverage			
Eligibility	0.25	0.5	0.75	1
0.26%	0.4	0.7	1.1	1.4
0.4%	0.5	1.1	1.6	2.2
0.53%	0.7	1.5	2.2	2.9

CONCLUSION

Over the next five years, the INSPIRED program in Prince Edward Island is expected to enroll an annual average 20 COPD patients. Over the next 30 years, the INSPIRED program is expected to have an average annual enrollment of 60 COPD patients in Prince Edward Island. Table 32 shows the five-year and 30-year average annual and cumulative total results of the INSPIRED program in Prince Edward Island. For every $1 invested in the INSPIRED program in Prince Edward Island, $21 (Real, 2015$) are saved in healthcare utilization costs. Moreover, the average annual net benefit per eligible COPD patient enrolled is $34,000 (Real, 2015$).

Table 32 Average Annual and Cumulative Total Results after 5- and 30-years of the INSPIRED Program in PEI

	Average Annual Results		Cumulative Total Results	
	5-Years	30-Years	5-Years	30-Years
Healthcare Utilization Prevented (ER visits and Hospitalizations)	100	250	460	7,400
Healthcare Costs Prevented (Millions, Real, 2015$)	0.6	2.3	2.9	69
Program Cost (Millions, Real, 2015$)	0.03	0.1	0.1	3.4
Net Benefit (Millions, Real, 2015$)	0.56	2.2	2.8	66

B.9. QUEBEC

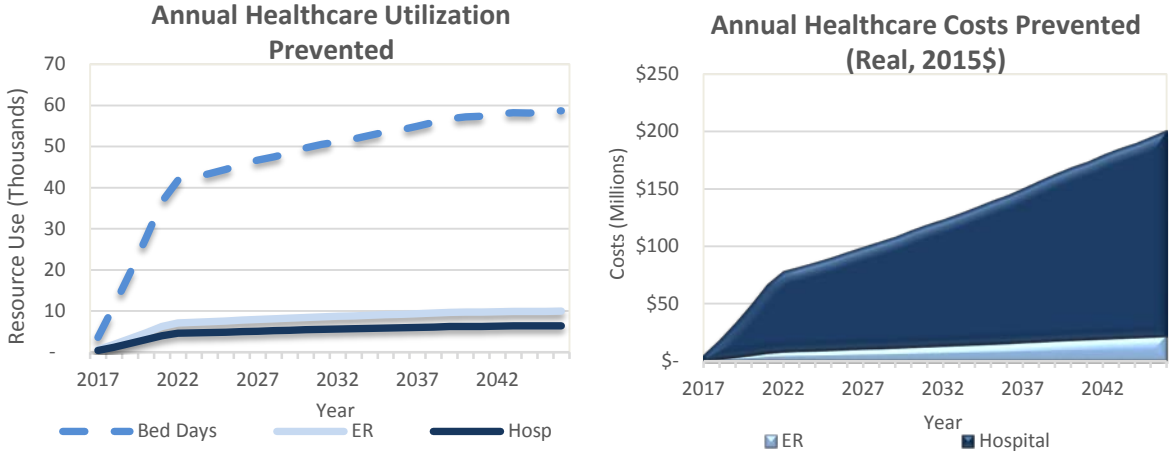
Over the first five years, the INSPIRED approach to COPD care could have an average annual enrollment of 1,400 patients who exhibit similar healthcare utilization patterns to those seen in the INSPIRED-Halifax program (roughly 0.4% of the patients with COPD). Over the 30 years of the analysis, the INSPIRED program could have an average annual enrollment of 3,400 COPD patients in Quebec. Table 33 illustrates the healthcare resource prevention due to the INSPIRED program after five years and after 30 years.

Table 33 5-Year and 30-Year Healthcare Resource Utilization Results of the INSPIRED Program in Quebec

	Average Annual Prevention			Total Prevention		
	ER Visits	Hospitalization	Bed Days	ER Visits	Hospitalization	Bed Days
5-Year Results	3,400	2,200	19,700	17,000	11,000	98,500
30-Year Results	7,900	5,100	47,000	238,000	153,000	1.4 Million

The left graph in Figure 22 shows the potential reduction in healthcare utilization across ERs, hospitals, and bed days in Quebec. After five years, the INSPIRED program could prevent 9% of ER visits, 9% of hospitalizations, and 9% of bed days. After 30 years, the program could prevent 17% of ER visits, 17% of hospitalizations, and 16% of bed days.

Figure 22 Annual Healthcare Utilization and Costs (Real, 2015$) Prevented in Quebec



The reduction in COPD-related healthcare utilization could translate into a reduction in healthcare costs. The graph on the right of Figure 22 illustrates the reduction in healthcare costs across the ER and hospitals due to the INSPIRED program. Over the next 5 years, the INSPIRED program in Quebec could prevent a total of:

- $19 million (Real, 2015$) in COPD-related ER costs (an average annual prevention of $4 million (Real, 2015$)), an reduction of 9%; and
- $158 million (Real, 2015$) in COPD-related hospital costs (an average annual prevention of $32 million (Real, 2015$)), a reduction of 10%.

