Modelling the CFHI Reducing Antipsychotic Medication Use Collaborative

National and Provincial Analysis
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RiskAnalytica
SCIENCE OF APPLIED RISK & REWARD MANAGEMENT

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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.

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

A third collaborative has just been launched but it is not part of this analysis. This analysis focuses on the results from CFHI's pan-Canadian program on Reducing Antipsychotic Medication Use in Long Term Care.

It is estimated that 27.5% of long term care residents throughout Canada are prescribed AP medication without a diagnosis of psychosis (CIHI, 2016). The AP program included 15 teams from 56 long term care homes in seven provinces and one territory and targeted residents with dementia who are inappropriately prescribed antipsychotic medication. Teams participating in the AP program worked to improve the appropriate use of antipsychotic medications through more patient-centered, team-based and data-driven approaches to managing challenging behaviours associated with dementia. The AP program has been able to reduce and discontinue the prescription of antipsychotic medication for more than half of participating residents with no increases in aggressive behaviours, while also lowering falls by 20%. The AP program builds on the success of an initiative that was supported through CFHI's EXTRA: Executive Training program. A team from the Winnipeg Regional Health Authority focused on an innovative approach to improving antipsychotic medication prescribing and dementia care in long term care homes. The innovation became the basis for CFHI's pan-Canadian AP program.

The purpose of this analysis is to provide an independent evaluation of the net benefit and cost effectiveness of CFHI's pan-Canadian expansion of the AP program. Using RiskAnalytica's Life at Risk simulation platform, as well as evidence collected from a sample of the AP program facilities that reported

standardized data, a scenario analysis was conducted to evaluate the impact that this program would have on Canada and all ten provinces if it were scaled up.

Reducing Antipsychotic (AP) Medication Use Program

After the first five years, if the AP program were spread throughout Canada, an annual average of 35,000 long-term care (LTC) residents who are taking antipsychotic medication without a diagnosis of psychosis, could have their prescriptions reduced or discontinued. Over the entire 30-year timeframe of the analysis, the AP program could have an average annual enrollment of 105,000 long-term care residents. Through the AP program, a cumulative total of 25 million and 448 million antipsychotic prescriptions could be avoided by 2021 and 2046, respectively.

By reducing the number of LTC residents on antipsychotic medication, the AP program could help prevent falls, which are a common adverse event associated with such medication (Pretorius, Gataric, Swedlun, & Miller, 2013). Table 1 shows the average annual prevention and total prevention after five and 30 years across falls, emergency room (ER) visits, and hospitalizations.

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

	Average Annual Prevention			Total Prevention		
	Falls	ER Visits	Hospitalizations	Falls	ER Visits	Hospitalizations
5-Year Results	18,000	3,900	1,400	91,000	19,000	7,000
30-Year Results	55,000	12,000	4,200	1.6 Million	349,000	127,000

After five years, the program could prevent a total of $254 million (Real, 2015$) in healthcare costs. The breakdown of the healthcare costs prevented are:

- $32 million in AP prescription costs (Real, 2015$), or an average annual prevention of $6.4 million (Real, 2015$) (a 19% reduction);
- $28 million in ER costs (Real, 2015$), or an average annual prevention of $6 million (Real, 2015$) (an 8% reduction); and
- $195 million in hospital costs (Real, 2015$), or an average annual prevention of $39 million (Real, 2015$) (an 8% reduction).

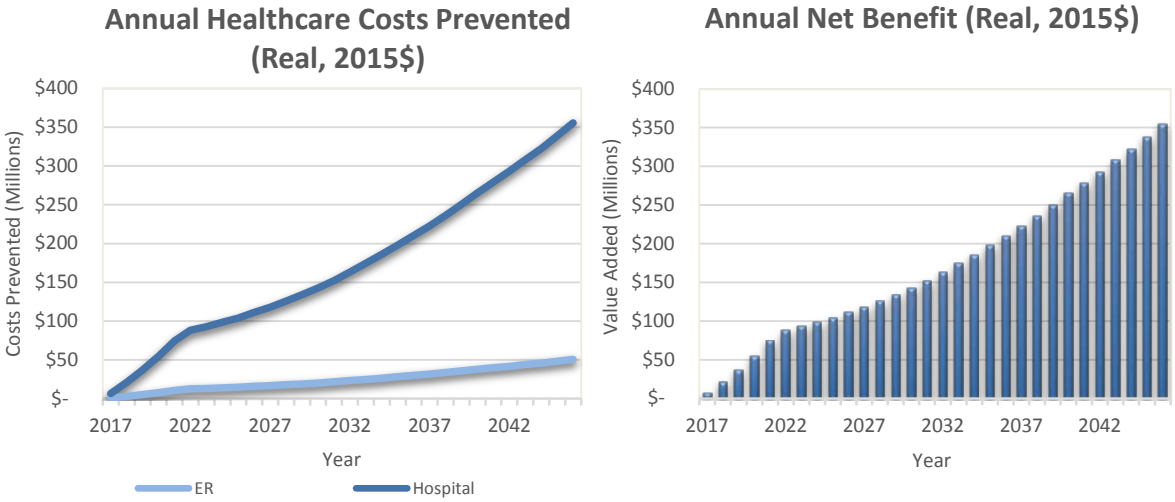
After 30 years, a total of $6.7 billion (Real, 2015$) in healthcare costs will be prevented. By 2046, the AP program could prevent a total of:

- $844 million in AP prescription costs (Real, 2015$), or an average annual prevention of $28 million (Real, 2015$) (a 35% reduction);
- $700 million (Real, 2015$), or an average annual prevention of $25 million (Real, 2015$), in ER costs (a 14% reduction); and

- $5.2 billion (Real, 2015$), or an average annual prevention of $172 million (Real, 2015$), in hospital costs (a 14% reduction).

The graph on the left of Figure 1 illustrates the value added to the healthcare system by preventing the aforementioned healthcare utilization due to falls.

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



The graph on the right of Figure 1 shows the annual net benefit of the AP program over the next 30 years, taking into consideration program costs. Even after the first five years of the AP program, there could be a total net benefit of $194 million (Real, 2015$), or an average annual benefit of $39 million (Real, 2015$). This is a result of reduced ER visits, hospitalizations, and prescription costs. By 2046, the AP program could generate a net benefit of $5.2 billion (Real, 2015$), or an average annual benefit of $172 million (Real, 2015$). For every $1 invested in the AP program, $4.24 (Real, 2015$) in healthcare costs could be prevented. Moreover, the average annual net benefit per eligible LTC resident discontinued from inappropriate antipsychotic medication could amount to $1,634 (Real, 2015$) in costs prevented.

CONCLUSIONS

Over the next 30 years, expanding the AP program across Canada could reduce healthcare resource utilization; specifically, it could reduce ER and hospital use by 480,000 visits by preventing a cumulative total of 1.6 million falls by 2046. The total costs prevented through a reduction in prescriptions, ER visits, and hospitalizations are estimated at $6.7 billion (Real, 2015$). Over the next 30 years, this could achieve a total net benefit of $5.2 billion (Real, 2015$). A breakdown of the average annual and cumulative total outcomes of the AP program is shown in Table 2 below.

Table 2 Summary Results

Program Impacts	Average Annual	Cumulative Total
Population Enrolled	105,000	-
Prescriptions Prevented (Millions)	15	448
Prescription Costs Prevented (Millions, Real, 2015$)	28	844
Falls Prevented	55,000	1.6 Million
ER Visits Due To Falls Prevented	12,000	349,000
Hospitalizations Due To Falls Prevented	4,200	127,000
ER Costs Prevented (Millions, Real, 2015$)	25	700
Hospital Costs Prevented (Millions, Real, 2015$)	172	5,200
Program Costs (Millions, Real, 2015$)	53	1,600
Net Benefit (Millions, Real, 2015$)	172	5,200

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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:

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

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 focuses on the AP program, a brief description of which is provided below.

The Reducing Antipsychotic Medication Use in Long-Term Care Program (the AP program) focuses on the inappropriate prescribing of antipsychotic medication residents with dementia in long-term care (LTC) who do not have a diagnosis of psychosis. In Canada, it is estimated that roughly 27.5% of LTC residents are inappropriately prescribed antipsychotic medication (CIHI, 2016). Antipsychotic medications are routinely prescribed to LTC residents, especially those with dementia, in order to treat the behavioural symptoms of the cognitive condition. Research has shown that the use of such medication should not be the first resort in caring for these residents. Environmental and behavioural approaches to caring for these residents have proven to be more effective than a pharmacological intervention (Barton, Findlay, & Blake, 2005). Moreover, these medications have been associated with cognitive decline (Vigen, et al., 2011) and they can increase the risk of stroke, heart attack, and premature death (Gareri, et al., 2014). Another serious adverse effect of antipsychotic medication is falling (Pretorius, Gataric, Swedlun, & Miller, 2013). Falls among the elderly population remain the leading cause of injury-related hospitalizations, with 20-30% of seniors falling each year (Public Health Agency of Canada, 2014). Through CFHI's EXTRA: Executive

Training program, a team from the Winnipeg Regional Health Authority designed an innovation that used data to identify residents living with dementia in long term care who had been prescribed antipsychotic medications without a diagnosis of psychosis. The innovation became the basis for CFHI's pan-Canadian AP program, which trained over 180 team members (including staff, healthcare providers and families) from 15 long term care organizations spanning fifty-six long term care facilities. Through team-based, person-centered care and quality improvement techniques, the AP program has been able to reduce and discontinue the prescription of antipsychotic medication by 18% and 36%, respectively (CFHI, n.d.). This is a 54% total reduction or discontinuation of antipsychotic medication, as well as a 20% reduction in falls with no increase in aggressive behaviours by residents.

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 expansion of the AP program across Canada and its provinces. In order to create a business case for scale, RiskAnalytica undertook 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 program. Using RiskAnalytica's Life at Risk simulation platform, a model was generated to evaluate the impact of the AP program on healthcare resources. This can 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 this program.

For the AP program, the health metrics that were used to evaluate the benefits of the program included the costs and/or costs prevented on healthcare utilization associated with:

- Antipsychotic medication use and costs
- ER visits and costs due to falls
- Hospitalizations and hospital costs due to falls

Falls are one of the most common adverse events associated with the use of antipsychotic medication in the elderly and as such, utilization associated with falls was evaluated. Moreover, the incidence of falls was tracked as part of the AP program. Although other common side effects of inappropriately prescribed antipsychotic medication such as stroke and heart attack also have impacts on the population, they were not included as part of this analysis due to the non-availability of data.

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 contains the 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 and AP programs 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 the AP program. In this scenario, we assume that 27.5% of the LTC population in Canada (20-40% depending on the provinces) continue to be inappropriately prescribed antipsychotic medication (CIHI, 2016).

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 CFHI 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 REDUCTION IN ANTIPSYCHOTIC MEDICATION USE PROGRAM

Prior to simulating the impact of the AP program in Canada and selected provinces, a set of assumptions needed to be made regarding the population that would be impacted by the AP program and the base case and intervention scenario rates of healthcare utilization and costs incurred by the target population. These assumptions are outlined below:

2.2.4.1 TARGET POPULATION

- **Long Term Care Population:** This parameter defines the current and expected LTC population within Canada and the selected provinces. Statistics Canada resident counts broken down by age and sex from the Long-Term Care Facilities Survey (LTCFS) were divided by the Canadian population for the most recent year of data available (2013). This rate was then multiplied by the Life at Risk population projections, providing an LTC count which correctly captures the increased need driven by the aging of the population. That is, even if the fraction of 80-year-old women requiring long-term care remains constant, the increase in the absolute number of beds required will grow as the population grows, and the increased fraction of the population that 80-year-old women make up as the mean age of Canadians increases means it will grow faster than the population itself.

  This constant-rate model neglects many factors, such as possible decreases in enrollment in long-term care driven by moves toward home care; possible increases in enrollment due to increased prevalence of chronic disease; and changes in government policy which could increase or decrease the availability of beds, as decisions on care options are often constrained by resource limitations and many facilities are already operating at near-capacity. However, the constant-rate model provides a useful status quo baseline to make comparisons against.

- **Eligible Population:** This assumption defines the population within LTC facilities that are eligible for the program. This parameter was based on the proportion of the LTC population that is inappropriately prescribed antipsychotic medication, estimated using CIHI data. The national proportion of the LTC population that is inappropriately prescribed medication is 27.5% (CIHI, 2016), with provincial breakdowns for Ontario, Alberta, and BC that range between 20 and 40% (CIHI, 2016). It is important to note that CIHI only contained partial data for Saskatchewan, Manitoba, Nova Scotia, and Newfoundland and Labrador. Moreover, there is no data for Quebec, New Brunswick, and Prince Edward Island. For these provinces with partial or no data, the national rate of 27.5% was used. In this base case scenario of this analysis, we assume that the rate of inappropriately prescribed medication is constant over the next thirty years. Likewise, in the intervention scenario, we assume that the eligible population for the AP program, based off of the inappropriate prescription rate, is constant over time.

  In other words, we consider the situations in which (1) nothing is done, and residents continue to be inappropriately prescribed medication, and (2) the AP program is able to address the problem within this group of people. Of course, in the real world, it is quite likely that the success of the program would spread its effects beyond the directly targeted, and the rates of inappropriate prescription would decrease faster than expected. This would mean that the benefits would be greater and the costs lower than predicted here.

2.2.4.2 PROGRAM RATES

The base case rates and the intervention rates describing healthcare utilization and costs are outlined in Table 3. The intervention rates for number of prescriptions, cost of prescriptions, and number of falls were determined based on the results achieved by the AP program by the third intervention quarter. These rates reflect the healthcare utilization and costs of the target population described in the "Eligible Population" in the section above (Section 2.2.4.1).

Note that the absolute number of falls in a given year within the long-term care residents was unavailable. The number of hospitalizations within this population, the injury rate[1] of falls (6%), and the percentage of seniors who fall in institutions was known. Using these values, we are able to

[1] Injury in this case was defined as a fall that causes a visit to the hospital.

estimate the total number of falls in the population and therefore the fall rate. As a result of the uncertainties involved, the fall counts should be taken as an approximation at best. However, it is important to remember that the number of hospitalizations due to falls was available. As long as the number of falls scales with the number of hospitalizations – and we assume that the falls prevented by the intervention are representative of the hospitalization-producing falls in general -- a 10% decrease in the number of falls will generate a 10% decrease in the number of corresponding hospitalizations. This will hold true regardless of whether it takes 100 falls to produce 1 hospitalization or only 10. While the ER visit counts were harder to estimate, the same rule applies: under the assumption that they are generated as some ratio of the total number of falls, the fractional change expected is independent of the absolute number of falls.

The calculation of the AP program costs (per participant) included implementation costs incurred by 15 teams in implementing the person-centered approaches to resident care in 56 facilities across Canada. The implementation costs included in the calculation are personnel, travel, supplies and services, equipment, and communications. These costs were borne both by CFHI funding and the implementing organizations.

Table 3 AP Program Base Case and Program Rates

	Base Case Rates	Intervention Rates	Source
Number of Prescriptions (per resident inappropriately prescribed medication per day)	1.127	0.738	CFHI
Cost of prescriptions (per resident inappropriately prescribed medication per day)	$1.22	$0.78	CFHI
Rate of Falls	20-30% of all seniors annually; rate of injury 6%, with 4.5-5% at lower 65-74 age brackets and 10% at 85+; 40-50% of seniors in institutions	13-23%[2] decrease in the fall rate	(Public Health Agency of Canada, 2014), (Finding Balance, 2013)
Emergency Room Visits due to falls	2.75 ER visits/hospital visits; 2.4-5.2 ratio for all falls in Canada 65+		(Finding Balance, 2013), (Parachute, 2015)
Emergency Room Costs due to falls	$972		(Woolcott, Khan, Mitrovic, Anis, & Marra, 2012)
Hospital Visits due to falls	Approx. 13000 in 2010 across Canada; roughly 0.06 hospitalizations / LTC patient 65+;		(Public Health Agency of Canada, 2014)
Hospital Costs due to falls	$20,500		(Finding Balance, 2013)
Program Costs	N/A	$0.83 per participant per day	CFHI

[2] Reducing Inappropriate Use of Antipsychotic Medication in Long Term Care (LTC): A CFHI Spread Collaborative. Falls in the last 30 days dropped from 18% to 14%, 14%, and 16% in Q1, Q2, and Q3, respectively, which is a 13-23% decrease.

