

# The Impact on Emergency Department Utilization of the CFHI Healthcare Collaborations and Initiatives

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Prepared on behalf of Canadian Foundation for Healthcare Improvement by:



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## EXECUTIVE SUMMARY

### KEY OUTCOMES

As the Canadian population ages, the annual number of emergency visits could increase from 15 million to over 21 million over the next 30 years if no changes are made to health care systems. This 40% increase in visits is significantly greater than the rate of population growth which would increase by only 30%. Implementation of intervention projects which are supported by rigorous analysis and evidence, such as those supported by the Canadian Foundation for Healthcare Improvement, must play a crucial role to help maintain the sustainability of the health care systems in Canada. Using RiskAnalytica's Life at Risk Platform and assuming a 50% implementation rate across the country, the combined impact of five such projects that affect emergency department use is estimated to:

- Avoid an average of 2.5 million emergency department visits each year over the next 30 years (a 14% reduction);
- Reduce the total emergency department length of stay for all patients by an average of 11.8 million hours each year (16% reduction); and
- Save an average of \$210 million dollars (present value) annually over the next 30 years if the alternative to emergency department visits, such as GP visits, were to save \$100 dollars per visit.

### INTRODUCTION AND SCOPE

The Canadian Foundation for Healthcare Improvement (CFHI) works collaboratively with governments, policy makers and health system leaders in order to enable the transformation of knowledge into actionable policies, programs, tools and leadership development. To achieve this, CFHI has developed programs and initiatives that promote the development of capacity and leadership which allows the individuals that participate in these programs to implemented evidence-based intervention projects in Canadian healthcare organizations (Anderson et al. 2008). Through these programs, CFHI has begun to inspire system change. The Executive Training for Research Application (EXTRA) program is one area that CFHI has continuously invested in. This program targets healthcare executives and provides them with evidence based knowledge that allows them to develop collaborative professional relationships and the capacity to implement change. These EXTRA fellows focus their analysis on areas that are currently

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impacting the Canadian healthcare system. One area of focus, among the many aspects of the healthcare system that EXTRA intervention projects support, is emergency department (ED) utilization.

Using the evidence collected during the EXTRA intervention projects, the objective of this study was to analytically investigate the potential impacts of expanding CFHI's intervention projects related to emergency department utilization from the initial pilot interventions to implementation across Canada. From CFHI's portfolio of over 400 EXTRA intervention projects, five EXTRA intervention projects that aim to reduce emergency department demand and costs were selected from across the country. The projects of focus were:

- **Advanced Access:** Increased Number of Advanced Access Practices within Cape Breton District Health Authority;
- **RACE:** Rapid Access to Consultative Expertise (RACE) in Providence Health Care;
- **Patient Flow:** Improving Patient Flow Through ED in Calgary Health Region;
- **PCP/ACP:** Primary Care Pathways and Advanced Care Paramedics from Bridging the Gap between Primary and Secondary Care: A DVT Care Process in Queen Elizabeth II Health Science Centre, Nova Scotia; and
- **Integrated Monitoring:** The Challenges of Chronic Conditions: Integrated, Intensified Clinical Monitoring and proactive follow-up of the stratified "chronically ill population" Client Groups in the territory of the CSSS des Sommets in the Laurentians, Quebec.

Using RiskAnalytica's Life at Risk simulation platform, an emergency department utilization model was developed based on over 40 diseases and risk factors and current emergency department demand. Detailed emergency department utilization data from the Canadian Institute for Health Information (CIHI) was used to estimate the baseline emergency demand. A scenario analysis was conducted using select outcomes from these projects to demonstrate the impact of the interventions on reducing ED demand and costs across the country in order to demonstrate the potential benefits that could be achieved if the 5 EXTRA intervention projects were to be expanded across Canada. It is important to note that the assumptions based on current and future emergency department utilization in Canada were employed in order to establish a baseline on which to measure the impact of the EXTRA intervention projects against.

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Throughout this study, the EXTRA intervention project investigators were consulted to review and assess the reasonableness of model inputs, model structure, model outputs and conclusions to ensure that the model is consistent with observed data.

### CURRENT AND FUTURE EMERGENCY DEPARTMENT DEMAND: RESULTS

#### Findings

Over the next 30 years, it is expected that the annual number of ED visits will be increasing at a significantly faster rate than the growth in the population over the same period. The key factors driving this increase can be attributed to the aging population. Over the next 30 years, if the current trends were to continue, it is likely that:

- The annual number of emergency department visits in Canada could increase by 40%, from 15 million per year in 2013 to over 21 million in 2043.
- The total number of hours spent in emergency departments could increase by 52% from 3.4 billion hours in 2013 to over 5 billion hours in 2043.

If the combined interventions were to be implemented across 50% of the Canadian healthcare system, they could have a significant impact on reducing the future demand on Emergency Departments. Specifically:

- An average of 2.5 million visits annually (for a total of 77 million) could be avoided over the next 30 years; and
- An average of 11.8 million hours annually (for a total of 367 million ED hours) could be avoided over the next 30 years.

If the net savings per ED visit avoided were \$100, the following savings could be realised:

- Average annual savings of \$210 million per year (present value) to the Canadian Health care system could be achieved over the next 30 years.

The previous benefits are under the conservative assumption that 50% of the health care system in Canada implemented the interventions. If 100% of the healthcare system in Canada were to implement

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the combined intervention, the decrease in emergency department utilization and the associated economic benefits would be even greater.

### CONCLUSIONS

The intervention projects that were put into practice as a result of CFHI's initiatives through their EXTRA program could have a significant impact on reducing overcrowding in emergency departments and costs if they were to be implemented nation-wide. Over the next 30 years, the number of ED visits and total length of stay could increase much faster than the rate of population growth if the current trend continues. The number of ED visits is expected to increase by 40% from current rates to 21 million in 2043 and the total length of stay for all patients could increase by 52% to over 5 billion hours in that year.

In order to reduce the growth in emergency visits to a rate comparable to the overall population growth rate, the combined intervention does not need to be completely implemented across the entire health care system. Fifty percent implementation is sufficient to reduce the number of visits and total emergency department time significantly. In this scenario, the combined expansion of the five EXTRA intervention projects across Canada could lead to a 14% reduction in ED visits in 2043, with an average reduction of 2.5 million visits annually over the next 30 years. A net savings of \$100 for each ED visit avoided could result in an average present value savings of \$210 million over the next 30 years. This analysis highlights the role that CFHI's interventions projects play in identifying and implementing initiatives that are aimed toward provoking system change, thereby improving healthcare for all Canadians.

## STRUCTURE OF THE REPORT

This report is divided into 4 sections:

- **Section 1** provides details on the background, purpose and objectives of the evaluation;
- **Section 2** highlights the general approach to the analysis, the subject-matter expert review of the approach and outcomes, and provides details on the Life at Risk® methodology and model assumptions as well as the input data and data assumptions applied for the analysis;
- **Section 3** summarizes the results of the base model, establishing a 30 year annual baseline estimate of emergency department utilization in Canada;
- **Section 4** summarizes the major findings and conclusions as well as identified research questions that were raised during the course of this study.

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## 1 INTRODUCTION AND BACKGROUND

### 1.1 CONTEXT

Established in 1996, the Canadian Foundation for Healthcare Improvement (CFHI) is dedicated to promoting the use of evidence to strengthen the delivery of health care services in order to transform and improve health care across Canada. Their ongoing collaboration with governments, policy makers and health system leaders has allowed CFHI to translate knowledge and innovative practices into actionable policies, programs, tools and leadership development that can lead to the improvement of the health for all Canadians. CFHI is at the nexus of policy and delivery and to support their goals and mission, they focus on four key program areas;

- Collaboration for innovation and improvement;
- Applied Research & Policy Analysis;
- Education & Training; and
- Evaluation & Performance Management.

It is through their Education & Training initiative that CFHI invested in the Executive Training for Research Application (EXTRA) program that aims to develop capacity and leadership in order to optimize the use of evidence informed decision making in the management and practice of Canadian health care organizations. This program has been geared towards health service executives in senior management positions and provides these EXTRA fellows with knowledge of evidence, capacity to draw on system thinking, development of collaborative professional relationships and the ability to introduce and manage evidence informed changes. The purpose of the program is to provide leaders with training that will enable them to acquire knowledge in order to make informed decisions within their organizations, through improved use of evidence, with the aim of having this knowledge translate to an improved way of providing health care that would lead to improved health outcomes across Canada (Anderson et al., 2001).

This report aims to demonstrate the potential benefits to the Canadian health care system that could be achieved if some of the initiatives that CFHI has undertaken could be implemented nation-wide.