Over the next 30 years, the INSPIRED program in Quebec is expected to prevent a total of:

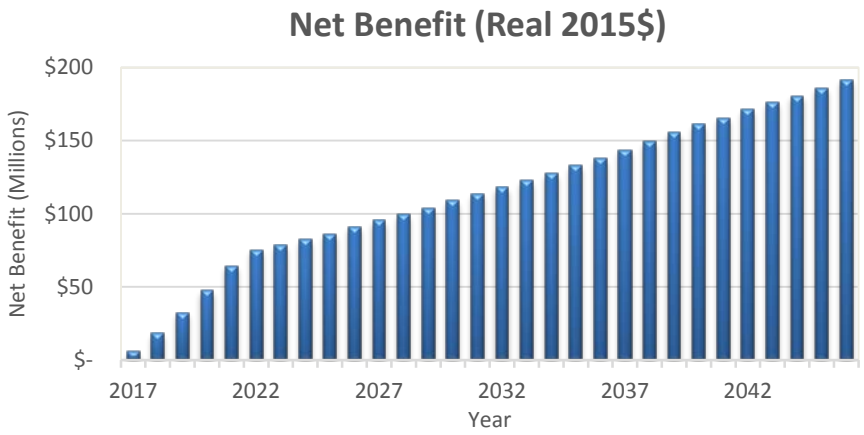
- $395 million (Real, 2015$) in COPD-related ER costs (an average annual prevention of $13 million (Real, 2015$)), a reduction of 17%; and
- $3.2 billion (Real, 2015$) in COPD-related hospital costs (an average annual prevention of $107 million (Real, 2015$)), a reduction of 18%.

The healthcare costs prevented in Quebec represent 24% of the healthcare costs prevented by the INSPIRED program in Canada.

Figure 23 shows the annual net benefit of the program in Quebec. Over the next five years, the INSPIRED program could have a total net benefit of $168 million (Real, 2015$) in Quebec. This is an average annual net benefit of $34 million (Real, 2015$). Over the next 30 years, the INSPIRED program could have a total net benefit of $3.4 billion (Real, 2015$) and an average annual net benefit of $114 million (Real, 2015$) in Quebec[16].

[16] Under a 10-year ramp-up period, the total net benefit of the INSPIRED program in Quebec could be $3.2 billion (Real, 2015$), an average annual net benefit of $108 million (Real, 2015$), over the next 30 years.

Figure 23 Annual Net Benefit (Real, 2015$) in Quebec



For every $1 invested in the INSPIRED program in Quebec, $21 (Real, 2015$) are saved in healthcare utilization costs. Moreover, the average annual net benefit per eligible COPD patient enrolled is $34,000 (Real, 2015$).

SENSITIVITY ANALYSIS

Sensitivity analysis was conducted on both program coverage and program eligibility. Program coverage was varied from 0.25 to 1 in order to measure the impact of coverage on the net benefit of the program. Program eligibility was varied from 0.26% to 0.53% in order to assess the impact of increasing the proportion of the patients with COPD that resemble the INSPIRED population.

Table 34 shows the possible average annual net benefit of the INSPIRED program in Quebec when we vary both program coverage (0.25, 0.50, 0.75, and 1) and program eligibility (0.26%, 0.4%, and 0.53%). At the lowest parameters, a 25% coverage and a 0.26% eligibility, the program could have a substantial average annual net benefit of $19 million (Real, 2015$). At the highest possible coverage (100%) and eligibility (0.53%), the program has potential annual net benefits of $151 million (Real, 2015$). At a 50% coverage and 0.4% eligibility, the INSPIRED program in Quebec could have an average annual net benefit of $57 million (Real, 2015$).

Table 34 Program Coverage and Eligibility Sensitivity Analysis (Average Annual) in Quebec

Net Benefit (Millions, Real, 2015$)	Program Coverage			
Eligibility	0.25	0.5	0.75	1
0.26%	19	37	56	74
0.4%	29	57	86	114
0.53%	38	76	113	151

CONCLUSION

Over the next five years, the INSPIRED program in Quebec is expected to enroll an annual average 1,400 COPD patients. Over the next 30 years, the INSPIRED program is expected to have an average annual enrollment of 3,400 COPD patients in Quebec. Table 35 shows the five-year and 30-year average annual and cumulative total results of the INSPIRED program in Quebec. For every $1 invested in the INSPIRED program in Quebec, $21 (Real, 2015$) are saved in healthcare utilization costs. Moreover, the average annual net benefit per eligible COPD patient enrolled is $34,000 (Real, 2015$).