3.0 REDUCING ANTIPSYCHOTIC MEDICATION USE PROGRAM RESULTS

3.1 PROGRAM ENROLLMENT

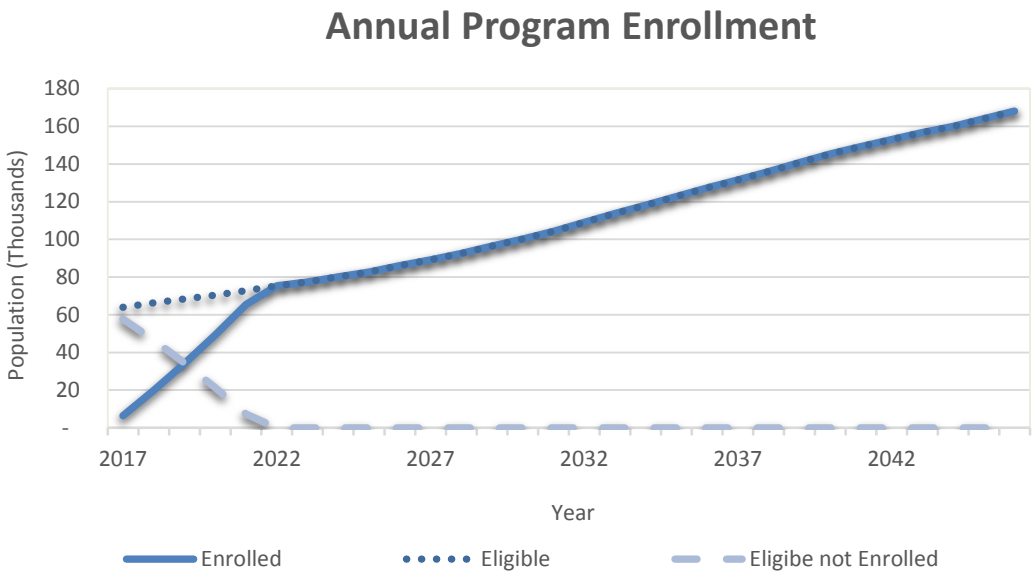
Currently in Canada, 27.5% of LTC residents are inappropriately prescribed antipsychotic medication (CIHI, 2016). That proportion of LTC residents, which accounts for 64,000 LTC residents in 2017, represents the eligible population for this program.

Figure 2 shows the program enrollment, the eligible population, and the eligible but not yet enrolled population through 2046. When an LTC resident is enrolled in the AP program, the amount of antipsychotic medication they are inappropriately prescribed is reduced or discontinued similar to the rates over the first three intervention quarters of the AP program. The five-year ramp-up period is evidenced by the steep increase in enrollment from 6,400 in 2017 to 65,500 in 2021. The AP program enrolls all eligible participants after 2021, which is shown as the eligible and enrolled lines converge. After five years, the average annual enrollment of the AP program is 35,000 LTC residents. The enrollment reaches a maximum in 2046 with 168,000 LTC residents enrolled in the program. Throughout the 30-year analysis, average annual enrollment in the AP program could be 105,000[3].

Provincial enrollment varies depending on the size of the LTC population and the population of individuals who are inappropriately prescribed. Ontario is expected to have the largest average annual enrollment with 43,000 participants per year, while P.E.I will have the lowest with an annual average of 600 participants.

[3] Average annual enrollment with a 10 year ramp-up is 99,000.

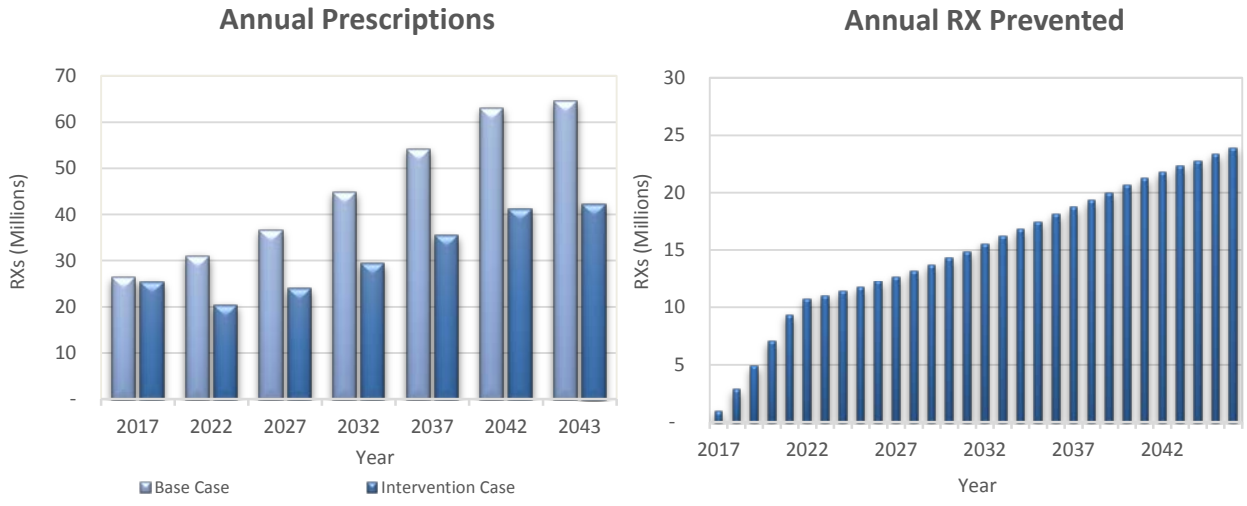
Figure 2 Annual Program Enrollment in Canada



3.2 Antipsychotic Medication Prescriptions (RX)

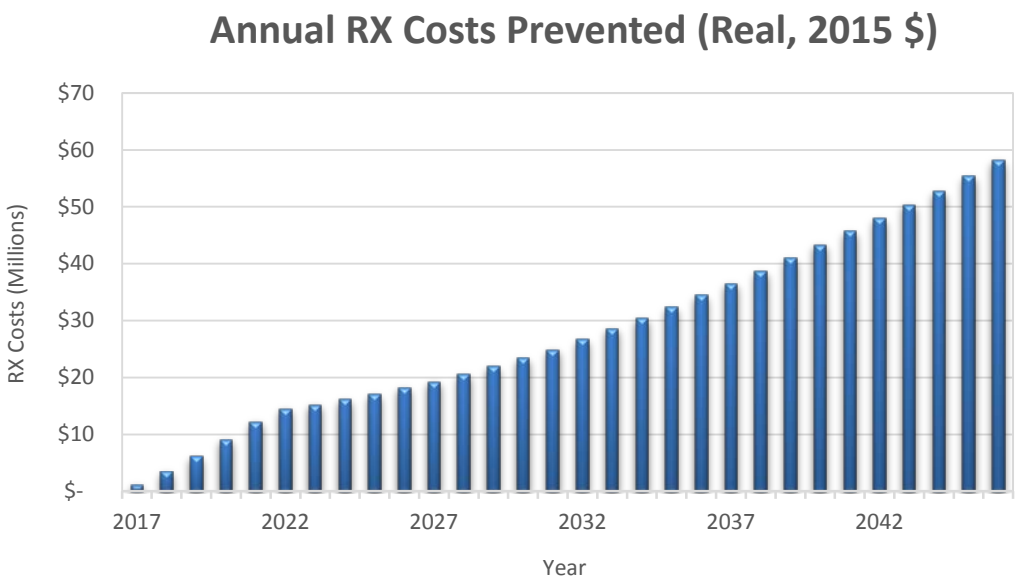
Figure 3 shows the total annual number of prescriptions in the base case and the intervention scenario (left) and the total annual prescriptions prevented (right). After five years, the AP program could prevent a total of 25 million inappropriate antipsychotic medication prescriptions (an average annual prevention of 5 million). Over the next 30 years, a total of 448 million antipsychotic prescriptions could be avoided through the AP program. This is an average annual reduction in the number of prescriptions by 15 million.

Figure 3 Annual Prescriptions Prevented in Canada



By preventing the inappropriate prescription of antipsychotic medication thereby reducing the number of prescriptions, total prescription costs of antipsychotic medication after five years could decrease by $32 million (Real, 2015$), or an average annual decrease of $6.4 million (Real, 2015$). Over the 30-year analysis, the AP program could prevent a total of $844 million (Real, 2015$) by 2046. This is an average annual prevention of $28 million (Real, 2015$) in antipsychotic prescription costs. Figure 4 shows the annual prescription (RX) costs prevented over the next 30 years.

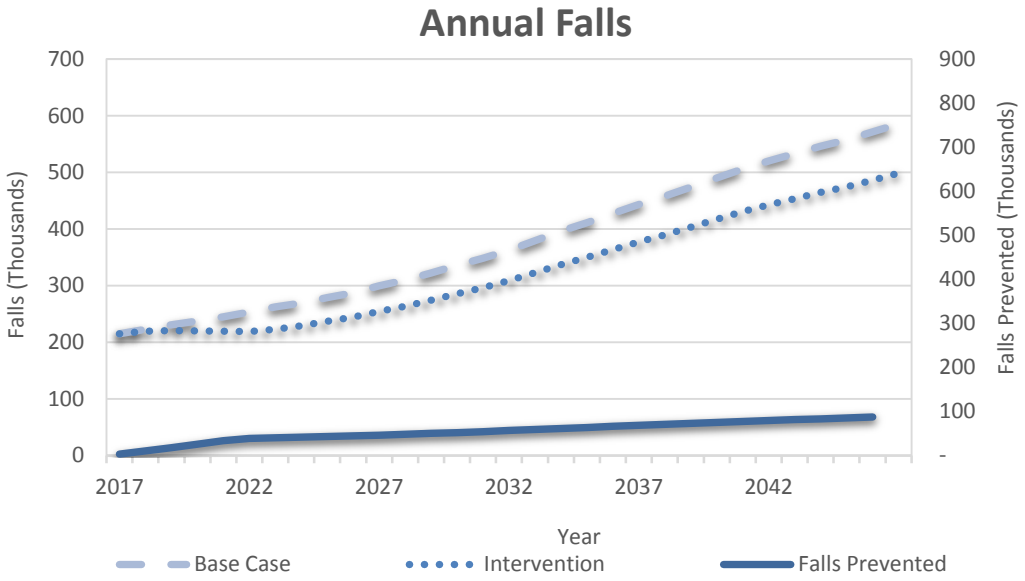
Figure 4 Annual Prescription Costs Prevented (Real, 2015$) in Canada



3.3 Adverse Events: Falls

One of the adverse events of antipsychotic medication in the elderly is the increased risk of falling (Pretorius, Gataric, Swedlun, & Miller, 2013). By reducing the number of LTC residents who are inappropriately prescribed antipsychotic medication, the risk of falling for this group is subsequently reduced. Figure 5 shows the annual number of falls between the base case (dashed line), intervention case (dotted line), and the annual number of falls prevented (blue line) due to the AP program.

Figure 5 Annual Falls in Canada

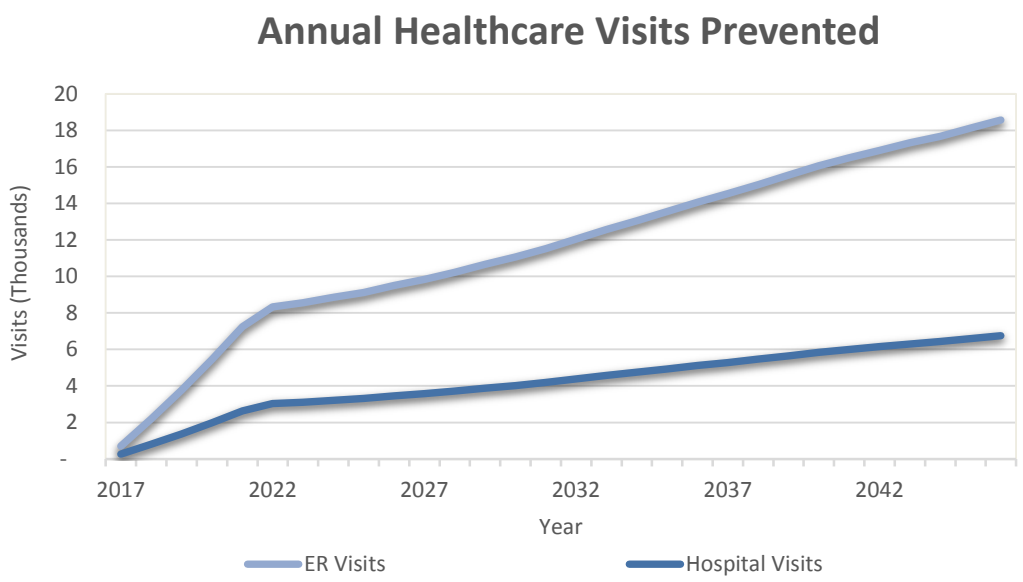


After the first five years, the AP program could prevent a total of 91,000 falls among LTC residents inappropriately prescribed AP medication, an average annual prevention of 18,000 falls. By 2046, the AP program could prevent a total of 1.6 million falls, or a 14% reduction, among LTC residents inappropriately prescribed AP medication in Canada. This is an average annual reduction in the number of falls by 55,000. This means that for every two residents that enter the program, one fall could be prevented. From another perspective, every two years, the AP program could prevent one fall in a member of the enrolled LTC population.

3.4 Fall-Related Healthcare Utilization

Preventing approximately 55,000 falls annually among enrolled LTC residents could have the added benefit of reducing the healthcare utilization associated with these falls. Figure 6 shows the ER visits and hospitalizations due to falls prevented annually over the next 30 years. After the first five years of the AP program, a total of 19,000 ER visits and 7,000 hospitalizations could be prevented. This is an average annual reduction in ER visits and hospitalizations over the first five years by 3,900 and 1,400, respectively. By 2046, a total of 349,000 ER visits and 127,000 hospitalizations could be prevented. This is a 14% reduction from the base case numbers. The annual average reductions in ER visits and hospitalizations related to falls are 12,000 and 4,200, respectively. ER visits represent 73% of all healthcare utilization prevented, while hospitalizations account for the remaining 27% of the resource utilization prevented.

Figure 6 Annual Prevented Fall-Related Healthcare Utilization in Canada



After five years, by preventing an estimated 26,000 healthcare visits across ERs and hospitals, the AP program could prevent a total of $222 million (Real, 2015$) in healthcare costs. Table 4 shows the breakdown of the total and average annual healthcare costs prevented across ERs and hospitals after 5 years.

Table 4 Fall-Related Healthcare Costs Prevented After 5 Years (Real, 2015$)

	Total Costs Prevented (Millions, Real, 2015$)	Annual Average Costs Prevented (Millions, Real, 2015$)
Emergency Room	28	6
Hospital	195	39
Total	222	45

After 30 years, by preventing a total of 475,000 healthcare visits across ERs and hospitals, the AP program could prevent a total of $5.9 billion (Real, 2015$) in healthcare costs. Table 5 shows the breakdown of the total and average annual healthcare costs prevented across ERs and hospitals after 30 years.

Table 5 Fall-Related Healthcare Costs Prevented After 30 Years (Real, 2015$)

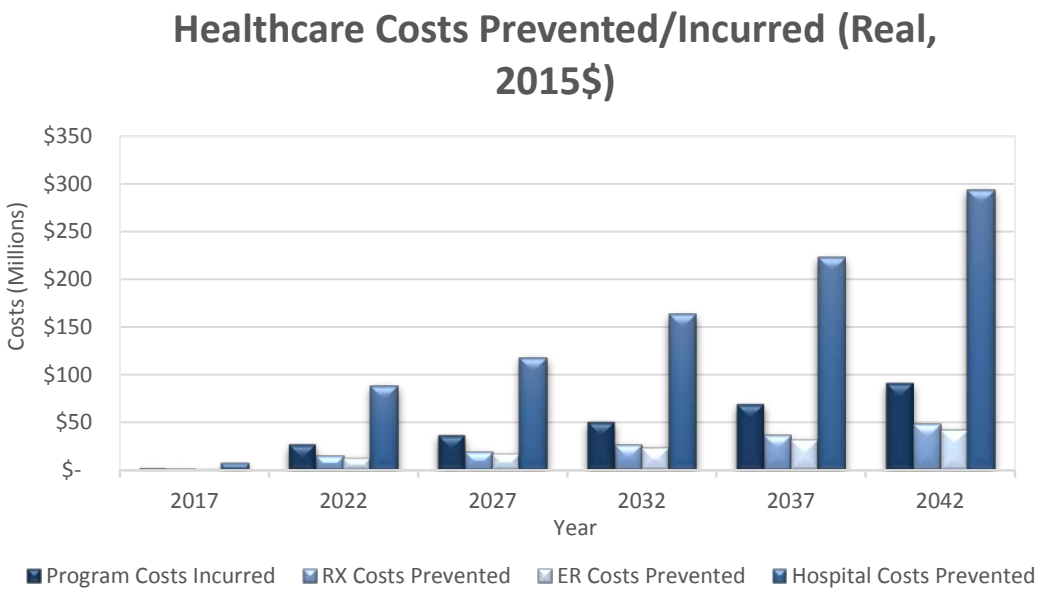
	Total Costs Prevented (Millions, Real, 2015$)	Annual Average Costs Prevented (Millions, Real, 2015$)
Emergency Room	700	25
Hospital	5,200	172
Total	5,900	197

In terms of healthcare utilization, ER visits represented 73% of the total reduction in healthcare visits and hospitalizations only accounted for 27%. However, in terms of healthcare costs prevented, ER costs represent only 12% of the total healthcare costs prevented, while prevented hospital costs represent 88%.