In order to demonstrate the impact of CFHI's collaboration for health system improvement on the Canadian Population, five projects from their EXTRA program that were aimed at reducing emergency

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department demand and costs were examined. In 2008-2009, the National Ambulatory Care Reporting System (NACRS) reported that there were 5.6 million visits to the ED, with the majority of these visits triaged to level 3 (urgent) and level 4 (less urgent) (CIHI, 2010), demonstrating the significant proportion of the Canadian population that receive care in emergency departments. The problem of overcrowding in emergency departments has been a national issue for decades. The Canadian Agency for Drugs and Technologies in Health (CADTH) undertook a four part series on ED overcrowding in 2006 which was designed to create knowledge on the actual factors that contribute to ED overcrowding. The goal of this series was to equip policy makers, hospital and ED administrators with knowledge that would enable them to develop tools and policies that could effectively address these issues. Some of the key findings from this series and from the literature suggest that the major factors that contribute to ED overcrowding are:

- Lack of access to primary care, specialist physicians and nurse practitioners;
- Increased complexity and acuity of patients presenting to the ED;
- The burden of chronic conditions;
- Shortage of nursing staff and physician staff;
- Lack of beds for patients admitted to the hospital; and
- Overall increase in patient volume.

Overcrowding can lead to a number of factors that impact the health and safety of Canadians such as: inadequate patient care (due to patients leaving without being seen), undertreated patients, prolonged delays in treatment, prolonged waiting times, among others (CAEP-NENP Position Statement, 2001). Therefore, increased pain and suffering experienced by patient's leads to a decrease in satisfaction in the Canadian Health Care system, a feeling that is also shared by the physicians, nurses and providers who are unable to provide adequate care. The same series on ED overcrowding by the CADTH found that 67% of ED directors felt that current policies on ED overcrowding have little or no effect. A technical report on hospital cost drivers released by CIHI in (2012) indicated that costs per ED visit has increased significantly and "has been the main factor in the increasing share of hospital expenditure for ED visits." (CIHI Report, 2012). When compared to costs for family physician visits and general practitioner visits, the direct ED costs are about five times that of family practitioner/general practitioner (FP/GP) visits (CIHI Report, 2012). In light of these factors, there is a need for evidence based strategies to effectively reduce ED overcrowding and the costs that result from it.

## 1.2 OVERVIEW OF ENGAGEMENT SCOPE

### **Purpose and Objective**

The purpose and objective of this engagement was to analytically demonstrate the benefits to the health care system and Canada of CFHI's collaboration initiatives. Five EXTRA intervention projects that aim to reduce emergency department demand and costs were selected as the right candidates to showcase CFHI's health system improvement collaborative efforts.

### **Scope of the engagement**

To achieve this objective, RiskAnalytica's Life at Risk Multi Disease Simulation (LRMDS) platform was used to generate a base model that estimated the current emergency department demand. The emergency department (ED) utilization rates were specific to each disease and injury included in the model.

Five EXTRA intervention projects that aim to reduce emergency demand were selected to showcase CFHI's health system improvement collaborative efforts. The intervention projects that were identified by CFHI include:

- Improving Patient Flow through ED in Calgary Health Region, Alberta;
- Bridging the Gap between Primary and Secondary Care: A DVT Care Process in Queen Elizabeth II Health Science Centre, Nova Scotia;
- Rapid Access to Consultative Expertise (RACE) in Providence Health Care, British Columbia;
- The Challenges of Chronic Conditions: Integrated, Intensified Clinical Monitoring and Proactive Follow-up of the Stratified "Chronically Ill Population" Client Groups in the Territory of the CSSS des Sommets in the Laurentians, Quebec; and
- Increased Number of Advanced Access Practices within Cape Breton District Health Authority, Nova Scotia.

Results from these intervention projects were used to develop a scenario analysis that demonstrated the impacts of these projects on reducing ED demand and costs across Canada. The outcomes of the base model and scenario results were compared to show the benefits that could be achieved if these projects were implemented nation-wide.

### 1.3 OVERVIEW OF EXTRA INTERVENTION PROJECTS

A brief summary on the objectives, interventions and outcomes of the EXTRA intervention projects is provided below. Further details on the individual projects can be found in Appendix B.

**Advanced Access** - The main objective of this intervention project was to increase the number of same day appointments within family physicians clinics. The project team worked with physicians to transform clinics in order to provide same day scheduling, known as advanced access. The outcome of this intervention project was a reduction in ED utilization and increased revenue at family physician clinics.

**Integrated Monitoring and Follow-up** - The main objective of this intervention project was to identify patients with co-morbid conditions who are complex and use healthcare services extensively, and develop an integrated response by better understanding and bringing together various departments and clinical teams in order to improve their well-being and maximize efficiency of services. The intervention project involved redefining the specific needs of these patients, reconfiguring the care and services that they are offered and intensely monitoring the patients in the community requiring a complex combination of health care services. Besides the improved well-being of the target population, the outcome of this intervention project was a reduction in emergency services use and hospitalizations.

**Patient Flow** - In order to begin to address the system issues that contribute to overcrowding in the Calgary health care system, the project investigator implemented an intervention project known as GRIDLOCC (Getting Rid of Inappropriate Delays that Limit Our Capacity to Care) which took a system based approach and focused on six areas within the ED system. As a result of the intervention project, a decrease in length of stay was reported for CTAS 3 patients as well as an increase in physician time spent with patients.

**PCP/ACP-** Using Deep Vein Thrombosis (DVT) as a target for this project, the objective of this EXTRA intervention project was to investigate the access and communication barriers that exist between the primary and secondary health care systems. The project team developed an evidence based scoring system that allowed family physicians and advanced paramedics to

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calculate the diagnostic likelihood score that a patient has DVT. As a result of the intervention project, a decrease in ED length of stay and ED utilization was reported

**RACE** - The EXTRA project investigators found that patients with complex chronic conditions often navigate multiple interfaces and may experience fragmented care and poor outcomes as a result. The project team implemented an innovative model of shared care involving a telephone advice line where family physicians can call one number and choose from a selection of speciality services for real time telephone advice known as RACE (Rapid Access to Consultative Expertise). This intervention project led to a significant reduction in visits to the ED and avoided unnecessary face-to-face consultation with specialists.

### **Out of Scope**

The scope of this analysis is limited to the data available from the outcomes of the EXTRA intervention projects. The EXTRA intervention projects used within the scope of this analysis only impacted the input and throughput areas within the ED system. Therefore factors that contribute to overcrowding in emergency departments on the output side were out of scope to this analysis. However, through the literature and discussions with the EXTRA project investigators, the input and throughput factors have also been shown to play a significant role in contributing to ED overcrowding. As a result, the impact of these EXTRA intervention projects on ED overcrowding can be considered significant if they were to be expanded across Canada.

Additionally, this analysis focused on ED utilization only. Increased service utilization in other sectors, such as increased clinic or specialist utilization was not considered for this analysis. However, it is important to note that ED visits are the most expensive form of care. Therefore a reduction in these visits could generate significant costs savings to Canadian healthcare systems.

## 2 OVERVIEW OF METHODOLOGY

### 2.1 THE LIFE AT RISK PLATFORM

The analysis of emergency department demand and the impact of the five EXTRA intervention projects were conducted using RiskAnalytica's Life at Risk Platform. The agent-based simulation platform allows detailed simulation of the Canadian population, multiple diseases and risk factors, and continuums of care. The platform tracks representative individuals by age, sex, and health profile typically over a thirty year period. The platform can be divided into three primary sections – demography, health, and utilization. As the platform was designed to be expandable, the scope of the analysis is limited by the data available to populate the model. Sections 2.1.1 to 2.1.3 outline the details of the model structure while Section 2.2 describes the data sources used for this analysis.

#### 2.1.1 DEMOGRAPHY

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There are four key processes that determine the overall demographic evolution of the population:

- Birth,
- Immigration,
- Emigration, and
- Death

Birth and immigration introduce new agents into the model, while emigration and death remove people from the system. The rate of each process is estimated from recent historical trends.