Table 35 Average Annual and Cumulative Total Results after 5- and 30-years of the INSPIRED Program in Quebec

	Average Annual Results		Cumulative Total Results	
	5-Years	30-Years	5-Years	30-Years
Healthcare Utilization Prevented (ER visits and Hospitalizations)	5,600	13,000	28,000	391,000
Healthcare Costs Prevented (Millions, Real, 2015$)	36	120	177	3,600
Program Cost (Millions, Real, 2015$)	2	6	9	174
Net Benefit (Millions, Real, 2015$)	34	114	168	3,400

B.10. SASKATCHEWAN

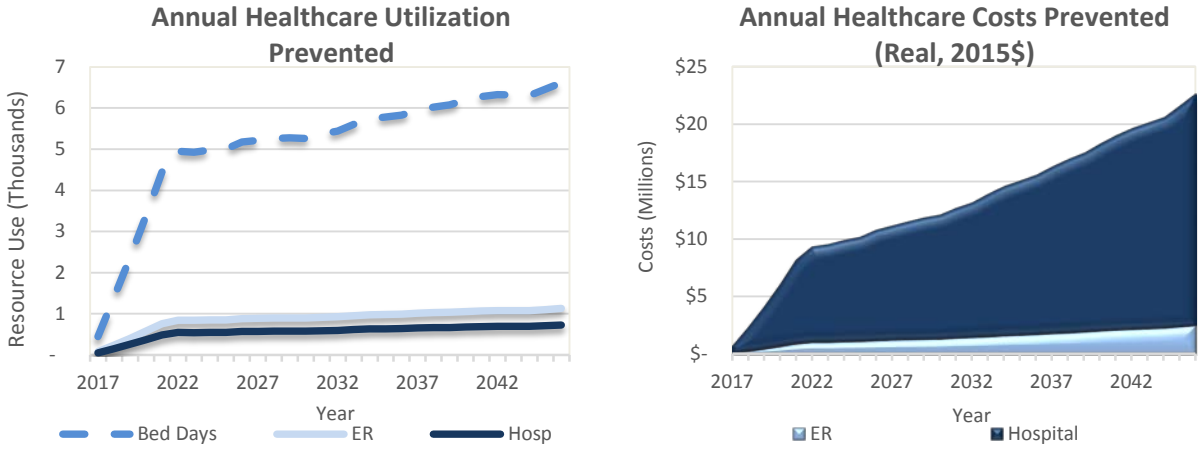
Over the first five years, the INSPIRED approach to COPD care could have an average annual enrollment of 170 patients who exhibit similar healthcare utilization patterns to those seen in the INSPIRED-Halifax program (roughly 0.4% of the patients with COPD). Over the 30 years of the analysis, the INSPIRED program could have an average annual enrollment of 400 COPD patients in Saskatchewan. Table 36 illustrates the healthcare resource prevention due to the INSPIRED program after five years and after 30 years.

Table 36 5-Year and 30-Year Healthcare Resource Utilization Results of the INSPIRED Program in Saskatchewan

	Average Annual Prevention			Total Prevention		
	ER Visits	Hospitalization	Bed Days	ER Visits	Hospitalization	Bed Days
5-Year Results	400	260	2,400	2,000	1,300	12,000
30-Year Results	900	560	5,100	26,300	17,000	154,000

The left graph in Figure 24 shows the potential reduction in healthcare utilization across ERs, hospitals, and bed days in Saskatchewan. After five years, the INSPIRED program could prevent 9% of ER visits, 9% of hospitalizations, and 9% of bed days. After 30 years, the program could prevent 17% of ER visits, 17% of hospitalizations, and 16% of bed days.

Figure 24 Annual Healthcare Utilization and Costs (Real, 2015$) Prevented in Saskatchewan



The reduction in COPD-related healthcare utilization could translate into a reduction in healthcare costs. The graph on the right of Figure 24 illustrates the reduction in healthcare costs across the ER and hospitals due to the INSPIRED program. Over the next 5 years, the INSPIRED program in Saskatchewan could prevent a total of:

- $2.4 million (Real, 2015$) in COPD-related ER costs (an average annual prevention of $473,000 (Real, 2015$)), an reduction of 9%; and
- $19.2 million (Real, 2015$) in COPD-related hospital costs (an average annual prevention of $4 million (Real, 2015$)), a reduction of 10%.