3.5 Net Benefit

By 2021 and 2046, the AP program could prevent a total of $254 million (Real, 2015$) and $6.7 billion in healthcare costs, respectively, by reducing the amount of antipsychotic medication inappropriately prescribed and preventing healthcare visits across ERs and hospitals. Hospital costs account for the largest portion of total costs prevented (77%), followed by prescription costs prevented (13%), and then ER costs prevented (11%). The program cost for the AP program is estimated to be $303 (Real, 2015$) per enrolled participant per year. Over the next five years, this amounts to a total of $60 million (Real, 2015$), or an average annual program cost of $12 million (Real, 2015$). Over the next 30 years, this amounts to a total of $1.6 billion (Real, 2015$) or an average annual program cost of approximately $53 million (Real, 2015$). Figure 7 shows the healthcare costs prevented and the cost incurred by the AP program.

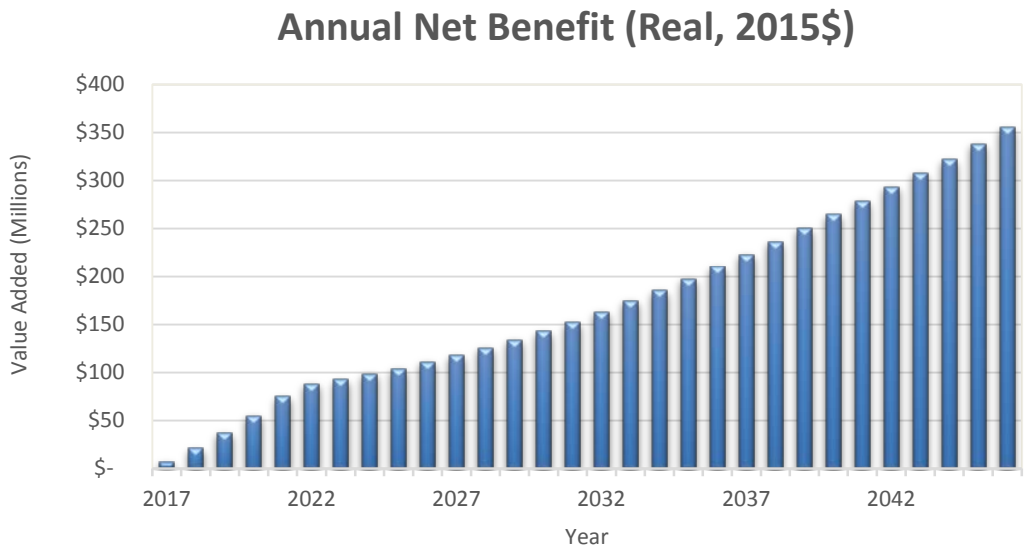
Figure 7 Healthcare Costs Prevented/Incurred (Real, 2015$) in Canada



The net benefit of the AP program is the difference between the total healthcare costs prevented across prescriptions, ERs, and hospitals, and the program cost. After the first five years of the AP program, there could be a total net benefit of $194 million (Real, 2015$), or an average annual net benefit of $39 million (Real, 2015$).

Over the next 30 years, the AP program could achieve a total net benefit of $5.2 billion (Real, 2015$)[4]. This is an average annual net benefit of $172 million (Real, 2015$). Figure 8 illustrates the annual net benefit achieved by the AP program over the next 30 years. For every $1 invested in the AP program, $4.24 (Real, 2015$) in healthcare costs could be prevented. Moreover, the average annual net benefit per eligible LTC resident enrolled could amount to $1,634 (Real, 2015$) in costs prevented.

Figure 8 Annual Net Benefit (Real, 2015$) in Canada



3.6 Provincial Analysis

The impact of the AP program was analyzed in the following provinces: Alberta, British Columbia, Manitoba, New Brunswick, Newfoundland and Labrador, Nova Scotia, Ontario, Prince Edward Island, Quebec, and Saskatchewan. For British Columbia, Alberta, Newfoundland and Labrador, Ontario, and Saskatchewan, the provincial rates of LTC residents who are inappropriately prescribed antipsychotic

[4] Net benefit of the AP program under a 10 year ramp-up period is estimated to be $4.9 billion (Real, 2015$), an average annual benefit of $165 million (Real, 2015$).

medication were used. This was 31.2%, 21.1%, 38.2%, 27.3%, and 31.3% for British Columbia, Alberta, Newfoundland and Labrador, Ontario, and Saskatchewan, respectively. For the other provinces, CIHI data was unavailable and therefore the national rate of 27.5% was used. Table 6 provides the summary of the enrollment, prescriptions prevented, falls prevented, healthcare costs prevented, program costs, and net benefits across the ten provinces.

Table 6 AP Medication Reduction Provincial Summary (Annual Averages)

Province	Enrollment	Prescriptions Prevented	Falls Prevented	Cost Prevented (Millions, Real 2015$)			Program Costs (Millions, Real, 2015$)	Net Benefit (Millions, Real 2015$)
				RX	ER	Hospital		
Alberta	7,000	979,000	3,600	2	2	11	4	11
British Columbia	15,000	2 Million	8,000	4	4	25	8	25
Manitoba	4,000	562,000	2,000	1	0.9	6	2	6
New Brunswick	2,200	315,000	1,200	0.6	0.5	4	1	4
Newfoundland and Labrador	1,700	244,000	900	0.5	0.4	3	0.9	3
Nova Scotia	3,000	432,000	1,600	0.8	0.7	5	2	5
Ontario	43,000	6 Million	22,000	12	10	70	22	70
Prince Edward Island	600	85,000	300	0.2	0.1	1	0.3	1
Quebec	25,000	4 Million	13,000	7	6	41	13	41
Saskatchewan	3,300	463,000	1,700	0.9	0.8	5	2	5

The largest impact of the AP program is in Ontario where there is an average annual enrollment of 43,000 participants. This concurs with the fact that Ontario's average annual LTC population over the next 30 years is substantially larger than the other provinces with just over 165,000 residents, almost five times as large as Alberta's LTC population of 34,000. With the smallest LTC population, Prince Edward Island has the smallest impact, with an average annual enrollment of 600 LTC residents over the next 30 years. However, even with a low enrollment, Prince Edward Island could generate an average annual net benefit of approximately $1 million (Real, 2015$).

3.7 Sensitivity Analysis

Section 2.2.4 outlines the assumptions and parameters that define the AP program. Sensitivity analysis was conducted on the program coverage and fall rate. Similarly to the INSPIRED program, the program coverage parameter was varied from 0 (base case) to 1 (100% coverage of the eligible population). The parameter was increased in increments of 0.25. The change in the fall rate was varied from 22% to 24% based on the range of the impact seen in the AP program.

Table 7 shows how the average annual program enrollment, prescriptions prevented, prevented prescription costs, falls prevented, healthcare utilization prevented, healthcare costs prevented, program costs, and net benefits of the program vary by the ability of the AP program to enroll all eligible participants. At a coverage where 25% of the eligible population is enrolled, the AP program could still generate an average annual net benefit of $43 million (Real, 2015$). At a 50% coverage, the AP program could have an average annual net benefit of $86 million (Real, 2015$).

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

Program Coverage	Enrollment	RX Prevented (Millions)	RX Costs Prevented (Millions, Real, 2015$)	Falls Prevented	Healthcare Utilization Prevented	Healthcare Costs Prevented (Millions, Real, 2015$)	Program Costs (Millions, Real, 2015$)	Net Benefit (Million, Real, 2015$)
0.25	26,000	4	7	14,000	4,000	49	13	43
0.5	53,000	8	14	27,000	8,000	98	27	86
0.75	79,000	11	21	41,000	12,000	148	40	129
1	105,000	15	28	55,000	16,000	197	53	172

Table 8 illustrates how the average annual number of falls prevented, prevented healthcare utilization, prevented healthcare costs, program costs, and net benefit of the AP program vary with the rate at which people fall. The net benefit decreases in the upper bound of this parameter from $172 million (Real, 2015$) to $85 million (Real, 2015$). Although more people fall in the "upper bound" scenario, the number of falls prevented, and therefore the healthcare utilization costs prevented, actually decrease. This is due to the fact that there are a fixed number of hospital/ER visits in the model. If more people fall, but the number of hospital/ER visits remains the same, then the rate at which individuals who fall visit an ER/hospital decreases. This reduces the ability for the AP program to prevent healthcare costs.

Table 8 Fall Rate Sensitivity Analysis, Average Annual Results (Real, 2015$)

Fall Rate	Falls Prevented	Healthcare Utilization Prevented	Healthcare Costs Prevented (Millions, Real, 2015$)	Program Costs (Millions, Real, 2015$)	Net Benefit (Millions, Real, 2015$)
Lower Bound	55,000	16,000	197	53	172
Upper Bound	30,000	9,000	110	53	85

Table 9 shows how the net benefit of the AP program changes when we vary both the program coverage (0.25, 0.50, 0.75, and 1) and the fall rate. At the lowest coverage (0.25) and upper fall rate, the AP program could still achieve a substantial average annual net benefit of $21 million (Real, 2015$). At the highest coverage (1) and lower fall rate, the AP program has a potential annual net benefit of $172 million. At a 50% coverage, the potential average annual net benefit of the AP program is $64 million (Real, 2015$) (between $42 million and $86 million (Real, 2015$)) across the two fall rate parameters.

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

Net Benefit (Millions, Real, 2015$)		Program Coverage			
		0.25	0.5	0.75	1
Fall Rate	Lower Bound	43	86	129	172
	Upper Bound	21	42	64	85

4.0 CONCLUSIONS

The purpose of this report was to estimate the potential impact of expanding CFHI's Reducing Antipsychotic Medication Use in Long-Term Care Collaborative across Canada. The program targets long-term care residents who are prescribed antipsychotic medications without a diagnosis of psychosis. The program demonstrated substantial cost savings and improved resident and family experience of care.

Over the first five years of the program, 35,000 LTC residents inappropriately prescribed medication could be enrolled thereby preventing a total of 25 million inappropriate prescriptions of AP medication further preventing a total of $32 million (Real, 2015$) in prescription costs by 2021. Moreover, the program could reduce the total number of falls in this LTC population by 91,000 preventing 19,000 ER visits and 7,000 hospitalizations. This could prevent $28 million (Real, 2015$) in ER costs and $195 million (Real, 2015$) in hospital costs over this five year period. By 2021, the program could achieve an estimated total net benefit of $194 million (Real, 2015$), an average annual net benefit of $39 million (Real, 2015$).

Over the next 30 years, the program could enroll an average of 105,000 LTC residents per year. The program could prevent a total of 448 million antipsychotic prescriptions, an average annual reduction of 15 million prescriptions. The reduction in AP medications prescribed could decrease the cost of these medications by 35%, an average annual prevention of $28 million (Real, 2015$) in AP prescription costs. Moreover, with falls being one of the adverse events associated with antipsychotic medication, there could be an average annual reduction of 55,000 falls among the eligible LTC population. A reduction in the number of falls among this group will reduce the healthcare utilization associated with falls by 14% or a total of 349,000 ER visits and 127,000 hospitalizations. This represents an average annual reduction in ER visits and hospitalizations by 12,000 and 4,200, respectively. The healthcare costs prevented due to the reduction in falls could amount to approximately $5.9 billion (Real, 2015$) by 2046. This is a 14% reduction from the base case, and is composed of $700 million (Real, 2015$) in ER costs prevented and $5.2 billion (Real, 2015$) in hospital costs prevented. This represents average annual cost preventions of $25 million (Real, 2015$) and $172 million (Real, 2015$) for ER and hospital costs, respectively. With an average annual program cost of $53 million (Real, 2015$), the AP program could have a total net benefit by 2046 of $5.2 billion (Real, 2015$) (average annual net benefit of $172 million (Real, 2015$)). For each $1 invested in the AP program, $4.24 (Real, 2015$) in healthcare costs can be prevented. The average annual net benefit for each eligible LTC resident enrolled is $1,634 (Real, 2015$).

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B. AP PROVINCIAL ANALYSIS

B.1. ALBERTA

After the first five years, an annual average of 2,000 long-term care (LTC) residents prescribed antipsychotic medication without a diagnosis of psychosis could have their prescriptions reduced or discontinued if the AP program were spread throughout Alberta. Over the entire 30-year timeframe of the analysis, the AP program in Alberta could have an average annual enrollment of 7,000 long-term care residents. Through the AP program, a cumulative total of 1.5 million and 29 million antipsychotic prescriptions could be avoided by 2021 and 2046, respectively. This could prevent a total of $2 million (Real, 2015$) and $56 million (Real, 2015$) in prescription costs after five years and 30 years, respectively.

By reducing the number of LTC residents on antipsychotic medication, the AP program could help prevent falls, which are a common adverse event associated with such medication (Pretorius, Gataric, Swedlun, & Miller, 2013). Table 10 illustrates the average annual prevention and total prevention after five and 30 years across falls, ER visits, and hospitalizations.

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

	Average Annual Prevention			Total Prevention		
	Falls	ER Visits	Hospitalizations	Falls	ER Visits	Hospitalizations
5-Year Results	1,100	230	80	5,400	1,100	400
30-Year Results	3,600	760	300	108,000	23,000	8,300

The graph on the right of Figure 9 illustrates the value added to the healthcare system by preventing the aforementioned healthcare utilization due to falls. After 5 years, the program could prevent a total of $13 million (Real, 2015$) in fall-related healthcare costs. The breakdown of the fall-related healthcare costs prevented are:

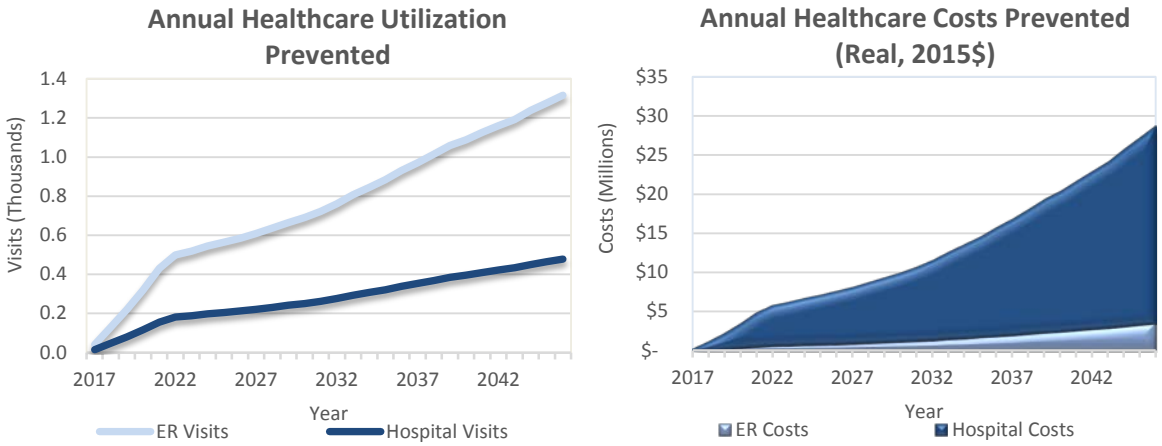
- $2 million in ER costs (Real, 2015$), or an average annual prevention of $327,000 (Real, 2015$); and
- $11 million in hospital costs (Real, 2015$), or an average annual prevention of $2 million (Real, 2015$).

After 30 years, a total of $391 million (Real, 2015$) in fall-related healthcare costs could be prevented. By 2046, the AP program could prevent a total of:

- $49 million (Real, 2015$), or an average annual prevention of $2 million (Real, 2015$), in ER costs; and
- $342 million (Real, 2015$), or an average annual prevention of $11 million (Real, 2015$), in hospital costs.