#### 2.1.2 HEALTH

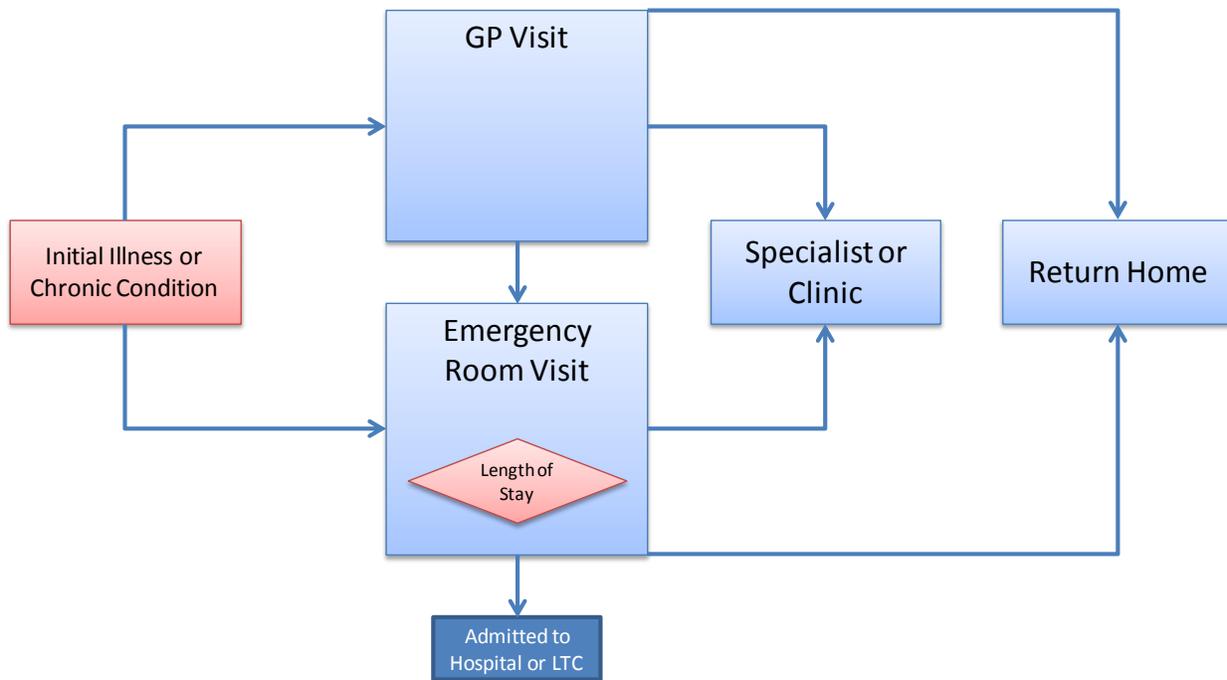
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Building upon the overall demographic trends, the health of the population is determined by estimating the incidence and remission (if relevant) of each of the diseases in the analysis. The incidence (or remission) can be dependent upon the age and sex of the individual in the model, as well as other risk factors such as smoking or other co-morbid conditions. In addition, the risk of death for each agent in the system is altered according to their health profile. The agent-based approach allows for the full tracking of co-morbidities allowing individuals to exist in the system with multiple diseases simultaneously.

2.1.3 EMERGENCY DEPARTMENT UTILIZATION

A simplified model of service utilization was constructed to focus on the number of emergency department visits and total length of stay in emergency departments. Figure 1 schematically shows the possible flow of patients. From initial illness (or event due to chronic illness) a patient could go to either a GP or the emergency room. If at a GP, the patient may be referred (or prefer to go) to the emergency room, referred to a specialist or clinic, or require no further care and return home. If a patient goes to the emergency department, the patient may be referred to a specialist or clinic, sent home after treatment, or admitted to the hospital or long term care.

**Figure 1** Simplified patient flow diagrams used in the model



For each disease in the model, the rate of emergency department visits can be used to estimate the total number of emergency department visits each year. In addition, for each condition, the average length of stay can be used to estimate the total number of hours. As the focus of this analysis was on emergency department utilization, utilization rates of specialists and clinics were not used.

Each of the five EXTRA intervention projects affected different parts of the patient pathway for various CTAS triage levels. For CTAS 4 and CTAS 5, Advanced Access increased the number of patients going to a GP while decreasing the number of patients going to the emergency room by 30%. PCP/ACP act to

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reduce both the length of stay in the emergency department by 25% and emergency department utilization by 36%. For CTAS 3, 4 and 5, Rapid Access to Consultative Expertise (RACE) reduced the number of patients going to the emergency department after visiting a GP by 30%. (It also reduced the number of patients referred to specialists though specialist utilization was not tracked in this analysis.) Integrated Monitoring and Follow-up directly reduced the rate at which people visit the emergency department by 50% for patients with chronic co-morbid conditions. Finally, Patient Flow can reduce the length of stay of patients once they are admitted to the emergency department by 25%.

## 2.2 DATA COLLECTION

### 2.2.1 POPULATION DEMOGRAPHICS

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The overall demographic trends are based on Statistics Canada data. The recent trends in birth, death, and migration rates over the last 10 years are assumed to continue over the next 30 years to establish a baseline demographic projection. The complete list of data inputs used can be found in Appendix B.

### 2.2.2 DISEASE AND RISK FACTORS

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The LRMSD includes a number of major diseases that are found to drive the demand for emergency department visits. These major diseases were included to estimate what the current and future demand for ED could look like over the next 30 years by taking into account disease demographics occurring in the population. The input of diseases data and key assumptions of the base model were obtained from a variety of data sources that had Canada specific data including Statistics Canada (Canadian Community Health Survey), Canadian Cancer Registry, PHAC disease surveillance data, and a variety of epidemiological health studies. The diseases included in the analysis are:

- Cancer - Lung (C34), Breast (C50), Prostate (C61), Colorectal (C18; C19; C20; C26), Skin (C43; C44), Others (Remainder of C00-C99; D00-D48)
- Respiratory - Asthma (J45), COPD (J44)
- Cardiovascular - Angina (I20), Other Ischemic Heart Disease (I24; I25), Myocardial Infarction (I21;I22), Cerebrovascular (I60-I69), Hypertension (I10-I15)
- Musculoskeletal – Rheumatoid Arthritis (M05; M06), Osteoarthritis (M15; M19; M47), Back Pain (M54), Osteoporosis (M80; M81; M82)
- Endocrine – Diabetes Type 1 (E10), Diabetes Type 2 (E11-E14), Thyroid (E00-E07)

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- Mental Disorders - Mood Disorders (F30-F39), Anxiety Disorders (F40; F41), Psychotic (F20-F29) Conduct (F91), ADHD (F90), Dementia (F00-F07), Substance Use Disorders (F10-F19)
- Digestive – Crohn’s Disease (K50), Colitis (K51; K52), Peptic Ulcers (K25; K27)
- Genitourinary – Urinary Incontinence (N39)
- Nervous – Alzheimer’s Disease (G30), Migraine (G43), Parkinson’s Disease (G20), Epilepsy (G40), Multiple Sclerosis (G35), Other (Remainder of G00-G99), External Causes – Motor Vehicle Accidents (V00-V99), Unintentional Falls (W00-W19), Other (Remainder of V00-V99; W00-W99; X00-X99; Y00-Y89)

This set of diseases accounts for approximately 85% of all causes of death in Canada.

Identified from a wide range of data sources, the key risk factors included into the base model are: smoking (by duration, severity, and time since cessation), obesity, heavy drinking, injury, stress, hypertension, socioeconomic factors (income), physical inactivity and co-morbid health conditions. The inclusion of these risk factors is important to the development of our model to account for the underlying factors that can also affect the onset and prevalence of disease in order to estimate the demand for ED over time. This involved a review of the literature to identify data on risk factors that are found to be significantly associated to the onset and mortality from diseases included into the model. Data on relative risk estimates have been obtained from a variety of research studies including: meta-analyses, systematic reviews, peer-reviewed journals, longitudinal studies and have been incorporated into the model.

The complete list of disease and risk factors data sources used can be found in Table 2 in Appendix B.

### 2.2.3 EMERGENCY DEPARTMENT VISITS

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Utilization data of emergency departments was obtained through a custom data request to the Canadian Institute for Health Information (CIHI). For each of the diseases included in the model, the data included the number of emergency visits, the median length of stay, triage level, age-group and sex. In addition, the same data were obtained for all causes to account for diseases not tracked in the model. CIHI collects data from all emergency departments in Ontario and Alberta, and from a limited number of other emergency departments in other parts of the country. As Ontario accounts for approximately 40% of the Canadian population, the Ontario data were adopted as representative of the country for the

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analysis. However, a sensitivity analysis using the Alberta data was conducted to investigate the dependence of the conclusions upon the dataset used. As shown in Section 3.2.3, the overall conclusions are insensitive to whether Ontario or Alberta data are used, though the exact numerical values do change.