Over the next 30 years, the INSPIRED program in Saskatchewan is expected to prevent a total of:

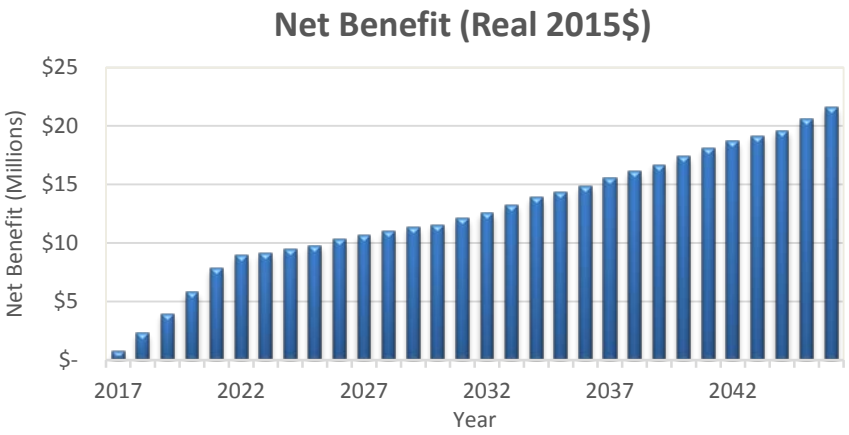
- $43 million (Real, 2015$) in COPD-related ER costs (an average annual prevention of $1.5 million (Real, 2015$)), a reduction of 17%; and
- $353 million (Real, 2015$) in COPD-related hospital costs (an average annual prevention of $12 million (Real, 2015$)), a reduction of 18%.

The healthcare costs prevented in Saskatchewan represent 3% of the healthcare costs prevented by the INSPIRED program in Canada.

Figure 25 shows the annual net benefit of the program in Saskatchewan. Over the next five years, the INSPIRED program could have a total net benefit of $20.6 million (Real, 2015$) in Saskatchewan. This is an average annual net benefit of $4 million (Real, 2015$). Over the next 30 years, the INSPIRED program could have a total net benefit of $377 million (Real, 2015$) and an average annual net benefit of $13 million (Real, 2015$) in Saskatchewan[17].

[17] Under a 10-year ramp-up period, the total net benefit of the INSPIRED program in Saskatchewan could be $355 million (Real, 2015$), an average annual net benefit of $12 million (Real, 2015$), over the next 30 years.

Figure 25 Annual Net Benefit (Real, 2015$) in Saskatchewan



For every $1 invested in the INSPIRED program in Saskatchewan, $21 (Real, 2015$) are saved in healthcare utilization costs. Moreover, the average annual net benefit per eligible COPD patient enrolled is $34,000 (Real, 2015$).

SENSITIVITY ANALYSIS

Sensitivity analysis was conducted on both program coverage and program eligibility. Program coverage was varied from 0.25 to 1 in order to measure the impact of coverage on the net benefit of the program. Program eligibility was varied from 0.26% to 0.53% in order to assess the impact of increasing the proportion of the patients with COPD that resemble the INSPIRED population.

Table 37 shows the possible average annual net benefit of the INSPIRED program in Saskatchewan when we vary both program coverage (0.25, 0.50, 0.75, and 1) and program eligibility (0.26%, 0.4%, and 0.53%). At the lowest parameters, a 25% coverage and a 0.26% eligibility, the program could have a substantial average annual net benefit of $3 million (Real, 2015$). At the highest possible coverage (100%) and eligibility (0.53%), the program has potential annual net benefits of $20 million (Real, 2015$). At a 50% coverage and 0.4% eligibility, the INSPIRED program in Saskatchewan could have an average annual net benefit of $8 million (Real, 2015$).

Table 37 Program Coverage and Eligibility Sensitivity Analysis (Average Annual) in Saskatchewan

Net Benefit (Millions, Real, 2015$)	Program Coverage			
Eligibility	0.25	0.5	0.75	1
0.26%	2	4	6	8
0.4%	3	6	9	13
0.53%	4	8	13	17

CONCLUSION

Over the next five years, the INSPIRED program in Saskatchewan is expected to enroll an annual average 170 COPD patients. Over the next 30 years, the INSPIRED program is expected to have an average annual enrollment of 400 COPD patients in Saskatchewan. Table 38 shows the five-year and 30-year average annual and cumulative total results of the INSPIRED program in Saskatchewan. For every $1 invested in the INSPIRED program in Saskatchewan, $21 (Real, 2015$) are saved in healthcare utilization costs. Moreover, the average annual net benefit per eligible COPD patient enrolled is $34,000 (Real, 2015$).

Table 38 Average Annual and Cumulative Total Results after 5- and 30-years of the INSPIRED Program in Saskatchewan

	Average Annual Results		Cumulative Total Results	
	5-Years	30-Years	5-Years	30-Years
Healthcare Utilization Prevented (ER visits and Hospitalizations)	660	1,460	3,300	43,300
Healthcare Costs Prevented (Millions, Real, 2015$)	4.4	14	21.6	396
Program Cost (Millions, Real, 2015$)	0.2	0.6	1	19
Net Benefit (Millions, Real, 2015$)	4	13	20.6	377