The total healthcare costs (prescriptions, ER, and hospital) prevented through the AP program in Alberta represent 7% of the total healthcare costs expected to be prevented by the AP program in all of Canada.

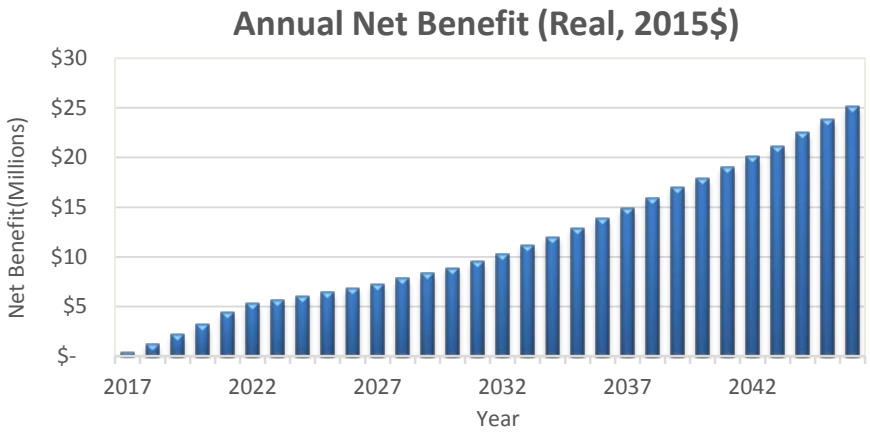
Figure 9 Annual Healthcare Utilization and Costs (Real, 2015$) Prevented in Alberta



The annual net benefit of the program is illustrated in Figure 10. Over the first five years, the AP program could have a total net benefit of $12 million (Real, 2015$). This is an average annual net benefit of $2 million (Real, 2015$). Over the next 30 years, the AP program is expected to have a total net benefit of $341 million (Real, 2015$) in Alberta[5]. The average annual net benefit of the program in Alberta is estimated to be $11 million (Real, 2015$) over the analysis period. For every $1 invested in the AP program in Alberta, $4.24 (Real, 2015$) are saved in healthcare utilization costs. Moreover, the average annual net benefit per eligible LTC resident enrolled is $1,650 (Real, 2015$).

[5] Under a 10-year ramp-up period, the total net benefit of the AP program in Alberta could be $324 million (Real, 2015$), an average annual net benefit of $10.8 million (Real, 2015$), over the next 30 years.

Figure 10 Annual Net Benefit (Real, 2015$) in Alberta



SENSITIVITY ANALYSIS

Sensitivity analysis was conducted on the program coverage and fall rate within Alberta. The program coverage parameter was varied from 0 (base case) to 1 (100% coverage of the eligible population), in increments of 0.25. Meanwhile, the change in the fall rate was varied from 22% to 24%.

Table 11 shows the possible net benefits of the AP program in Alberta when we vary both the program coverage (0.25, 0.50, 0.75, and 1) and the fall rate. At a 25% coverage (0.25) and upper fall rate, the AP program could still achieve a substantial average annual net benefit of $1 million (Real, 2015$). At the highest coverage (1) and lower fall rate, the AP program has a potential annual net benefit of $11 million (Real, 2015$). At a 50% coverage, the potential average annual net benefit of the AP program is $4.5 million (Real, 2015$) (between $3 million and $6 million (Real, 2015$)) across the two fall rate parameters.

Table 11 Fall Rate and Program Coverage Sensitivity Analysis (Annual Averages) in Alberta

Net Benefit (Millions, Real, 2015$)		Program Coverage			
		0.25	0.5	0.75	1
Fall Rate	Lower Bound	3	6	9	11
	Upper Bound	1	3	4	6

CONCLUSION

Over the next five years, the AP program in Alberta is expected to enroll an average of 2,000 LTC residents per year. Over the next 30 years, the AP program in Alberta is expected to enroll an average of 7,000 LTC residents per year. Table 12 shows the five-year and 30-year average annual and cumulative total results of the AP program in Alberta. For every $1 invested in the AP program in Alberta, $4.24 (Real, 2015$) could be prevented in healthcare utilization costs. Moreover, the average annual net benefit per eligible LTC resident enrolled is $1,650 (Real, 2015$).

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

	Average Annual Results		Cumulative Total Results	
	5-Years	30-Years	5-Years	30-Years
Prescriptions Prevented (Millions)	0.3	1	1.5	29
Falls Prevented	1,100	3,600	5,400	108,000
Healthcare Utilization Prevented	310	1,060	1,500	31,300
Healthcare Costs Prevented (Millions, Real, 2015$)	3	15	15	446
Program Cost (Millions, Real, 2015$)	0.7	4	3	105
Net Benefit (Millions, Real, 2015$)	2	11	12	341

B.2. BRITISH COLUMBIA (BC)

After the first five years, an annual average of 5,000 long-term care (LTC) residents prescribed antipsychotic medication without a diagnosis of psychosis could have their prescriptions reduced or discontinued if the AP program were spread throughout British Columbia. Over the entire 30-year timeframe of the analysis, the AP program in British Columbia could have an average annual enrollment of 15,000 long-term care residents. Through the AP program, a cumulative total of 3.5 million and 65 million antipsychotic prescriptions could be avoided by 2021 and 2046, respectively. This could prevent a total of $4 million (Real, 2015$) and $123 million (Real, 2015$) in prescription costs after five years and 30 years, respectively.

By reducing the number of LTC residents on antipsychotic medication, the AP program could help prevent falls, which are a common adverse event associated with such medication (Pretorius, Gataric, Swedlun, & Miller, 2013). Table 13 illustrates the average annual prevention and total prevention after five and 30 years across falls, ER visits, and hospitalizations.

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

	Average Annual Prevention			Total Prevention		
	Falls	ER Visits	Hospitalizations	Falls	ER Visits	Hospitalizations
5-Year Results	2,500	540	200	12,700	2,700	1,000
30-Year Results	8,000	1,700	600	238,000	51,000	18,400

The graph on the right of Figure 11 illustrates the value added to the healthcare system by preventing the aforementioned healthcare utilization due to falls. After 5 years, the program could prevent a total of $31 million (Real, 2015$) in fall-related healthcare costs. The breakdown of the fall-related healthcare costs prevented are:

- $4 million in ER costs (Real, 2015$), or an average annual prevention of $800,000 (Real, 2015$); and
- $27 million in hospital costs (Real, 2015$), or an average annual prevention of $5 million (Real, 2015$).

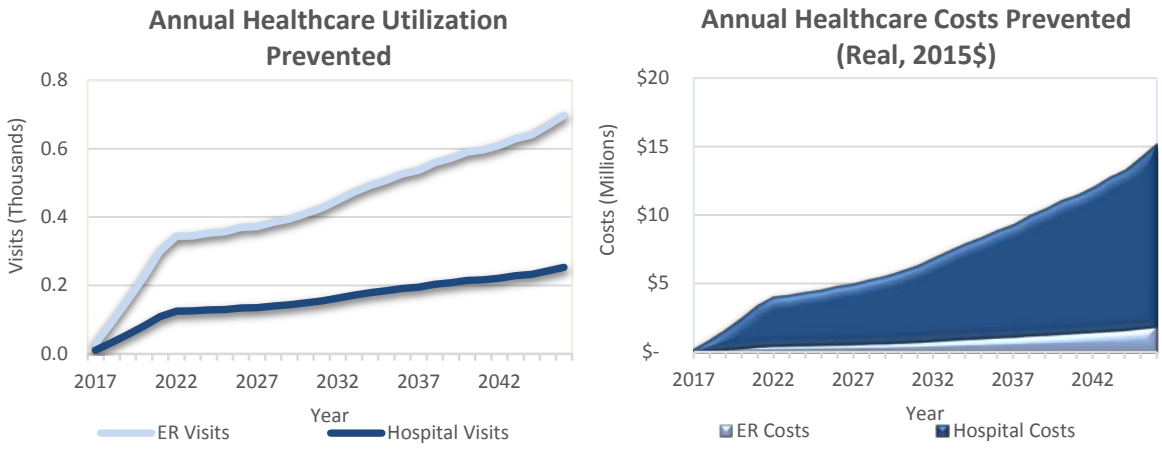
After 30 years, a total of $858 million (Real, 2015$) in fall-related healthcare costs could be prevented. By 2046, the AP program could prevent a total of:

- $107 million (Real, 2015$), or an average annual prevention of $4 million (Real, 2015$), in ER costs; and

- $751 million (Real, 2015$), or an average annual prevention of $25 million (Real, 2015$), in hospital costs.

The total healthcare costs (prescriptions, ER, and hospital) prevented through the AP program in British Columbia represent 15% of the total healthcare costs expected to be prevented by the AP program in all of Canada.

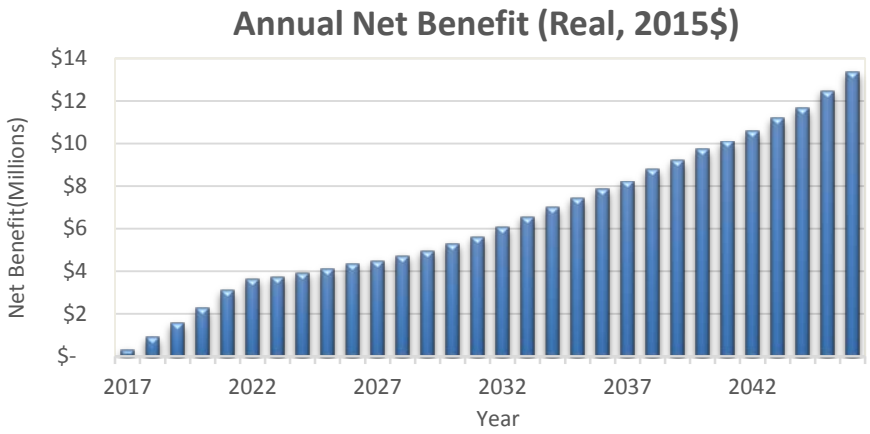
Figure 11 Annual Healthcare Utilization and Costs (Real, 2015$) Prevented in BC



The annual net benefit of the program is illustrated in Figure 12. Over the first five years, the AP program could have a total net benefit of $27 million (Real, 2015$). This is an average annual net benefit of $5 million (Real, 2015$). Over the next 30 years, the AP program is expected to have a total net benefit of $749 million (Real, 2015$) in British Columbia[6]. The average annual net benefit of the program in British Columbia is estimated to be $25 million (Real, 2015$) over the analysis period. For every $1 invested in the AP program in British Columbia, $4.24 (Real, 2015$) are saved in healthcare utilization costs. Moreover, the average annual net benefit per eligible LTC resident enrolled is $1,639 (Real, 2015$).

[6] Under a 10-year ramp-up period, the total net benefit of the AP program in British Columbia could be $710 million (Real, 2015$), an average annual net benefit of $24 million (Real, 2015$), over the next 30 years.

Figure 12 Annual Net Benefit (Real, 2015$) in BC



SENSITIVITY ANALYSIS

Sensitivity analysis was conducted on the program coverage and fall rate within British Columbia. The program coverage parameter was varied from 0 (base case) to 1 (100% coverage of the eligible population), in increments of 0.25. Meanwhile, the change in the fall rate was varied from 22% to 24%.

Table 14 shows the possible net benefits of the AP program in British Columbia when we vary both the program coverage (0.25, 0.50, 0.75, and 1) and the fall rate. At a 25% coverage (0.25) and upper fall rate, the AP program could still achieve a substantial average annual net benefit of $3 million (Real, 2015$). At the highest coverage (1) and lower fall rate, the AP program has a potential annual net benefit of $25 million (Real, 2015$). At a 50% coverage, the potential average annual net benefit of the AP program is $9 million (Real, 2015$) (between $6 million and $12 million (Real, 2015$)) across the two fall rate parameters.

Table 14 Fall Rate and Program Coverage Sensitivity Analysis (Annual Averages) in BC

Net Benefit (Millions, Real, 2015$)		Program Coverage			
		0.25	0.5	0.75	1
Fall Rate	Lower Bound	6	12	19	25
	Upper Bound	3	6	9	12

CONCLUSION

Over the next five years, the AP program in British Columbia is expected to enroll an average of 5,000 LTC residents per year. Over the next 30 years, the AP program in British Columbia is expected to enroll an

average of 15,000 LTC residents per year. Table 15 shows the five-year and 30-year average annual and cumulative total results of the AP program in British Columbia. For every $1 invested in the AP program in British Columbia, $4.24 (Real, 2015$) could be prevented in healthcare utilization costs. Moreover, the average annual net benefit per eligible LTC resident enrolled is $1,639 (Real, 2015$).

Table 15 Average Annual and Cumulative Total Results after 5- and 30-years of the AP Program in BC

	Average Annual Results		Cumulative Total Results	
	5-Years	30-Years	5-Years	30-Years
Prescriptions Prevented (Millions)	0.7	2	3.5	65
Falls Prevented	2,500	8,000	12,700	238,000
Healthcare Utilization Prevented	640	2,300	3,700	69,400
Healthcare Costs Prevented (Millions, Real, 2015$)	7	33	35	980
Program Cost (Millions, Real, 2015$)	2	8	8	231
Net Benefit (Millions, Real, 2015$)	5	25	27	749

B.3. MANITOBA

After the first five years, an annual average of 1,500 long-term care (LTC) residents prescribed antipsychotic medication without a diagnosis of psychosis could have their prescriptions reduced or discontinued if the AP program were spread throughout Manitoba. Over the entire 30-year timeframe of the analysis, the AP program in Manitoba could have an average annual enrollment of 4,000 long-term care residents. Through the AP program, a cumulative total of 1 million and 17 million antipsychotic prescriptions could be avoided by 2021 and 2046, respectively. This could prevent a total of $1.3 million (Real, 2015$) and $32 million (Real, 2015$) in prescription costs after five years and 30 years, respectively.

By reducing the number of LTC residents on antipsychotic medication, the AP program could help prevent falls, which are a common adverse event associated with such medication (Pretorius, Gataric, Swedlun, & Miller, 2013). Table 16 illustrates the average annual prevention and total prevention after five and 30 years across falls, ER visits, and hospitalizations.

Table 16 5-Year and 30-Year Healthcare Resource Utilization Results of the AP Program in Manitoba

	Average Annual Prevention			Total Prevention		
	Falls	ER Visits	Hospitalizations	Falls	ER Visits	Hospitalizations
5-Year Results	800	160	60	3,800	800	300
30-Year Results	2,000	440	160	62,000	13,100	4,800

The graph on the right of Figure 13 illustrates the value added to the healthcare system by preventing the aforementioned healthcare utilization due to falls. After 5 years, the program could prevent a total of $9 million (Real, 2015$) in fall-related healthcare costs. The breakdown of the fall-related healthcare costs prevented are:

- $1 million in ER costs (Real, 2015$), or an average annual prevention of $230,000 (Real, 2015$); and
- $8 million in hospital costs (Real, 2015$), or an average annual prevention of $2 million (Real, 2015$).

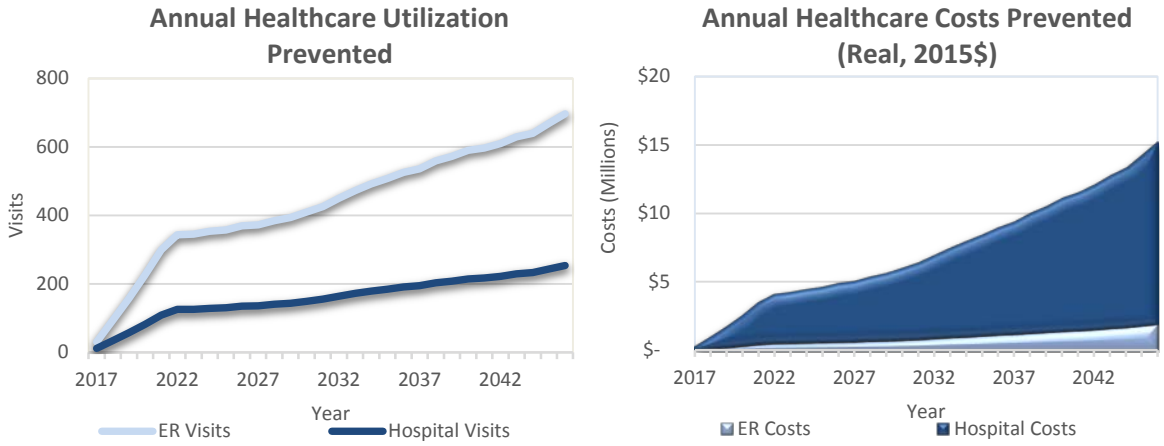
After 30 years, a total of $221 million (Real, 2015$) in fall-related healthcare costs could be prevented. By 2046, the AP program could prevent a total of:

- $28 million (Real, 2015$), or an average annual prevention of $917,000 (Real, 2015$), in ER costs; and

- $193 million (Real, 2015$), or an average annual prevention of $6 million (Real, 2015$), in hospital costs.