## 3 RESULTS

The results are divided into two sections. The first examines future emergency department demand if the current trends were to continue with no interventions. These baseline results, presented in Section 3.1, establish the benchmark against which the impact of the EXTRA intervention projects can be measured. Section 3.2 examines the impact of the EXTRA intervention on emergency department utilization in Canada.

### 3.1 BASELINE RESULTS

The baseline results consist of two parts. The first is the validation of the model structure through the reproduction of historical observations. The second examines the expected emergency department utilization if the current emergency department rates were to continue over the next 30 years.

#### 3.1.1 DEMOGRAPHIC RESULTS

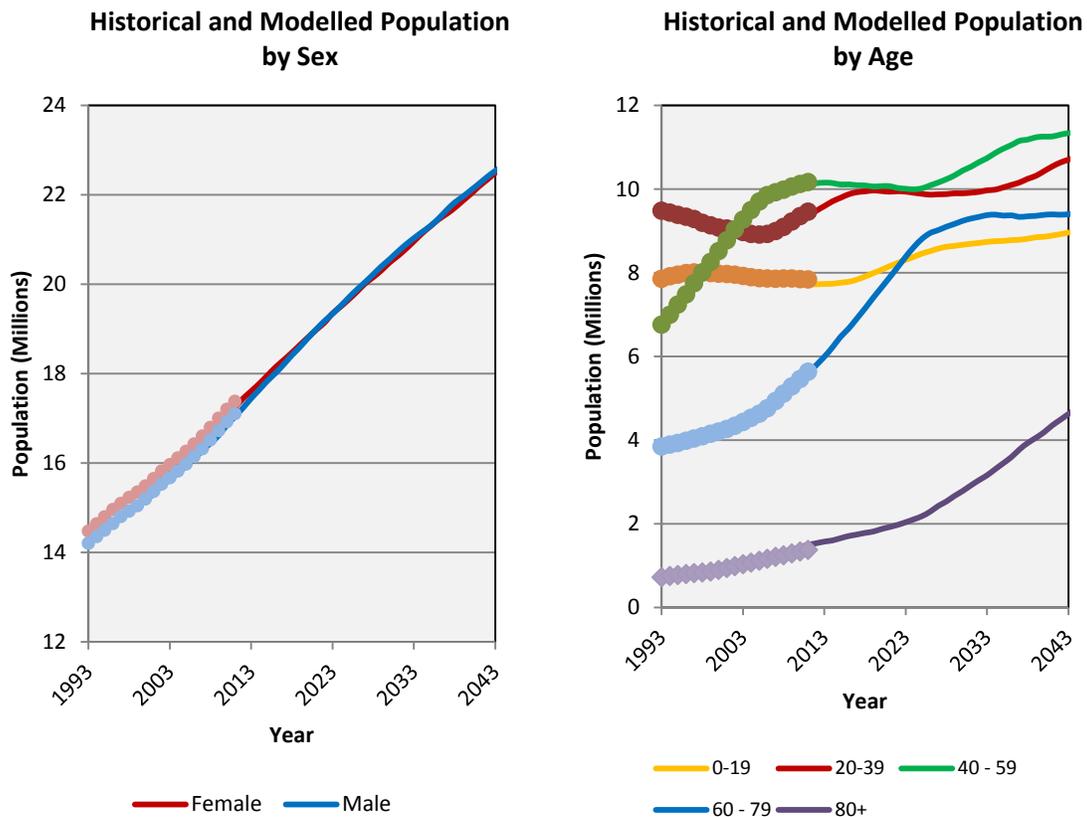
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In order to validate the demographic results, the simulation is started 20 years in the past in 1993, and run 30 years into the future until 2043. As shown in Figure 2, the model is accurately able to reproduce the historical observations. In Figure 2, the points indicate the historical values while the lines show the modelled results. In addition, the population projection falls with the range of moderate growth projection from Statistics Canada.

An important feature to note in the figures is the rapid increase in the number of people over 60 years old expected in the next 30 years. This ageing population will place a much greater burden on the healthcare systems in Canada. Overall, the total population on Canada would increase from 35 million in 2013 to 45 million by 2043. The 30% increase is driven largely by immigration.

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**Figure 2** Comparison of historical (points) and modelled (lines) populations by sex (left) and age (right)



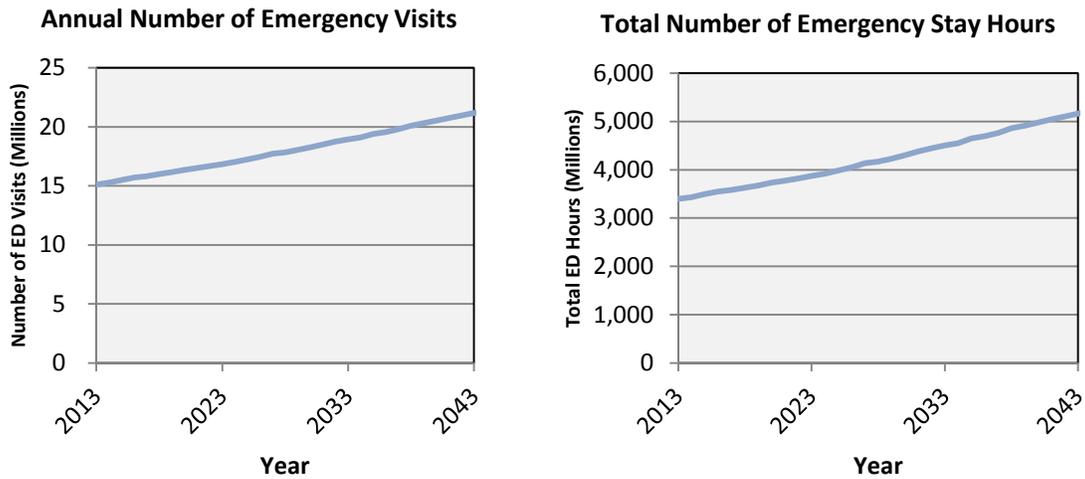
### 3.1.2 EMERGENCY DEPARTMENT UTILIZATION

Based upon the demographic and disease modelling, the annual number of ED visits in Canada could increase from 15 million per year in 2013 to over 21 million by 2043. The 40% increase in annual visits is significantly greater than the 30% growth in the population over the same period. Additionally, the total number of hours spent in ED visits could increase by 52%, from 3.4 billion hours in 2013 to over 5 billion hours by 2043. Figure 3 shows the growth in number of visits (left) and total hours (right) for ED utilization in Canada from 2013 to 2043.

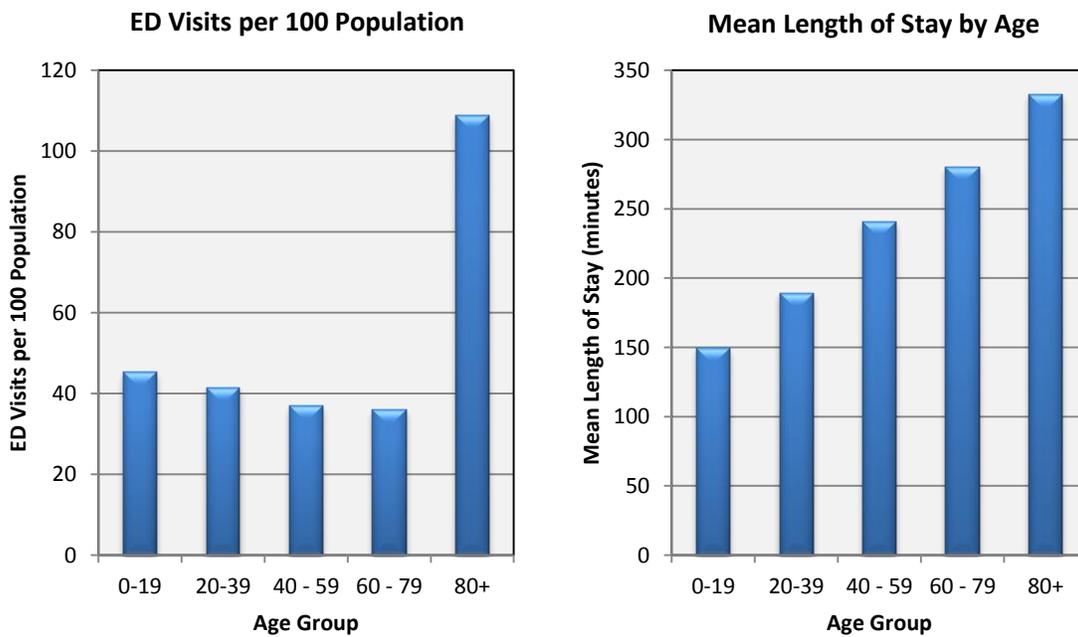
The key factor driving the growth in ED utilization at high rates than the overall population growth rate is the aging of the population, and the associated increased risk of illness. As shown in Figure 4, the ED utilization rates increase significantly for people over 80 years old. In addition, the length of time that a patient stays in the ED increases significantly with age and the net result is that as the population ages, a greater fraction of people use ED services.