The total healthcare costs (prescriptions, ER, and hospital) prevented through the AP program in Manitoba represent 3% of the total healthcare costs expected to be prevented by the AP program in all of Canada.

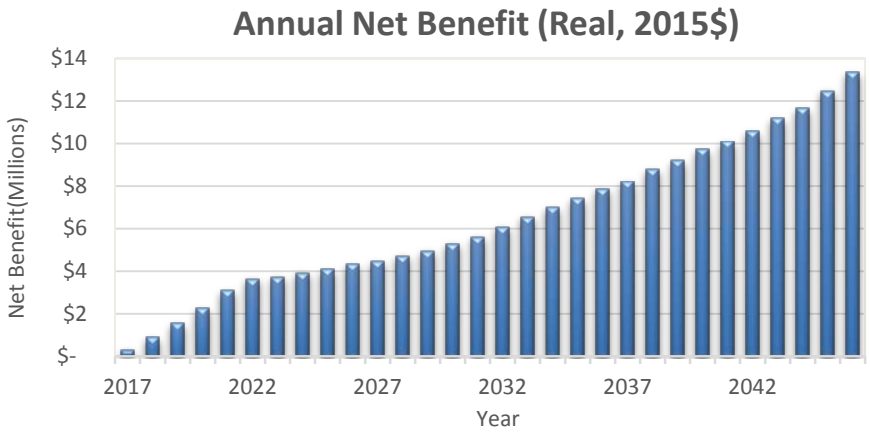
Figure 13 Annual Healthcare Utilization and Costs (Real, 2015$) in Manitoba



The annual net benefit of the program is illustrated in Figure 14. Over the first five years, the AP program could have a total net benefit of $8 million (Real, 2015$). This is an average annual net benefit of $2 million (Real, 2015$). Over the next 30 years, the AP program is expected to have a total net benefit of $193 million (Real, 2015$) in Manitoba[7]. The average annual net benefit of the program in Manitoba is estimated to be $6 million (Real, 2015$) over the analysis period. For every $1 invested in the AP program in Manitoba, $4.24 (Real, 2015$) are saved in healthcare utilization costs. Moreover, the average annual net benefit per eligible LTC resident enrolled is $1,624 (Real, 2015$).

[7] Under a 10-year ramp-up period, the total net benefit of the AP program in Manitoba could be $181 million (Real, 2015$), an average annual net benefit of $6 million (Real, 2015$), over the next 30 years.

Figure 14 Annual Net Benefit (Real, 2015$) in Manitoba



SENSITIVITY ANALYSIS

Sensitivity analysis was conducted on the program coverage and fall rate within Manitoba. The program coverage parameter was varied from 0 (base case) to 1 (100% coverage of the eligible population), in increments of 0.25. Meanwhile, the change in the fall rate was varied from 22% to 24%.

Table 17 shows the possible net benefits of the AP program in Manitoba when we vary both the program coverage (0.25, 0.50, 0.75, and 1) and the fall rate. At a 25% coverage (0.25) and upper fall rate, the AP program could still achieve an average annual net benefit of 800,000 (Real, 2015$). At the highest coverage (1) and lower fall rate, the AP program has a potential annual net benefit of $6 million (Real, 2015$). At a 50% coverage, the potential average annual net benefit of the AP program is $1.5 million (Real, 2015$) (between $2 million and $3 million (Real, 2015$)) across the two fall rate parameters.

Table 17 Fall Rate and Program Coverage Sensitivity Analysis (Annual Averages) in Manitoba

Net Benefit (Millions, Real, 2015$)		Program Coverage			
		0.25	0.5	0.75	1
Fall Rate	Lower Bound	2	3	5	6
	Upper Bound	0.8	2	2	3

CONCLUSION

Over the next five years, the AP program in Manitoba is expected to enroll an average of 1,500 LTC residents per year. Over the next 30 years, the AP program in Manitoba is expected to enroll an average of 4,000 LTC residents per year. Table 18 shows the five-year and 30-year average annual and cumulative total results of the AP program in Manitoba. For every $1 invested in the AP program in Manitoba, $4.24 (Real, 2015$) could be prevented in healthcare utilization costs. Moreover, the average annual net benefit per eligible LTC resident enrolled is $1,624 (Real, 2015$).

Table 18 Average Annual and Cumulative Total Results after 5- and 30-years of the AP Program in Manitoba

	Average Annual Results		Cumulative Total Results	
	5-Years	30-Years	5-Years	30-Years
Prescriptions Prevented (Millions)	0.2	0.6	1	17
Falls Prevented	800	2,000	3,800	62,000
Healthcare Utilization Prevented	220	600	4,600	75,100
Healthcare Costs Prevented (Millions, Real, 2015$)	2	8	11	252
Program Cost (Millions, Real, 2015$)	0.5	2	3	59
Net Benefit (Millions, Real, 2015$)	2	6	8	193

B.4. New Brunswick

After the first five years, an annual average of 800 long-term care (LTC) residents prescribed antipsychotic medication without a diagnosis of psychosis could have their prescriptions reduced or discontinued if the AP program were spread throughout New Brunswick. Over the entire 30-year timeframe of the analysis, the AP program in New Brunswick could have an average annual enrollment of 2,200 long-term care residents. Through the AP program, a cumulative total of 600,000 and 9 million antipsychotic prescriptions could be avoided by 2021 and 2046, respectively. This could prevent a total of $700,000 (Real, 2015$) and $18 million (Real, 2015$) in prescription costs after five years and 30 years, respectively.

By reducing the number of LTC residents on antipsychotic medication, the AP program could help prevent falls, which are a common adverse event associated with such medication (Pretorius, Gataric, Swedlun, & Miller, 2013). Table 19 illustrates the average annual prevention and total prevention after 5 and 30 years across falls, ER visits, and hospitalizations.

Table 19 5-Year and 30-Year Healthcare Resource Utilization Results of the AP Program in New Brunswick

	Average Annual Prevention			Total Prevention		
	Falls	ER Visits	Hospitalizations	Falls	ER Visits	Hospitalizations
5-Year Results	400	90	30	2,000	430	160
30-Year Results	1,200	250	90	35,000	7,400	2,700

The graph on the right of Figure 15 illustrates the value added to the healthcare system by preventing the aforementioned healthcare utilization due to falls. After 5 years, the program could prevent a total of $5 million (Real, 2015$) in healthcare costs due to falls. The breakdown of the fall-related healthcare costs prevented are:

- $600,000 in ER costs (Real, 2015$), or an average annual prevention of $123,000 (Real, 2015$); and
- $4 million in hospital costs (Real, 2015$), or an average annual prevention of $900,000 (Real, 2015$).

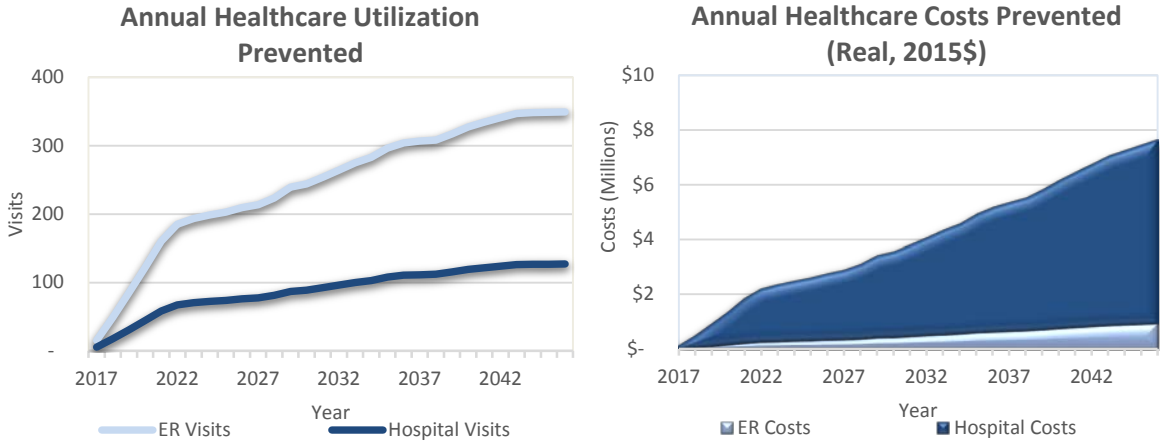
After 30 years, a total of $123 million (Real, 2015$) in fall-related healthcare costs could be prevented. By 2046, the AP program could prevent a total of:

- $15 million (Real, 2015$), or an average annual prevention of $500,000 (Real, 2015$), in ER costs; and

- $108 million (Real, 2015$), or an average annual prevention of $4 million (Real, 2015$), in hospital costs.

The total healthcare costs (prescriptions, ER, and hospital) prevented through the AP program in New Brunswick represent 2% of the total healthcare costs expected to be prevented by the AP program in all of Canada.

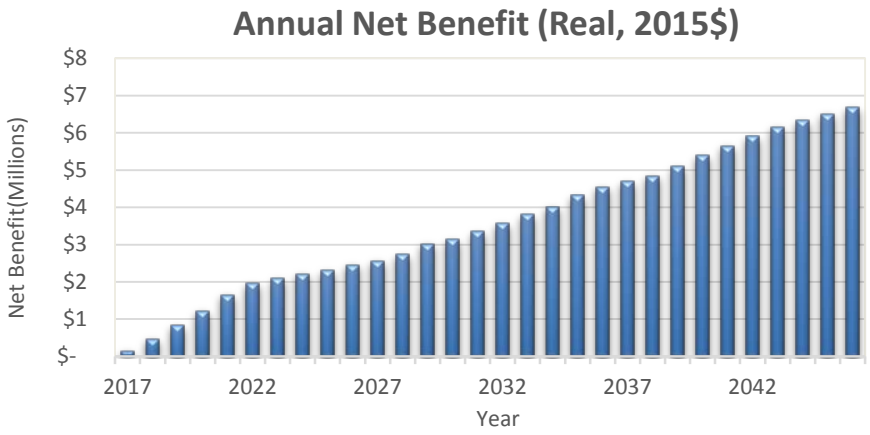
Figure 15 Annual Healthcare Utilization and Costs (Real, 2015$) Prevented in New Brunswick



The annual net benefit of the program is illustrated in Figure 16. Over the first five years, the AP program could have a total net benefit of $4 million (Real, 2015$). This is an average annual net benefit of $900,000 (Real, 2015$). Over the next 30 years, the AP program is expected to have a total net benefit of $107 million (Real, 2015$) in New Brunswick[8]. The average annual net benefit of the program in New Brunswick is estimated to be $4 million (Real, 2015$) over the analysis period. For every $1 invested in the AP program in New Brunswick, $4.24 (Real, 2015$) are saved in healthcare utilization costs. Moreover, the average annual net benefit per eligible LTC resident enrolled is $1,619 (Real, 2015$).

[8] Under a 10-year ramp-up period, the total net benefit of the AP program in New Brunswick could be $103 million (Real, 2015$), an average annual net benefit of $3 million (Real, 2015$), over the next 30 years.

Figure 16 Annual Net Benefit (Real, 2015$) in New Brunswick



SENSITIVITY ANALYSIS

Sensitivity analysis was conducted on the program coverage and fall rate within New Brunswick. The program coverage parameter was varied from 0 (base case) to 1 (100% coverage of the eligible population), in increments of 0.25. Meanwhile, the change in the fall rate was varied from 22% to 24%.

Table 20 shows the possible net benefits of the AP program in New Brunswick when we vary both the program coverage (0.25, 0.50, 0.75, and 1) and the fall rate. At a 25% coverage (0.25) and upper fall rate, the AP program could still achieve a substantial average annual net benefit of $400,000 (Real, 2015$). At the highest coverage (1) and lower fall rate, the AP program has a potential annual net benefit of $4 million (Real, 2015$). At a 50% coverage, the potential average annual net benefit of the AP program is $1.4 million (Real, 2015$) (between $900,000 and $2 million (Real, 2015$)) across the two fall rate parameters.

Table 20 Fall Rate and Program Coverage Sensitivity Analysis (Annual Averages) in New Brunswick

Net Benefit (Millions, Real, 2015$)		Program Coverage			
		0.25	0.5	0.75	1
Fall Rate	Lower Bound	0.9	2	3	4
	Upper Bound	0.4	0.9	1	2

CONCLUSION

Over the next five years, the AP program in New Brunswick is expected to enroll an average of 800 LTC residents per year. Over the next 30 years, the AP program in New Brunswick is expected to enroll an

average of 2,200 LTC residents per year. Table 21 shows the five-year and 30-year average annual and cumulative total results of the AP program in New Brunswick. For every $1 invested in the AP program in New Brunswick, $4.24 (Real, 2015$) could be prevented in healthcare utilization costs. Moreover, the average annual net benefit per eligible LTC resident enrolled is $1,619 (Real, 2015$).

Table 21 Average Annual and Cumulative Total Results after 5- and 30-years of the AP Program in New Brunswick

	Average Annual Results		Cumulative Total Results	
	5-Years	30-Years	5-Years	30-Years
Prescriptions Prevented (Millions)	0.1	0.3	0.6	9
Falls Prevented	400	1,200	2,000	35,000
Healthcare Utilization Prevented	120	340	590	10,000
Healthcare Costs Prevented (Millions, Real, 2015$)	1.1	5	5.6	141
Program Cost (Millions, Real, 2015$)	0.3	1	1.3	33
Net Benefit (Millions, Real, 2015$)	0.9	4	4	108

B.5. Newfoundland and Labrador

After the first five years, an annual average of 600 long-term care (LTC) residents prescribed antipsychotic medication without a diagnosis of psychosis could have their prescriptions reduced or discontinued if the AP program were spread throughout Newfoundland and Labrador. Over the entire 30-year timeframe of the analysis, the AP program in Newfoundland and Labrador could have an average annual enrollment of 1,700 long-term care residents. Through the AP program, a cumulative total of 400,000 and 7.3 million antipsychotic prescriptions could be avoided by 2021 and 2046, respectively. This could prevent a total of $506,000 (Real, 2015$) and $14 million (Real, 2015$) in prescription costs after five years and 30 years, respectively.

By reducing the number of LTC residents on antipsychotic medication, the AP program could help prevent falls, which are a common adverse event associated with such medication (Pretorius, Gataric, Swedlun, & Miller, 2013). Table 22 illustrates the average annual prevention and total prevention after five and 30 years across falls, ER visits, and hospitalizations.

Table 22 5-Year and 30-Year Healthcare Resource Utilization Results of the AP Program in Newfoundland and Labrador

	Average Annual Prevention			Total Prevention		
	Falls	ER Visits	Hospitalizations	Falls	ER Visits	Hospitalizations
5-Year Results	300	60	20	1,500	100	230
30-Year Results	900	70	140	27,000	2,100	4,300

The graph on the right of Figure 17 illustrates the value added to the healthcare system by preventing the aforementioned healthcare utilization due to falls. After 5 years, the program could prevent a total of $3.5 million (Real, 2015$) in fall-related healthcare costs. The breakdown of the fall-related healthcare costs prevented are:

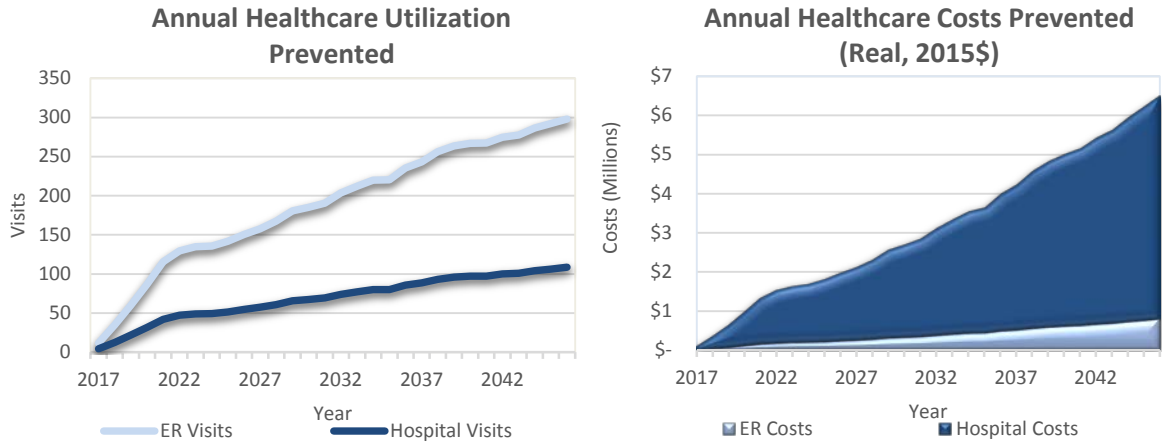
- $441,000 in ER costs (Real, 2015$), or an average annual prevention of $88,000 (Real, 2015$); and
- $3.1 million in hospital costs (Real, 2015$), or an average annual prevention of $619,000 (Real, 2015$).