The Impact of the CFHI Health Care Collaborations and Initiatives

**Figure 3** Estimated number of ED visits (left) and total number of ED hours (right) from 2013 to 2043



**Figure 4** Number of ED visits by age (left) and mean length of stay by age (right)



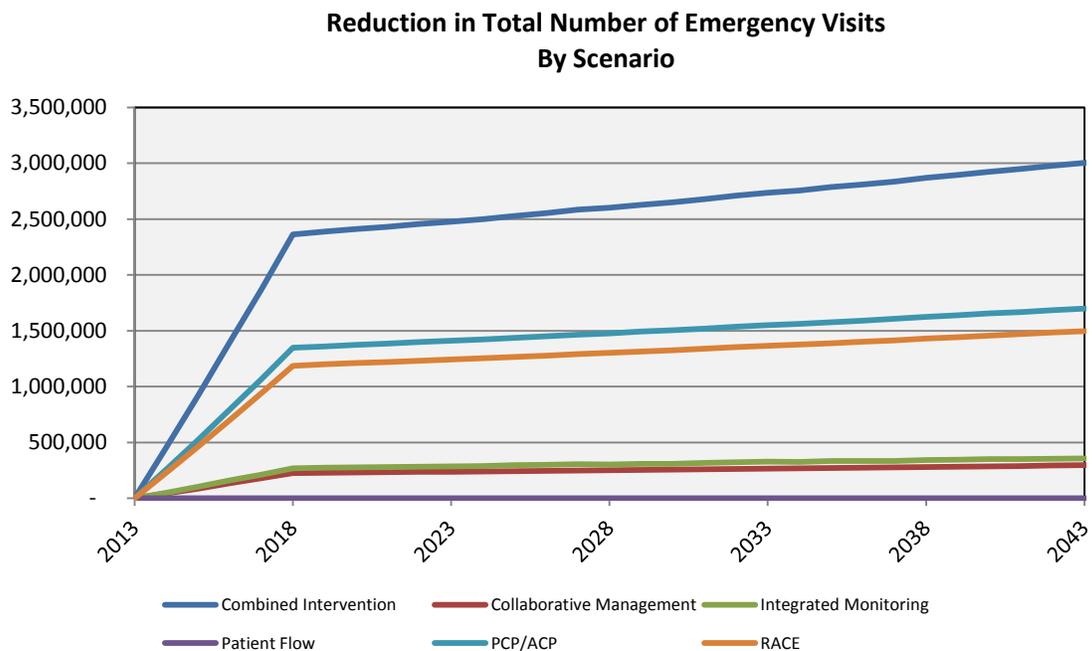
It is important to note that it is unlikely that age and disease-specific rate of ED utilization will remain unchanged over the next 30 years. Changes to the health care system are ongoing. However, the assumption that the system remains unchanged provides a baseline estimate of which to measure the significance of possible interventions against.

### 3.2 INTERVENTION RESULTS

#### 3.2.1 EMERGENCY DEPARTMENT VISITS

The impact of expanding each of the EXTRA intervention projects across 50% of the Canadian healthcare system – an expansion we assume ramps up over a five-year period -- individually could reduce emergency department utilization from between 2% to 17%. Figure 5 shows the annual reduction in number of ED visits under each scenario, and the combined impact of all of the intervention projects simultaneously.

**Figure 5** Reduction in the number of ED visits for each intervention project and the combined impact of all intervention projects



Under the combined impact of all five EXTRA intervention projects, the annual number of emergency visits could be reduced by 3 million by 2043. This is a 17% reduction in the number of CTAS 3, 4 and 5 visits. It is important to note that while future changes in ED utilization may alter the baseline demand projection, the percentage reduction in the number of visits due to the combined EXTRA interventions would likely still be significant compared to the case without them.

## The Impact of the CFHI Health Care Collaborations and Initiatives

The reduction in the number of emergency visits could have a significant impact on costs to the health care systems. ED care is the most expensive form of care and costs are increasing. For example, CIHI data show that between 2003 and 2008, ED costs increased from \$113 to \$166 (CIHI Report, 2012). While patients who avoid the ED would likely incur other costs in the healthcare system (i.e. GP, clinics, etc.), if the average new savings were \$100 per visit avoided, it would result in an average annual savings of \$210 million (present value) over the next 30 years conservatively assuming a 2% inflation rate on the savings.

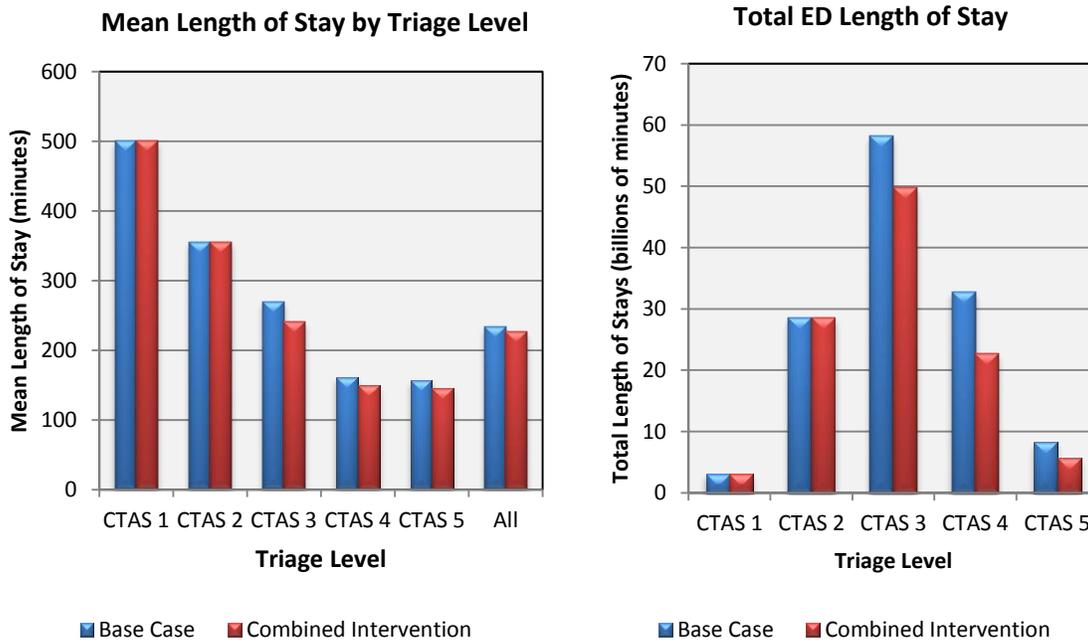
### 3.2.2 EMERGENCY DEPARTMENT LENGTH OF STAY

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The impact in the length of stay in EDs varies significantly based upon the triage severity. As the EXTRA intervention projects do not affect the most severe triage levels (CTAS 1 and CTAS 2), the mean length of stay and total hours for those two levels remain unchanged. As shown in Figure 6, the mean length of stay for patients that stay in the ED can be reduced slightly for triage levels 3, 4 and 5. However, in conjunction with the visits avoided, the total number of hours can be reduced significantly. The net result is that if 50% of the EDs were to implement the combined intervention, the total number of ED hours in 2043 is only 26% higher than in 2013, which is slightly less than the population growth.