After 30 years, a total of $97 million (Real, 2015$) in fall-related healthcare costs could be prevented. By 2046, the AP program could prevent a total of:

- $12 million (Real, 2015$), or an average annual prevention of $400,000 (Real, 2015$), in ER costs; and
- $85 million (Real, 2015$), or an average annual prevention of $2.8 million (Real, 2015$), in hospital costs.

The total healthcare costs (prescriptions, ER, and hospital) prevented through the AP program in Newfoundland and Labrador represent 1.6% of the total healthcare costs expected to be prevented by the AP program in all of Canada.

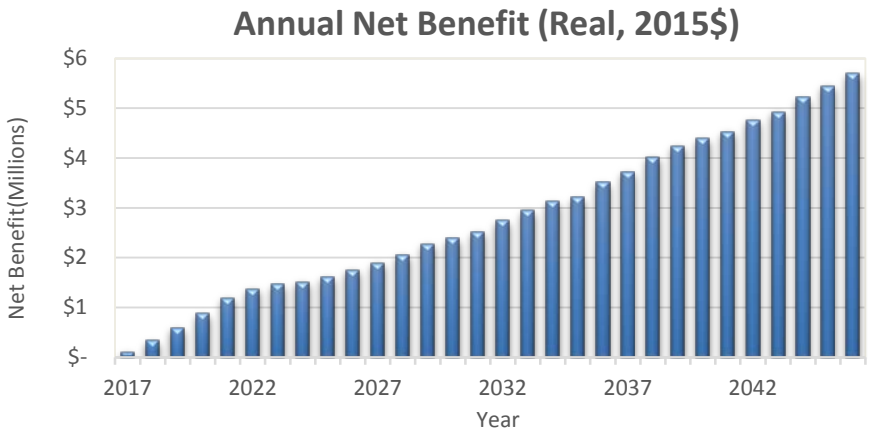
Figure 17 Annual Healthcare Utilization and Costs (Real, 2015$) Prevented in Newfoundland and Labrador



The annual net benefit of the program is illustrated in Figure 18. Over the first five years, the AP program could have a total net benefit of $3.1 million (Real, 2015$). This is an average annual net benefit of $618,000 (Real, 2015$). Over the next 30 years, the AP program is expected to have a total net benefit of $84 million (Real, 2015$) in Newfoundland and Labrador[9]. The average annual net benefit of the program in Newfoundland and Labrador is estimated to be $2.8 million (Real, 2015$) over the analysis period. For every $1 invested in the AP program in Newfoundland and Labrador, $4.24 (Real, 2015$) are saved in healthcare utilization costs. Moreover, the average annual net benefit per eligible LTC resident enrolled is $1,636 (Real, 2015$).

[9] Under a 10-year ramp-up period, the total net benefit of the AP program in Newfoundland and Labrador could be $80 million (Real, 2015$), an average annual net benefit of $2.7 million (Real, 2015$), over the next 30 years.

Figure 18 Annual Net Benefit (Real, 2015$) in Newfoundland and Labrador



SENSITIVITY ANALYSIS

Sensitivity analysis was conducted on the program coverage and fall rate within Newfoundland and Labrador. The program coverage parameter was varied from 0 (base case) to 1 (100% coverage of the eligible population), in increments of 0.25. Meanwhile, the change in the fall rate was varied from 22% to 24%.

Table 23 shows the possible net benefits of the AP program in Newfoundland and Labrador when we vary both the program coverage (0.25, 0.50, 0.75, and 1) and the fall rate. At a 25% coverage (0.25) and upper fall rate, the AP program could still achieve an average annual net benefit of $300,000 (Real, 2015$). At the highest coverage (1) and lower fall rate, the AP program has a potential annual net benefit of $2.8 million (Real, 2015$). At a 50% coverage, the potential average annual net benefit of the AP program is $1.05 million (Real, 2015$) (between $700,000 and $1.4 million (Real, 2015$)) across the two fall rate parameters.

Table 23 Fall Rate and Program Coverage Sensitivity Analysis (Annual Averages) in Newfoundland and Labrador

Net Benefit (Millions, Real, 2015$)		Program Coverage			
		0.25	0.5	0.75	1
Fall Rate	Lower Bound	0.7	1.4	2.1	2.8
	Upper Bound	0.3	0.7	1	1.4

CONCLUSION

Over the next five years, the AP program in Newfoundland and Labrador is expected to enroll an average of 600 LTC residents per year. Over the next 30 years, the AP program in Newfoundland and Labrador is expected to enroll an average of 1,700 LTC residents per year. Table 24 shows the five-year and 30-year average annual and cumulative total results of the AP program in Newfoundland and Labrador. For every $1 invested in the AP program in Newfoundland and Labrador, $4.24 (Real, 2015$) could be prevented in healthcare utilization costs. Moreover, the average annual net benefit per eligible LTC resident enrolled is $1,636 (Real, 2015$).

Table 24 Average Annual and Cumulative Total Results after 5- and 30-years of the AP Program in Newfoundland and Labrador

	Average Annual Results		Cumulative Total Results	
	5-Years	30-Years	5-Years	30-Years
Prescriptions Prevented	79,300	244,000	400,000	7.3 Million
Falls Prevented	300	900	1,500	27,000
Healthcare Utilization Prevented	80	210	330	6,400
Healthcare Costs Prevented (Millions, Real, 2015$)	0.8	3.7	4	110
Program Cost (Millions, Real, 2015$)	0.2	0.9	1	26
Net Benefit (Millions, Real, 2015$)	0.6	2.8	3	84

B.6. NOVA SCOTIA

After the first five years, an annual average of 1,100 long-term care (LTC) residents prescribed antipsychotic medication without a diagnosis of psychosis could have their prescriptions reduced or discontinued if the AP program were spread throughout Nova Scotia. Over the entire 30-year timeframe of the analysis, the AP program in Nova Scotia could have an average annual enrollment of 3,000 long-term care residents. Through the AP program, a cumulative total of 760,000 and 13 million antipsychotic prescriptions could be avoided by 2021 and 2046, respectively. This could prevent a total of $970,000 (Real, 2015$) and $24 million (Real, 2015$) in prescription costs after five years and 30 years, respectively.

By reducing the number of LTC residents on antipsychotic medication, the AP program could help prevent falls, which are a common adverse event associated with such medication (Pretorius, Gataric, Swedlun, & Miller, 2013). Table 25 illustrates the average annual prevention and total prevention after five and 30 years across falls, ER visits, and hospitalizations.

Table 25 5-Year and 30-Year Healthcare Resource Utilization Results of the AP Program in Nova Scotia

	Average Annual Prevention			Total Prevention		
	Falls	ER Visits	Hospitalizations	Falls	ER Visits	Hospitalizations
5-Year Results	600	120	40	2,800	200	440
30-Year Results	1,600	120	250	47,400	10,100	3,700

The graph on the right of Figure 19 illustrates the value added to the healthcare system by preventing the aforementioned healthcare utilization due to falls. After 5 years, the program could prevent a total of $6.8 million (Real, 2015$) in fall-related healthcare costs. The breakdown of the fall-related healthcare costs prevented are:

- $800,000 in ER costs (Real, 2015$), or an average annual prevention of $169,000 (Real, 2015$); and
- $6 million in hospital costs (Real, 2015$), or an average annual prevention of $1.2 million (Real, 2015$).

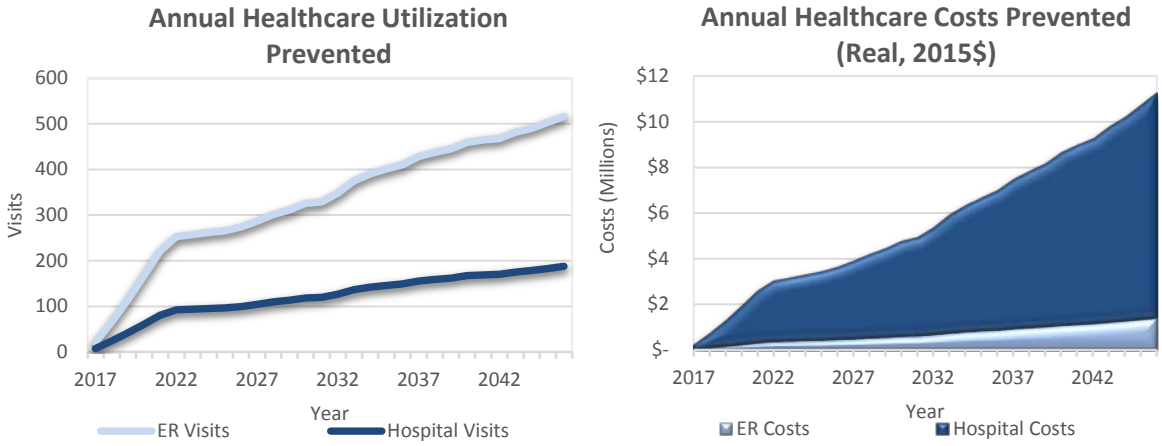
After 30 years, a total of $170 million (Real, 2015$) in fall-related healthcare costs could be prevented. By 2046, the AP program could prevent a total of:

- $21 million (Real, 2015$), or an average annual prevention of $700,000 (Real, 2015$), in ER costs; and

- $149 million (Real, 2015$), or an average annual prevention of $5 million (Real, 2015$), in hospital costs.

The total healthcare costs (prescriptions, ER, and hospital) prevented through the AP program in Nova Scotia represent 2.8% of the total healthcare costs expected to be prevented by the AP program in all of Canada.

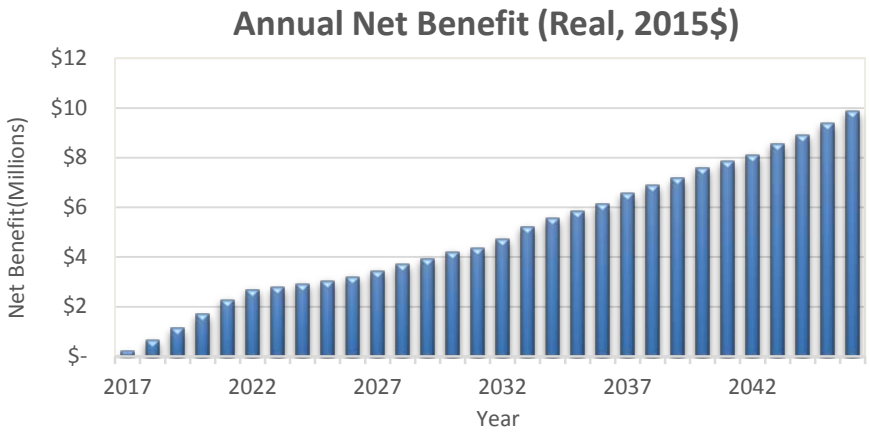
Figure 19 Annual Healthcare Utilization and Costs (Real, 2015$) Prevented in Nova Scotia



The annual net benefit of the program is illustrated in Figure 20. Over the first five years, the AP program could have a total net benefit of $5.9 million (Real, 2015$). This is an average annual net benefit of $1.2 million (Real, 2015$). Over the next 30 years, the AP program is expected to have a total net benefit of $148 million (Real, 2015$) in Nova Scotia[10]. The average annual net benefit of the program in Nova Scotia is estimated to be $5 million (Real, 2015$) over the analysis period. For every $1 invested in the AP program in Nova Scotia, $4.24 (Real, 2015$) are saved in healthcare utilization costs. Moreover, the average annual net benefit per eligible LTC resident enrolled is $1,626 (Real, 2015$).

[10] Under a 10-year ramp-up period, the total net benefit of the AP program in Nova Scotia could be $140 million (Real, 2015$), an average annual net benefit of $4.7 million (Real, 2015$), over the next 30 years.

Figure 20 Annual Net Benefit (Real, 2015$) in Nova Scotia



SENSITIVITY ANALYSIS

Sensitivity analysis was conducted on the program coverage and fall rate within Nova Scotia. The program coverage parameter was varied from 0 (base case) to 1 (100% coverage of the eligible population), in increments of 0.25. Meanwhile, the change in the fall rate was varied from 22% to 24%.

Table 26 shows the possible net benefits of the AP program in Nova Scotia when we vary both the program coverage (0.25, 0.50, 0.75, and 1) and the fall rate. At a 25% coverage (0.25) and upper fall rate, the AP program could still achieve an average annual net benefit of $600,000 (Real, 2015$). At the highest coverage (1) and lower fall rate, the AP program has a potential annual net benefit of $5 million (Real, 2015$). At a 50% coverage, the potential average annual net benefit of the AP program is $1.8 million (Real, 2015$) (between $1.2 million and $2.5 million (Real, 2015$)) across the two fall rate parameters.

Table 26 Fall Rate and Program Coverage Sensitivity Analysis (Annual Averages) in Nova Scotia

Net Benefit (Millions, Real, 2015$)		Program Coverage			
		0.25	0.5	0.75	1
Fall Rate	Lower Bound	1.2	2.5	3.7	5
	Upper Bound	0.6	1.2	1.8	2.4

CONCLUSION

Over the next five years, the AP program in Nova Scotia is expected to enroll an average of 1,100 LTC residents per year. Over the next 30 years, the AP program in Nova Scotia is expected to enroll an average of 3,000 LTC residents per year. Table 27 shows the five-year and 30-year average annual and cumulative

total results of the AP program in Nova Scotia. For every $1 invested in the AP program in Nova Scotia, $4.24 (Real, 2015$) could be prevented in healthcare utilization costs. Moreover, the average annual net benefit per eligible LTC resident enrolled is $1,626 (Real, 2015$).

Table 27 Average Annual and Cumulative Total Results after 5- and 30-years of the AP Program in Nova Scotia

	Average Annual Results		Cumulative Total Results	
	5-Years	30-Years	5-Years	30-Years
Prescriptions Prevented (Millions)	0.2	0.4	0.8	13
Falls Prevented	600	1,600	2,800	47,400
Healthcare Utilization Prevented	160	370	640	13,800
Healthcare Costs Prevented (Millions, Real, 2015$)	1.6	6.5	7.7	194
Program Cost (Millions, Real, 2015$)	0.4	1.5	1.8	46
Net Benefit (Millions, Real, 2015$)	1.2	5	5.9	148

B.7. ONTARIO

After the first five years, an annual average of 14,000 long-term care (LTC) residents prescribed antipsychotic medication without a diagnosis of psychosis could have their prescriptions reduced or discontinued if the AP program were spread throughout Ontario. Over the entire 30-year timeframe of the analysis, the AP program in Ontario could have an average annual enrollment of 43,000 long-term care residents. Through the AP program, a cumulative total of 10 million and 183 million antipsychotic prescriptions could be avoided by 2021 and 2046, respectively. This could prevent a total of $13 million (Real, 2015$) and $345 million (Real, 2015$) in prescription costs after five years and 30 years, respectively.

By reducing the number of LTC residents on antipsychotic medication, the AP program could help prevent falls, which are a common adverse event associated with such medication (Pretorius, Gataric, Swedlun, & Miller, 2013). Table 28 illustrates the average annual prevention and total prevention after 5 and 30 years across falls, ER visits, and hospitalizations.

Table 28 5-Year and 30-Year Healthcare Resource Utilization Results of the AP Program in Ontario

	Average Annual Prevention			Total Prevention		
	Falls	ER Visits	Hospitalizations	Falls	ER Visits	Hospitalizations
5-Year Results	7,300	1,600	600	37,000	7,800	2,800
30-Year Results	22,000	4,700	1,700	669,000	142,000	52,000

The graph on the right of Figure 21 illustrates the value added to the healthcare system by preventing the aforementioned healthcare utilization due to falls. After 5 years, the program could prevent a total of $90 million (Real, 2015$) in fall-related healthcare costs. The breakdown of the fall-related healthcare costs prevented are:

- $11 million in ER costs (Real, 2015$), or an average annual prevention of $2 million (Real, 2015$); and
- $78 million in hospital costs (Real, 2015$), or an average annual prevention of $16 million (Real, 2015$).