## The Impact of the CFHI Health Care Collaborations and Initiatives

**Figure 6** Reduction in mean length of stay (left) and total ED hours (right) under the combined intervention by triage level



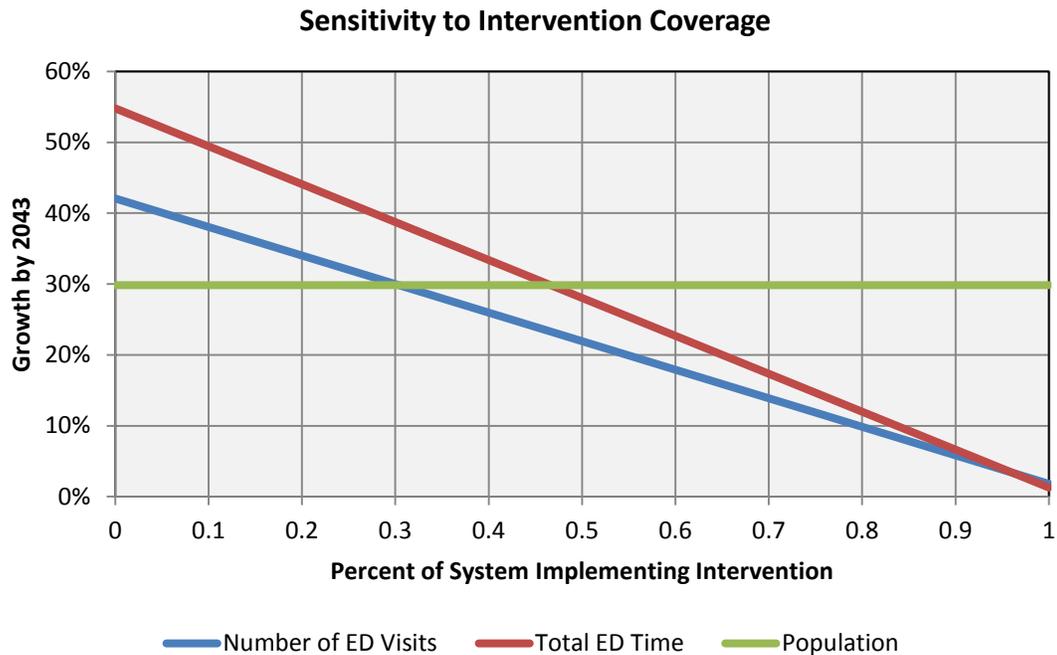
### 3.2.3 SENSITIVITY ANALYSIS

The results presented have assumed that the interventions can be implemented across 50% of the healthcare system, but achievable coverage rates are subject to considerable uncertainty. In order to understand the dependence of the impact of the combined EXTRA intervention project, a sensitivity analysis to the percent of the system implementing the combined intervention was conducted. Figure 7 shows the total growth in emergency department visits and hours as a function of the percent of the system implementing the combined intervention. To establish a point of reference, the growth in the population over the same period of time is also shown. In order to reduce the rate of growth in ED visits to rates similar to the population growth, only about 30% of the system needs to implement the combined intervention. However, as the total number of hours is increasing faster than the number of visits, about 50% of the healthcare system would need to implement the combined intervention to reduce the growth in total hours to rates similar to the population growth. Therefore, in order to achieve a significant reduction in emergency department utilization, the combined intervention does not need to be implemented completely across the country. Even if 50% of the healthcare system were

## The Impact of the CFHI Health Care Collaborations and Initiatives

to implement the combined intervention, significant reductions in utilization could be achieved with the corresponding direct cost savings.

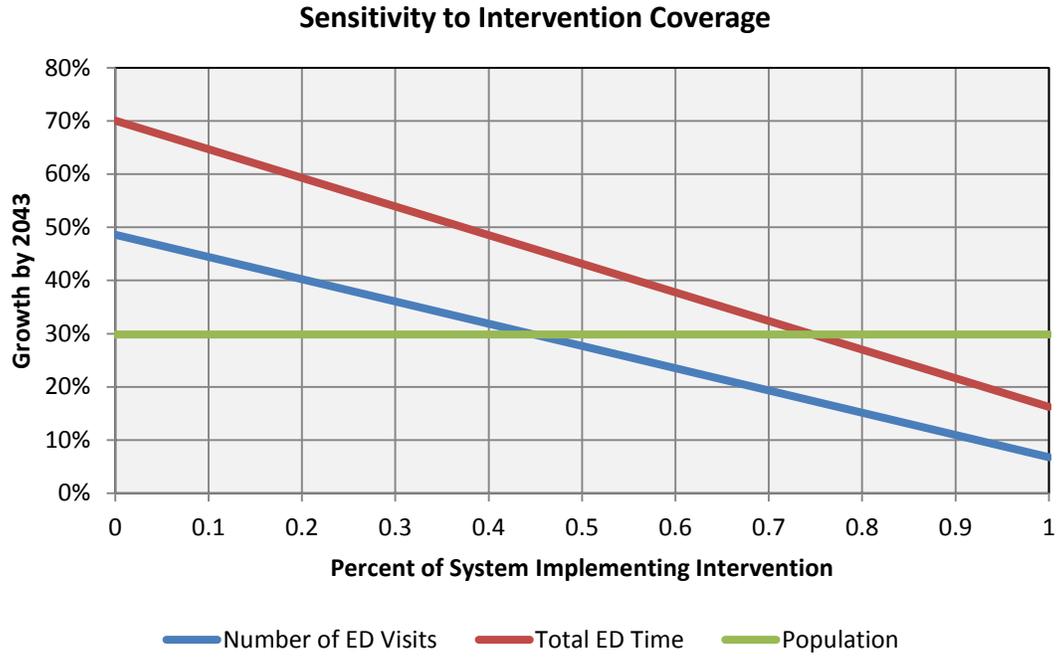
**Figure 7** The sensitivity of the growth in number of emergency visits and total ED time to the percent of the healthcare system implementing the combined intervention when Ontario data is used to calibrate the model



In addition to the fraction of the system implementing the combined intervention, regional differences in emergency department utilization could alter the conclusions. The analysis used the emergency department utilization data from Ontario as a proxy for the rest of the country. However, based on the CIHI dataset, the utilization rates in Ontario are about 35% lower than in Alberta. Despite the differences in utilization, even if the higher Albertan rates are used, the overall conclusions still remain sound. As shown in Figure 8, the combined interventions can still significantly reduce the growth in emergency department visits and total emergency department time though a somewhat higher fraction of the system must implement the interventions to reduce the rate to levels comparable to the rate of population growth.

## The Impact of the CFHI Health Care Collaborations and Initiatives

**Figure 8** The sensitivity of the growth in number of emergency visits and total ED time to the percent of the healthcare system implementing the combined intervention when Alberta data is used to calibrate the model



## 4 CONCLUSIONS

### 4.1 GENERAL CONCLUSIONS

If the current trends continue, the number of emergency department visits and total length of stay could increase much faster than the rate of population growth. Over the next 30 years, the annual number of ED visits could increase from 15 million in 2013 to over 21 million in 2043. The total length of stay could increase from 3.4 billion hours in 2013 to over 5 billion hours in 2043. This is significantly greater than the population growth of 30% over the same period.

Implementation of the EXTRA intervention projects across the country could provide a means to help reduce the growth of emergency department demand. With the implementation of the combined intervention in 50% of the healthcare system, the rate of growth in ED utilization would be reduced to rates comparable to the rate of population growth. In this case, an average of 2.5 million ED visits could be avoided on an annual basis and an average of 11.8 million hours spent in the ED could be avoided per year over the next 30 years. If each avoided ED visit saved the health care system \$100, this would amount to an average saving of \$210 million (present value) per year.

### 4.2 LIMITATIONS AND FUTURE RESEARCH

The literature has shown that ED overcrowding is as a result of a combination of issues that impact the input, throughput and output process within the ED system. The interventions analyzed in this paper are restricted to the outcomes of the EXTRA intervention projects identified within the scope of this analysis. The outcomes from the five intervention projects only looked at factors that impact the input and throughput process. As a result, analyses on factors that impact the output process within the ED (such as inadequate number of acute care beds) were not addressed in this paper. However, through the literature and consultations with EXTRA project investigators, it was identified that factors such as lack of access to a family physician or a specialist and shortage of nursing and physician staff that contribute to the input and throughput process are significant contributors to overcrowding in the ED.

Ontario and Alberta data used in this analysis provided a reasonable approximation of ED visits across the country. A key limitation was the availability of data from all provinces. Additionally, it is important to note that some differences may exist in number of ED visits by triage level between rural and urban

## The Impact of the CFHI Health Care Collaborations and Initiatives

sites. Due to time constraints and data availability, this report did not take into account the differences between these two sites.

This study did not consider all costs that may occur as a result of redirecting patients away from the ED, for example increased specialist costs or clinic costs. As more people are redirected from the ED, it is expected that there will be an increase in costs in these sectors of the health care system. However, as previously mentioned, ED costs are considered the most expensive form of service when compared to clinics, FP/GPs and specialists.

Despite these limitations, this analysis has demonstrated the potential impact of the EXTRA intervention projects if they were to be implemented nation-wide. In addition, each of the above mentioned scope limitations have been identified as a potential area for future research and expansion of the Life at Risk Model.