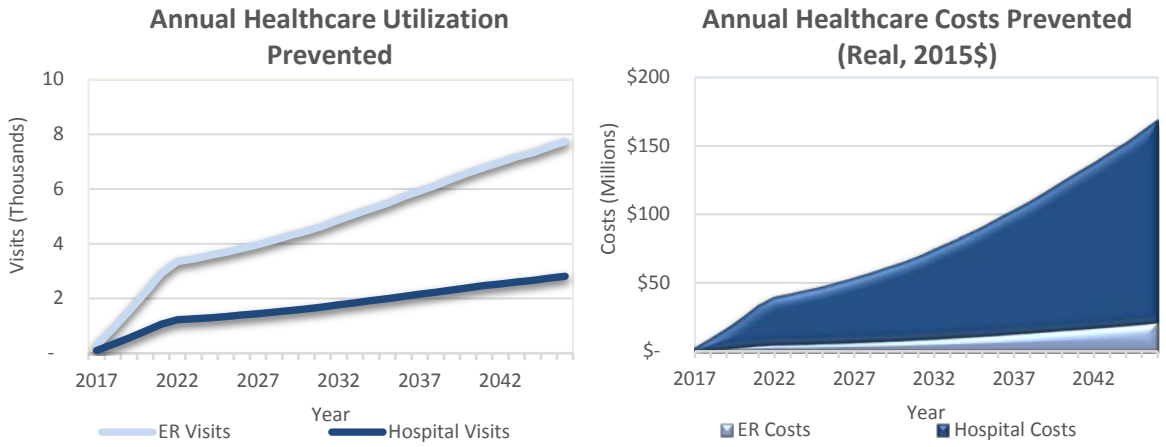
After 30 years, a total of $2.4 billion (Real, 2015$) in fall-related healthcare costs could be prevented. By 2046, the AP program could prevent a total of:

- $301 million (Real, 2015$), or an average annual prevention of $10 million (Real, 2015$), in ER costs; and

- $2.1 billion (Real, 2015$), or an average annual prevention of $70 million (Real, 2015$), in hospital costs.

The total healthcare costs (prescriptions, ER, and hospital) prevented through the AP program in Ontario represent 41% of the total healthcare costs expected to be prevented by the AP program in all of Canada.

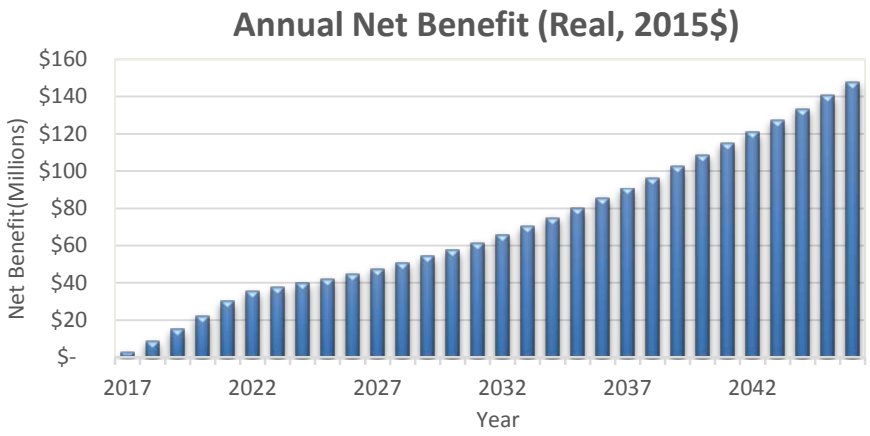
Figure 21 Annual Healthcare Utilization and Costs (Real, 2015$) Prevented in Ontario



The annual net benefit of the program is illustrated in Figure 22. Over the first five years, the AP program could have a total net benefit of $78 million (Real, 2015$). This is an average annual net benefit of $16 million (Real, 2015$). Over the next 30 years, the AP program is expected to have a total net benefit of $2.1 billion (Real, 2015$) in Ontario[11]. The average annual net benefit of the program in Ontario is estimated to be $70 million (Real, 2015$) over the analysis period. For every $1 invested in the AP program in Ontario, $4.24 (Real, 2015$) are saved in healthcare utilization costs. Moreover, the average annual net benefit per eligible LTC resident enrolled is $1,637 (Real, 2015$).

[11] Under a 10-year ramp-up period, the total net benefit of the AP program in Ontario could be $1.9 billion (Real, 2015$), an average annual net benefit of $66 million (Real, 2015$), over the next 30 years.

Figure 22 Annual Net Benefit (Real, 2015$) in Ontario



SENSITIVITY ANALYSIS

Sensitivity analysis was conducted on the program coverage and fall rate within Ontario. The program coverage parameter was varied from 0 (base case) to 1 (100% coverage of the eligible population), in increments of 0.25. Meanwhile, the change in the fall rate was varied from 22% to 24%.

Table 29 shows the possible net benefits of the AP program in Ontario when we vary both the program coverage (0.25, 0.50, 0.75, and 1) and the fall rate. At a 25% coverage (0.25) and upper fall rate, the AP program could still achieve a substantial average annual net benefit of $9 million (Real, 2015$). At the highest coverage (1) and lower fall rate, the AP program has a potential annual net benefit of $70 million (Real, 2015$). At a 50% coverage, the potential average annual net benefit of the AP program is $26 million (Real, 2015$) (between $17 million and $35 million (Real, 2015$)) across the two fall rate parameters.

Table 29 Fall Rate and Program Coverage Sensitivity Analysis (Annual Averages) in Ontario

Net Benefit (Millions, Real, 2015$)		Program Coverage			
		0.25	0.5	0.75	1
Fall Rate	Lower Bound	18	35	53	70
	Upper Bound	9	17	26	35

CONCLUSION

Over the next five years, the AP program in Ontario is expected to enroll an average of 14,000 LTC residents per year. Over the next 30 years, the AP program in Ontario is expected to enroll an average of 43,000 LTC residents per year. Table 30 shows the five-year and 30-year average annual and cumulative total results of the AP program in Ontario. For every $1 invested in the AP program in Ontario, $4.24 (Real, 2015$) could be prevented in healthcare utilization costs. Moreover, the average annual net benefit per eligible LTC resident enrolled is $1,637 (Real, 2015$).

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

	Average Annual Results		Cumulative Total Results	
	5-Years	30-Years	5-Years	30-Years
Prescriptions Prevented (Millions)	2	6	10	183
Falls Prevented	7,300	22,000	37,000	669,000
Healthcare Utilization Prevented	2,200	6,400	10,600	194,000
Healthcare Costs Prevented (Millions, Real, 2015$)	21	92	102	2,700
Program Cost (Millions, Real, 2015$)	5	22	24	650
Net Benefit (Millions, Real, 2015$)	16	70	78	2,100

B.8. Prince Edward Island (PEI)

After the first five years, an annual average of 200 long-term care (LTC) residents prescribed antipsychotic medication without a diagnosis of psychosis could have their prescriptions reduced or discontinued if the AP program were spread throughout Prince Edward Island. Over the entire 30-year timeframe of the analysis, the AP program in Prince Edward Island could have an average annual enrollment of 600 long-term care residents. Through the AP program, a cumulative total of 140,000 and 2.5 million antipsychotic prescriptions could be avoided by 2021 and 2046, respectively. This could prevent a total of $178,000 (Real, 2015$) and $4.8 million (Real, 2015$) in prescription costs after five years and 30 years, respectively.

By reducing the number of LTC residents on antipsychotic medication, the AP program could help prevent falls, which are a common adverse event associated with such medication (Pretorius, Gataric, Swedlun, & Miller, 2013). Table 31 illustrates the average annual prevention and total prevention after five and 30 years across falls, ER visits, and hospitalizations.

Table 31 5-Year and 30-Year Healthcare Resource Utilization Results of the AP Program in PEI

	Average Annual Prevention			Total Prevention		
	Falls	ER Visits	Hospitalizations	Falls	ER Visits	Hospitalizations
5-Year Results	100	20	10	500	110	40
30-Year Results	300	70	20	9,300	2,000	700

The graph on the right of Figure 23 illustrates the value added to the healthcare system by preventing the aforementioned healthcare utilization due to falls. After 5 years, the program could prevent a total of $1.2 million (Real, 2015$) in fall-related healthcare costs. The breakdown of the fall-related healthcare costs prevented are:

- $200,000 in ER costs (Real, 2015$), or an average annual prevention of $31,000 (Real, 2015$); and
- $1 million in hospital costs (Real, 2015$), or an average annual prevention of $218,000 (Real, 2015$).

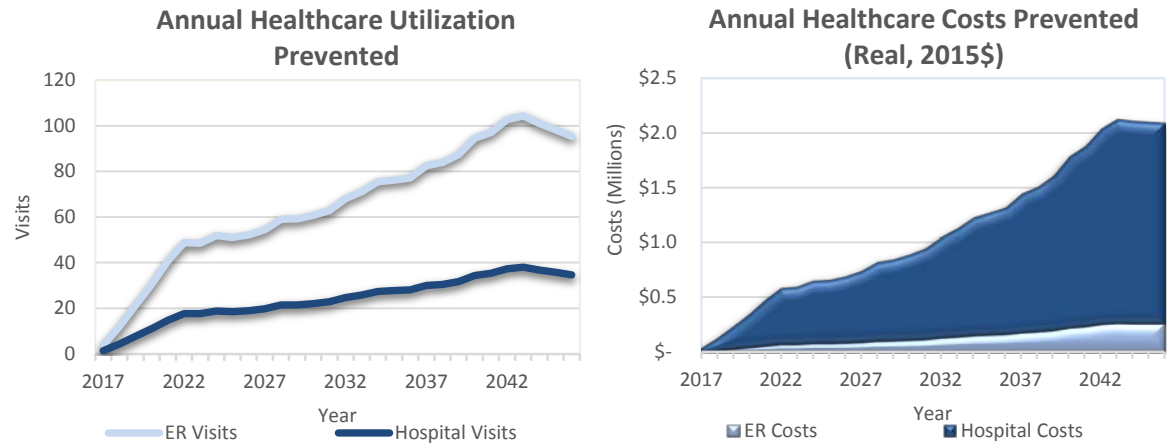
After 30 years, a total of $33 million (Real, 2015$) in fall-related healthcare costs could be prevented. By 2046, the AP program could prevent a total of:

- $4 million (Real, 2015$), or an average annual prevention of $139,000 (Real, 2015$), in ER costs; and

- $29 million (Real, 2015$), or an average annual prevention of $975,000 (Real, 2015$), in hospital costs.

The total healthcare costs (prescriptions, ER, and hospital) prevented through the AP program in Prince Edward Island represent 0.6% of the total healthcare costs expected to be prevented by the AP program in all of Canada.

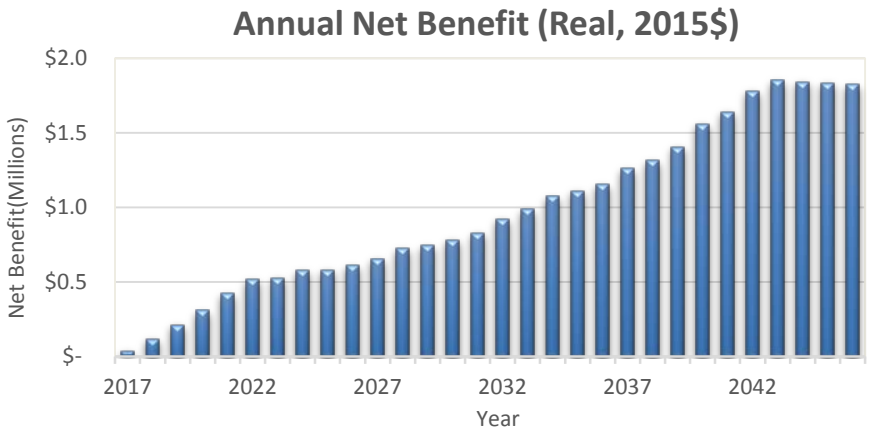
Figure 23 Annual Healthcare Utilization and Costs (Real, 2015$) Prevented in PEI



The annual net benefit of the program is illustrated in Figure 24. Over the first five years, the AP program could have a total net benefit of $1.1 million (Real, 2015$). This is an average annual net benefit of $218,000 (Real, 2015$). Over the next 30 years, the AP program is expected to have a total net benefit of $29 million (Real, 2015$) in Prince Edward Island[12]. The average annual net benefit of the program in Prince Edward Island is estimated to be $973,000 (Real, 2015$) over the analysis period. For every $1 invested in the AP program in Prince Edward Island, $4.24 (Real, 2015$) are saved in healthcare utilization costs. Moreover, the average annual net benefit per eligible LTC resident enrolled is $1,634 (Real, 2015$).

[12] Under a 10-year ramp-up period, the total net benefit of the AP program in Prince Edward Island could be $28 million (Real, 2015$), an average annual net benefit of $919,000 (Real, 2015$), over the next 30 years.

Figure 24 Annual Net Benefit (Real, 2015$) in PEI



SENSITIVITY ANALYSIS

Sensitivity analysis was conducted on the program coverage and fall rate within Prince Edward Island. The program coverage parameter was varied from 0 (base case) to 1 (100% coverage of the eligible population), in increments of 0.25. Meanwhile, the change in the fall rate was varied from 22% to 24%.

Table 32 shows the possible net benefits of the AP program in Prince Edward Island when we vary both the program coverage (0.25, 0.50, 0.75, and 1) and the fall rate. At a 25% coverage (0.25) and upper fall rate, the AP program could still achieve an average annual net benefit of $100,000 (Real, 2015$). At the highest coverage (1) and lower fall rate, the AP program has a potential annual net benefit of $1 million (Real, 2015$). At a 50% coverage, the potential average annual net benefit of the AP program is $350,000 (Real, 2015$) (between $200,000 and $500,000 (Real, 2015$)) across the two fall rate parameters.

Table 32 Fall Rate and Program Coverage Sensitivity Analysis (Annual Averages) in PEI

Net Benefit (Millions, Real, 2015$)		Program Coverage			
		0.25	0.5	0.75	1
Fall Rate	Lower Bound	0.2	0.5	0.7	1
	Upper Bound	0.1	0.2	0.4	0.5

CONCLUSION

Over the next five years, the AP program in Prince Edward Island is expected to enroll an average of 200 LTC residents per year. Over the next 30 years, the AP program in Prince Edward Island is expected to enroll an average of 600 LTC residents per year. Table 33 shows the five-year and 30-year average annual

and cumulative total results of the AP program in Prince Edward Island. For every $1 invested in the AP program in Prince Edward Island, $4.24 (Real, 2015$) could be prevented in healthcare utilization costs. Moreover, the average annual net benefit per eligible LTC resident enrolled is $1,634 (Real, 2015$).

Table 33 Average Annual and Cumulative Total Results after 5- and 30-years of the AP Program in PEI

	Average Annual Results		Cumulative Total Results	
	5-Years	30-Years	5-Years	30-Years
Prescriptions Prevented	28,000	85,000	140,000	2.5 Million
Falls Prevented	100	300	500	9,300
Healthcare Utilization Prevented	30	90	150	2,700
Healthcare Costs Prevented (Millions, Real, 2015$)	0.3	1.3	1.4	38
Program Cost (Millions, Real, 2015$)	0.07	0.3	0.3	9
Net Benefit (Millions, Real, 2015$)	0.2	1	1.1	29

B.9. QUEBEC

After the first five years, an annual average of 8,600 long-term care (LTC) residents prescribed antipsychotic medication without a diagnosis of psychosis could have their prescriptions reduced or discontinued if the AP program were spread throughout Quebec. Over the entire 30-year timeframe of the analysis, the AP program in Quebec could have an average annual enrollment of 25,000 long-term care residents. Through the AP program, a cumulative total of 6 million and 108 million antipsychotic prescriptions could be avoided by 2021 and 2046, respectively. This could prevent a total of $8 million (Real, 2015$) and $202 million (Real, 2015$) in prescription costs after five years and 30 years, respectively.