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## B OVERVIEW OF MODELLED EXTRA INTERVENTION PROJECTS

### B.1 BRIDGING THE GAP BETWEEN PRIMARY AND SECONDARY CARE: USE OF CLINICAL PATHWAY FOR THE INVESTIGATION AND MANAGEMENT OF DEEP VEIN THROMBOSIS<sup>1</sup>

#### Objective

The purpose of this EXTRA intervention project was to investigate the access and communication barriers that exist between the primary and secondary health care system, which in turn can contribute to increased utilization of the ED (Campbell et al. 2008). Using the clinical management of deep vein thrombosis (DVT) as a case study, Dr. Sam Campbell explored some of the problems that contribute to these barriers. Current tools that should have made it easier to rule DVT in or out for family physician practitioners without having to refer patients to specialists were not available in Queen Elizabeth II Health Science Center sites of Capital Health at the start of the project.<sup>2</sup> These patients had to be referred to the ED in order to have a compression ultrasound ordered where they were more than likely to be triaged at a high level (implying low urgency). See Appendix C for a detailed description on ED triage levels. Additionally, patients with DVT are put at risk as the prolonged sitting position can be potentially detrimental. Patients without DVT are also put at risk when they are exposed to unnecessary testing which in some cases can prove painful or harmful (Tovey et al.. 2003). The short term objective of this project was to identify interventions that would lead to the improvement of DVT management (Campbell et al. 2008).<sup>3</sup> In this case, accurate screening would have the advantage of reducing the number of individuals that present to the ED and reduce the number of ED physicians that would be required to screen patients. The anticipation was that the interventions used in this study, if successful, could be adapted to the management of other clinical conditions. The long term goal of this EXTRA project was to begin to address some of the issues that create these barriers or “silos” between primary and secondary health care systems. This could then result in increased cost savings in the health care systems and an improvement in the management of healthcare.

#### Intervention and Project Outcomes

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<sup>1</sup> Campbell et al. Intervention Project Progress Report 3: Primary Care Pathway for the Investigation and Management of Deep Vein Thrombosis. EXTRA Project 2008.

<sup>2</sup> Queen Elizabeth II Health Sciences Centre, an 860 bed teaching hospital in Halifax Nova Scotia was the site for this project.

<sup>3</sup> As a result of venography which is a procedure that has been used to identify and locate blood clots in the veins of the legs and lower abdomen in individuals with suspected deep vein thrombosis.

## The Impact of the CFHI Health Care Collaborations and Initiatives

As part of a clinical pathway from primary care to secondary care, a team of stakeholders comprising of health care professionals from both sectors (primary and secondary care) developed evidence based scoring systems that allowed the user to calculate the probability that a patient has DVT. Family physicians were able to immediately rule out DVT where necessary. In the event a patient required additional testing, family physicians that were unable to perform this test within their clinics could send patients to the hospital for further testing. Advanced Care Paramedics (ACPs) who were on duty 24 hours a day were able to process these patients who required hospital investigation and/or treatment. These patients were able to bypass the ED line as a result,<sup>4</sup> and in some cases avoid the occupation of an ED bed based on the ACPs initiative.<sup>5</sup> A 25% reduction in length of stay was reported as a result of the intervention. Additionally, increased efficiency as a result of increased use of DVT clinics (80% increase) was reported.<sup>6</sup> Expanding the scope of practice of ACPs had the added advantage of freeing up the time of emergency physicians to focus on other areas that would result in improved patient flow (Campbell et al., 2012). A significant number of family physicians that had used the pathway felt that it had improved their ability to manage DVT. 70% of patients reported that the process was more efficient. A follow-up study found that 95% of the physicians that participated in the survey felt that the process was worthwhile and improved patient outcomes. Currently, the pathway is now considered as part of the standard care for DVT and is being implemented in other areas such as anticoagulation management.

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<sup>4</sup> It is important to note that patients in the ED who were in need of immediate care were seen immediately and that these patients did not compromise the safety of high need patients.

<sup>5</sup> For example, if CUS is to be delayed, the ACP can administer the appropriate dose of low molecular weight heparin and arranges for CUS the next day.

<sup>6</sup> Cost of using clinics is less than that of using ED's. An increase in clinic use therefore implies a decreased cost to the health care system.

## B.2 ADVANCED ACCESS PRINCIPLES IN FAMILY PHYSICIAN PRACTICES: PATIENT CENTERED CARE<sup>7</sup>

### **Objective**

The primary goal of the CFHI EXTRA project was to increase the number of advanced access practices within Cape Breton District Health Authority. A study conducted in 2005 by CIHI showed that “Nearly one in five Canadian Adults (18%)...revealed that they could have received their emergency department care from a regular physician in a non ED-setting” (CIHI, 2005). Patients within Cape Breton District Health Authority reported that it was more convenient to go to the ED for urgent needs rather than visit their family physician as in some case it takes on average four days to get an urgent appointment (Rankin, 2008). The EXTRA project investigators identified these issues as some of those that may contribute to overcrowding with the ED. The short term goal was to slowly increase the number of advanced access visits in clinics within Cape Breton, with a long term goal of potentially reducing the number of patients attending the ED for less urgent or non-urgent visits (triage level 4 and 5) and redirecting them to the primary care setting.

### **Intervention and Project Outcomes**

The intervention project utilized an evaluative research approach to use local data as change motivator for advanced access. (CFHI, 2006) A team comprising of a physician change champion, an academic researcher and a director of primary care assisted in helping local physicians interested in the project in transforming their office practices to advanced access. Tracking tools were developed and provided to physicians to allow for the evaluation of the program. By increasing patient access to primary care, a reduction in family physician patient emergency room visits was observed. Specifically, a 32% reduction of CTAS 4 and 5 patients was achieved by 2008. Physicians reported a 7% increase in revenue within their clinics as a result of the increased utilization of clinics. The project team used the Institute for Healthcare Improvement tool to measure the people’s satisfaction with the change in FP appointment to advanced access. A comparison of survey results from patients in advanced access booking practice to those from a more traditional practice showed a significant difference in the mean values of the two

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<sup>7</sup> Rankin E. Advanced Access Principles in Family Physician Practices: Patient Centered Care; EXTRA Intervention Project Final Report. 2008

groups. The responses from this survey can be used as an indicator that patients would really rather see the FP for minor appointment and primary care ailments rather than go to the ED. Due to the success of this implementation program, the Nova Scotia Department of Health included advanced access as part of its Primary Care Action Plan.

### B.3 COLLABORATIVE MANAGEMENT OF PATIENTS WITH CHRONIC, COMPLEX, CO-MORBID CONDITIONS <sup>8</sup>

#### **Objective**

The challenges of chronic disease management are a problem that has plagued the Canadian health care systems for decades. Results from a self-reported survey conducted by CCHS showed that about nine million Canadians have at least one of seven chronic health conditions and the same survey showed that people with chronic health conditions use health care services more often and more intensely (Health Quality of Ontario report, 2012). As a result, chronic diseases are considered key drivers of health care utilization. The need for effective management of these conditions is necessary to minimize the costs to the healthcare system that arise as a result. It has been reported that patients with one or more chronic conditions uses approximately 55% of specialist consultations (Health Council of Canada, 2007). The same survey conducted by the health council of Canada in 2007 found that “[o]ne-third of adults with chronic conditions (33%) who visited an emergency department in the last 12 months report that their last visit was for a condition that could have been treated by their primary care provider if he/she had been available”. Further studies have shown that a significant amount of these specialist consultations that take place in the ED are unnecessary and can take place in the primary care setting. However, due to fragmentation of services between primary care and secondary care, these consultations usually require visits to the ED (Kvamme et al., 2001). This project sought to begin to address some of the problems that contribute to the challenges of chronic disease management such as lack of access to specialists in a timely manner that lead to ED visits that could have been avoided.

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<sup>8</sup> Wilson, M., Barr, S. Collaborative Management of Patients with Chronic, Complex Co-morbid Conditions: Final Intervention Project Report. May 1st 2012.

### **Intervention and Project Outcomes**

The intervention project involved a shared care program through the initiation of a telephone advice line that allowed family physicians to consult specialists when the need arose. The telephone advice line, known as the RACE (Rapid Access to Consultative Expertise) advice line is a model of share care that allows family physicians to call one number, and choose from a selection of specialty services which allows them to be routed directly to the specialist's cell phone or pager for advice (Wilson et al., 2012). Initial results and feedback from participants indicated that there was increased knowledge transfer, enhanced care experience and a potential for control of per capita cost of health care through the reduction of unnecessary consults or emergency visits. The numbers showed that about approximately 78% of calls were answered within 10 minutes. In order to evaluate project outcomes, physicians were asked to fill in surveys and the results were as follows:

- 62% of 161 calls avoided a face-to-face consultation with a specialist; and
- 32% of 150 calls avoided a visit to the emergency department.