By reducing the number of LTC residents on antipsychotic medication, the AP program could help prevent falls, which are a common adverse event associated with such medication (Pretorius, Gataric, Swedlun, & Miller, 2013). Table 34 illustrates the average annual prevention and total prevention after five and 30 years across falls, ER visits, and hospitalizations.

Table 34 5-Year and 30-Year Healthcare Resource Utilization Results of the AP Program in Quebec

	Average Annual Prevention			Total Prevention		
	Falls	ER Visits	Hospitalizations	Falls	ER Visits	Hospitalizations
5-Year Results	4,500	950	350	22,500	4,800	1,700
30-Year Results	13,000	2,800	1,000	394,000	84,000	30,000

The graph on the right of Figure 25 illustrates the value added to the healthcare system by preventing the aforementioned healthcare utilization due to falls. After 5 years, the program could prevent a total of $55 million (Real, 2015$) in fall-related healthcare costs. The breakdown of the fall-related healthcare costs prevented are:

- $7 million in ER costs (Real, 2015$), or an average annual prevention of $1 million (Real, 2015$); and
- $48 million in hospital costs (Real, 2015$), or an average annual prevention of $10 million (Real, 2015$).

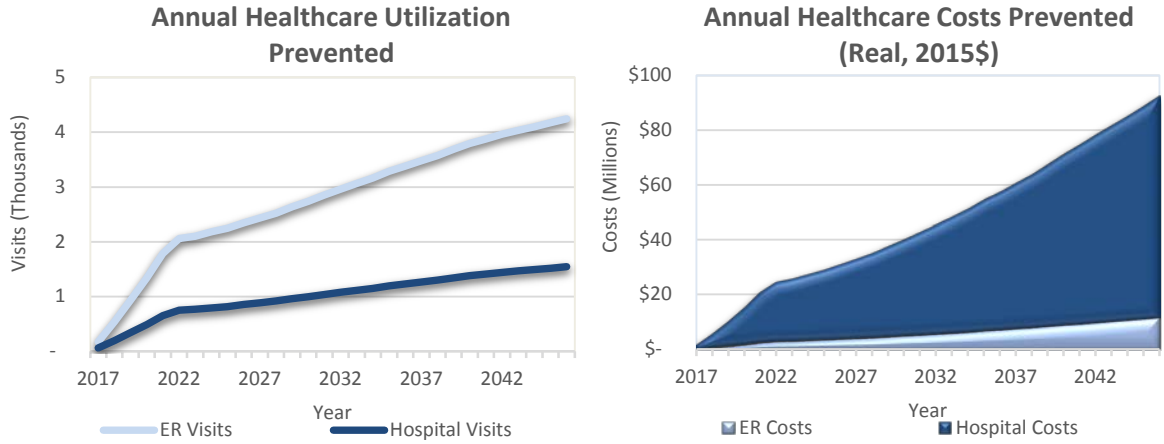
After 30 years, a total of $1.4 billion (Real, 2015$) in fall-related healthcare costs could be prevented. By 2046, the AP program could prevent a total of:

- $176 million (Real, 2015$), or an average annual prevention of $6 million (Real, 2015$), in ER costs; and

- $1.2 billion (Real, 2015$), or an average annual prevention of $41 million (Real, 2015$), in hospital costs.

The total healthcare costs (prescriptions, ER, and hospital) prevented through the AP program in Quebec represent 24% of the total healthcare costs expected to be prevented by the AP program in all of Canada.

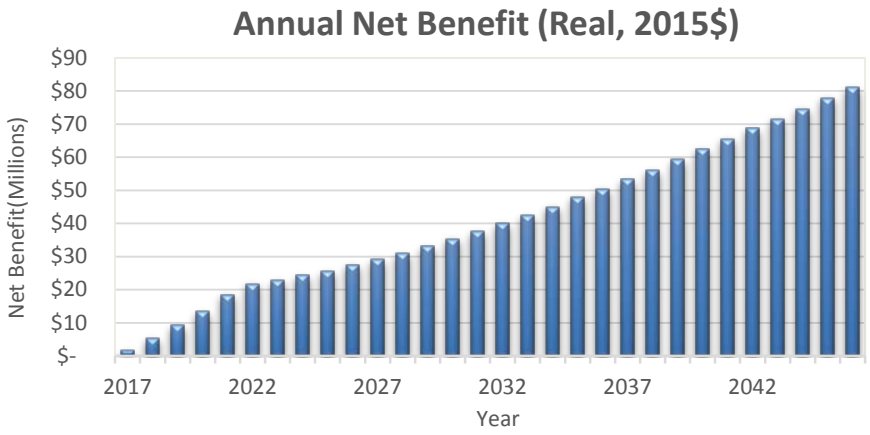
Figure 25 Annual Healthcare Utilization and Costs (Real, 2015$) Prevented in Quebec



The annual net benefit of the program is illustrated in Figure 26. Over the first five years, the AP program could have a total net benefit of $48 million (Real, 2015$). This is an average annual net benefit of $10 million (Real, 2015$). Over the next 30 years, the AP program is expected to have a total net benefit of $1.2 billion (Real, 2015$) in Quebec[13]. The average annual net benefit of the program in Quebec is estimated to be $41 million (Real, 2015$) over the analysis period. For every $1 invested in the AP program in Quebec, $4.24 (Real, 2015$) are saved in healthcare utilization costs. Moreover, the average annual net benefit per eligible LTC resident enrolled is $1,627 (Real, 2015$).

[13] Under a 10-year ramp-up period, the total net benefit of the AP program in Quebec could be $1.1 billion (Real, 2015$), an average annual net benefit of $39 million (Real, 2015$), over the next 30 years.

Figure 26 Annual Net Benefit (Real, 2015$) in Quebec



SENSITIVITY ANALYSIS

Sensitivity analysis was conducted on the program coverage and fall rate within Quebec. The program coverage parameter was varied from 0 (base case) to 1 (100% coverage of the eligible population), in increments of 0.25. Meanwhile, the change in the fall rate was varied from 22% to 24%.

Table 35 shows the possible net benefits of the AP program in Quebec when we vary both the program coverage (0.25, 0.50, 0.75, and 1) and the fall rate. At a 25% coverage (0.25) and upper fall rate, the AP program could still achieve a substantial average annual net benefit of $5 million (Real, 2015$). At the highest coverage (1) and lower fall rate, the AP program has a potential annual net benefit of $41 million (Real, 2015$). At a 50% coverage, the potential average annual net benefit of the AP program is $15 million (Real, 2015$) (between $10 million and $21 million (Real, 2015$)) across the two fall rate parameters.

Table 35 Fall Rate and Program Coverage Sensitivity Analysis (Annual Averages) in Quebec

Net Benefit (Millions, Real, 2015$)		Program Coverage			
		0.25	0.5	0.75	1
Fall Rate	Lower Bound	10	21	31	41
	Upper Bound	5	10	15	20

CONCLUSION

Over the next five years, the AP program in Quebec is expected to enroll an average of 8,600 LTC residents per year. Over the next 30 years, the AP program in Quebec is expected to enroll an average of 25,000

LTC residents per year. Table 36 shows the five-year and 30-year average annual and cumulative total results of the AP program in Quebec. For every $1 invested in the AP program in Quebec, $4.24 (Real, 2015$) could be prevented in healthcare utilization costs. Moreover, the average annual net benefit per eligible LTC resident enrolled is $1,627 (Real, 2015$).

Table 36 Average Annual and Cumulative Total Results after 5- and 30-years of the AP Program in Quebec

	Average Annual Results		Cumulative Total Results	
	5-Years	30-Years	5-Years	30-Years
Prescriptions Prevented (Millions)	1	4	6	108
Falls Prevented	4,500	13,000	22,500	394,000
Healthcare Utilization Prevented	1,300	3,800	6,500	114,000
Healthcare Costs Prevented (Millions, Real, 2015$)	13	54	63	1,600
Program Cost (Millions, Real, 2015$)	3	13	15	380
Net Benefit (Millions, Real, 2015$)	10	41	48	1,200

B.10. SASKATCHEWAN

After the first five years, an annual average of 1,300 long-term care (LTC) residents prescribed antipsychotic medication without a diagnosis of psychosis could have their prescriptions reduced or discontinued if the AP program were spread throughout Saskatchewan. Over the entire 30-year timeframe of the analysis, the AP program in Saskatchewan could have an average annual enrollment of 3,300 long-term care residents. Through the AP program, a cumulative total of 900,000 and 14 million antipsychotic prescriptions could be avoided by 2021 and 2046, respectively. This could prevent a total of $1.2 million (Real, 2015$) and $26 million (Real, 2015$) in prescription costs after five years and 30 years, respectively.

By reducing the number of LTC residents on antipsychotic medication, the AP program could help prevent falls, which are a common adverse event associated with such medication (Pretorius, Gataric, Swedlun, & Miller, 2013). Table 37 illustrates the average annual prevention and total prevention after five and 30 years across falls, ER visits, and hospitalizations.

Table 37 5-Year and 30-Year Healthcare Resource Utilization Results of the AP Program in Saskatchewan

	Average Annual Prevention			Total Prevention		
	Falls	ER Visits	Hospitalizations	Falls	ER Visits	Hospitalizations
5-Year Results	700	140	50	3,300	700	260
30-Year Results	1,700	360	130	51,000	11,000	3,900

The graph on the right of Figure 27 illustrates the value added to the healthcare system by preventing the aforementioned healthcare utilization due to falls. After 5 years, the program could prevent a total of $8 million (Real, 2015$) in fall-related healthcare costs. The breakdown of the fall-related healthcare costs prevented are:

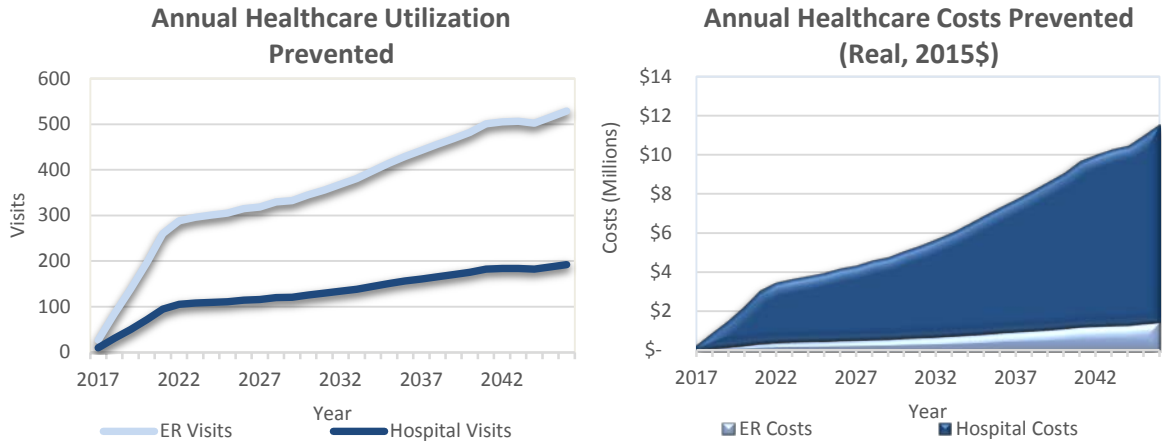
- $1 million in ER costs (Real, 2015$), or an average annual prevention of $202,000 (Real, 2015$); and
- $7 million in hospital costs (Real, 2015$), or an average annual prevention of $1.4 million (Real, 2015$).

After 30 years, a total of $181 million (Real, 2015$) in fall-related healthcare costs could be prevented. By 2046, the AP program could prevent a total of:

- $23 million (Real, 2015$), or an average annual prevention of $751,000 (Real, 2015$), in ER costs; and
- $158 million (Real, 2015$), or an average annual prevention of $5 million (Real, 2015$), in hospital costs.

The total healthcare costs (prescriptions, ER, and hospital) prevented through the AP program in Saskatchewan represent 3% of the total healthcare costs expected to be prevented by the AP program in all of Canada.

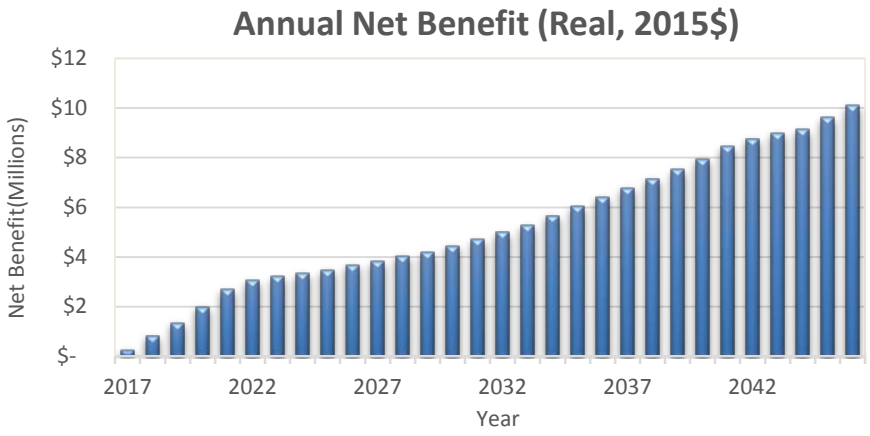
Figure 27 Annual Healthcare Utilization and Costs (Real, 2015$) Prevented in Saskatchewan



The annual net benefit of the program is illustrated in Figure 28. Over the first five years, the AP program could have a total net benefit of $7 million (Real, 2015$). This is an average annual net benefit of $1.4 million (Real, 2015$). Over the next 30 years, the AP program is expected to have a total net benefit of $158 million (Real, 2015$) in Saskatchewan[14]. The average annual net benefit of the program in Saskatchewan is estimated to be $5 million (Real, 2015$) over the analysis period. For every $1 invested in the AP program in Saskatchewan, $4.24 (Real, 2015$) are saved in healthcare utilization costs. Moreover, the average annual net benefit per eligible LTC resident enrolled is $1,615 (Real, 2015$).

[14] Under a 10-year ramp-up period, the total net benefit of the AP program in Saskatchewan could be $148 million (Real, 2015$), an average annual net benefit of $4.9 million (Real, 2015$), over the next 30 years.

Figure 28 Annual Net Benefit (Real, 2015$) in Saskatchewan



SENSITIVITY ANALYSIS

Sensitivity analysis was conducted on the program coverage and fall rate within Saskatchewan. The program coverage parameter was varied from 0 (base case) to 1 (100% coverage of the eligible population), in increments of 0.25. Meanwhile, the change in the fall rate was varied from 22% to 24%.

Table 38 shows the possible net benefits of the AP program in Saskatchewan when we vary both the program coverage (0.25, 0.50, 0.75, and 1) and the fall rate. At a 25% coverage (0.25) and upper fall rate, the AP program could still achieve an average annual net benefit of 700,000 (Real, 2015$). At the highest coverage (1) and lower fall rate, the AP program has a potential annual net benefit of $5 million (Real, 2015$). At a 50% coverage, the potential average annual net benefit of the AP program is $1.9 million (Real, 2015$) (between $1.3 million and $2.6 million (Real, 2015$)) across the two fall rate parameters.

Table 38 Fall Rate and Program Coverage Sensitivity Analysis (Annual Averages) in Saskatchewan

Net Benefit (Millions, Real, 2015$)		Program Coverage			
		0.25	0.5	0.75	1
Fall Rate	Lower Bound	1.3	2.6	4	5
	Upper Bound	0.7	1.3	2	3

CONCLUSION

Over the next five years, the AP program in Saskatchewan is expected to enroll an average of 1,300 LTC residents per year. Over the next 30 years, the AP program in Saskatchewan is expected to enroll an average of 3,300 LTC residents per year. Table 39 shows the five-year and 30-year average annual and

cumulative total results of the AP program in Saskatchewan. For every $1 invested in the AP program in Saskatchewan, $4.24 (Real, 2015$) could be prevented in healthcare utilization costs. Moreover, the average annual net benefit per eligible LTC resident enrolled is $1,615 (Real, 2015$).

Table 39 Average Annual and Cumulative Total Results after 5- and 30-years of the AP Program in Saskatchewan

	Average Annual Results		Cumulative Total Results	
	5-Years	30-Years	5-Years	30-Years
Prescriptions Prevented (Millions)	0.2	0.5	0.9	14
Falls Prevented	700	1,700	3,300	51,000
Healthcare Utilization Prevented	190	490	960	14,900
Healthcare Costs Prevented (Millions, Real, 2015$)	1.8	6.8	9	206
Program Cost (Millions, Real, 2015$)	0.4	1.6	2	48
Net Benefit (Millions, Real, 2015$)	1.4	5	7	158