The potential for improvement of population health as access to care is enhanced was another outcome from this project, based on the results collected. Increased knowledge transfer was reported by family physicians as a result of the RACE initiative.

#### **B.4 EMERGENCY DEPARTMENT OVERCROWDING <sup>9</sup>**

Calgary Health Region's experience with overcrowding in the emergency departments has contributed to Albertans' dissatisfaction with their healthcare system. Based on the initial investigation, this intervention project identified that prolonged waiting for ED creates five issues in Calgary which are: patient safety, patient dissatisfaction, healthcare provider dissatisfaction, Calgary Health Region Reputation and Community Safety. Looking at the problem from a system based perspective, the project team recognized that overcrowding in Calgary's ED was a result of demand for services exceeding the capacity to provide those services. The project team members framed the problem using a conceptual model that was developed by Asplin et al. that partitioned the ED overcrowding into three interdependent components: input, throughput and output. Based on the model, a nationwide survey of

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<sup>9</sup> Flemons, W, Conly J, Eagle C. Emergency Department Overcrowding: Effecting System Level Change to Improve Patient Flow Through Tertiary Care Emergency Department: Final Intervention Project Report. May 1<sup>st</sup> 2008.

## The Impact of the CFHI Health Care Collaborations and Initiatives

ED Directors (Rowe, B et al.), and factors reported by Schull et al.,<sup>10</sup> the team came up with the following list of areas in which there were possible interventions:

- A. Input
  - i. Appropriateness of patient demand
  - ii. Intermittent surges in demand
- B. Throughput
  - i. ED physician staffing and characteristics
  - ii. ED nurse staffing and profile
  - iii. Consultant response times and consult policy
  - iv. Access to radiological test off-hours
- C. Output
  - i. Lack of admitting beds
  - ii. Home care service availability
  - iii. Alternate level of care availability

The objective of this project was to reduce waiting times for ED patient's initial assessment.

### Interventions and Outcomes

The intervention project, named GRIDLOCC (Getting Rid of Inappropriate Delays that Limit Our Capacity to Care) took a system based approach and focused on six areas, related to, input, throughput and output. Based on the conceptual model by Asplin, the areas of focus of the intervention project were:

**Area 1 (input)** – Administrative data was analyzed for the purpose of investigating factors that resulted in patients visiting the ED. The purpose of this analysis was to determine if there were a significant amount of patients that would have been able to receive their care in an alternate setting.

**Area 2 (throughput)** – Four projects were developed to look at improving workflow and patient flow through the ED, in order to reduce the time discharged patients spent in the ED.

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<sup>10</sup> This is based on a study done by Schull et al. in 2001. The main goal of the article was to clarify the conceptual framework of ED overcrowding and to develop a standard definition and parsimonious list of important determinants of ED overcrowding.

## The Impact of the CFHI Health Care Collaborations and Initiatives

Area 3 (**throughput**) – The short term aim of the intervention projects were to reduce the time to make a decision to admit a patient from 250 minutes to 120 minutes with a long term aim of reducing the length of stay for admitted ED patients, thereby reducing wait time for initial assessment.

Area 4 (**output**) – Projects in this area were designed to reduce the time of transfer for a patient once the decision to admit had been made.

Area 4a (**output**) – the intervention project area was developed with a focus of moving discharged patients home or to an alternate care setting. Lean improvement methods were used to attempt to develop hypothesis for improvement and implementation.

A variety of methods were adopted to implement the interventions in the areas identified above. The following are the methods, key results and outcomes that emerged from this project:

1. Redesigned patient flow and creating designated zones for physicians and for different CTAS categories – Resulted in reduction of median time for patients to undergo initial ED physician assessment and increased time spent providing direct care to patients.
2. Developed a form that residents could use to standardize and expedite the decision to process – Resulted in a reduced the time it took to make a decision to admit and allowed for better communication amongst hospital staff.
3. Introduced new discharge process and practices – Resulted in a reduction in the time that a discharge order was written to a person leaving the ED, reduction in the time it took to prepare a room and a reduction in the time for the next patient to occupy the bed.

The outcomes from this project were positive. A 21% decrease in the time it takes to see a physician for CTAS 3 patients was reported. A four percent reduction of physician time spent between CTAS 3 patients was also noted and finally a 90% decrease in discharge time to new occupant was reported. A 51% increase was noted in patient satisfaction based on the increase in time spent with patients by physicians.

**B.5 THE CHALLENGES OF CHRONIC CONDITIONS: INTEGRATED, INTENSIFIED CLINICAL MONITORING AND PROACTIVE FOLLOW-UP OF STRATIFIED “CHRONICALLY ILL POPULATION”<sup>11</sup>**

It is known that “high-demand” patients, those vulnerable populations who suffer from complex co morbid chronic conditions, have been found to consume a disproportionate amount of health care services in Canada. A study done by CIHI found that seniors with three or more chronic conditions reported three times more health care resource use, including ED visits which amounted to 13.3 million visits per year at the time of the study (CIHI, 2011). An article by Hiver in 2008 reported that 3% of the Laurentides population uses 50% of hospital beds. The main objective of this project done at the CSS des Sommets (Laurentians, Quebec) was to identify 200 of those persons at risk of repetitive ED visits and hospitalizations, have a resolute, coordinated and proactive response to a patient case bringing together various clinical departments and community resources in order to maximize efficiency of services with the aims of:

- Improving the overall wellbeing of “high consumers”;
- Increasing patient’s autonomy in terms of managing their well-being;
- Promoting a relevant and timely use of health services;
- Improving disease symptoms by proactive clinical interventions;
- Preventing and reducing acute episodes of chronic conditions and further complication;
- Optimizing drug management; and
- Reducing emergency hospital visits by maximizing primary care in the community.

**Intervention and Project Outcomes**

The intervention project involved:

- Redefining the specific needs and preferences of these chronically ill patients;
- Reconfiguring the care and services that they are offered; and
- Intensely monitoring these vulnerable patients who require a complex combination of healthcare services.

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<sup>11</sup> Rapport final du projet d’intervention. FORCES-EXTRA. 2008. Les défis de la chronicité : le suivi clinique intégré et intensifié de clientèles cibles, France Laframboise, Inf., M.Sc., Mentor : Jean Mireault, Md, M.Sc.

## The Impact of the CFHI Health Care Collaborations and Initiatives

The “Défi Santé” project was able to reduce the total bed occupancy by 10% in just nine months after implementation. In 2012, emergency visit rates, hospitalizations and interventions in CLSC rates dropped by 58%, 39% and 10% respectively. An increase in the overall well-being, moderate physical activities and social activities of enrolled patients was also reported. Currently, family physicians are taking an active interest in following these “high-demand” patients and are seeking to manage their conditions efficiently. Since then, many Quebec health organisations have been following their vulnerable chronically ill population with the results of 40-60% decrease in the numbers of emergency visits, 50-70% decrease in hospitalisation days and a sensitive increase (0-10%) in community professional services with those stratified patients.<sup>12</sup>

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<sup>12</sup> CSSS Papineau, CSSS Pierre-de-Sorel, CSSS Alphonse-Desjardins, CSSS Nord de Lanaudière, etc....2009-2013. See slide in appendix.

**C DATA SOURCES AND ASSUMPTIONS**

**Table 1** Statistics Canada Data Sources

Quantity	Description	CANSIM Table
<b>Population</b>	The population of Canada by age and sex from 1971 to 2012.	051-0001
<b>Births</b>	The number of births in Canada by sex from 1971 to 2012	051-0013
<b>Deaths</b>	Number of deaths in Canada by age and sex	051-0002
<b>Immigration</b>	Immigration into Canada by age and sex	051-0012
<b>Emigration</b>	Emigration from Canada by age and sex	051-0012
<b>Risk Factors</b>	Risk Factors by age and sex from 2003-2011	105-0501
<b>Retirement</b>	Retirement by age, sex, class of worker	282-0051
<b>Wages</b>	Wages by age, sex, industry type	282-0072
<b>Wages</b>	Wages by age, sex	202-0407
<b>Employment</b>	Employment by age, sex, province	282-0002
<b>Employment</b>	Employment by age, sex, province, industry	282-0008

**Table 2** Disease Data Sources

Property	Data Source	Diseases
<b>Mortality</b>	CANSIM Tables 102-01573, 103-1563, 103-1561, 103-1569, 102-0503, 102-0524 to 102-0526, 102-0529 to 102-0534, and 102-0540.	Cancers, Respiratory System Disorders, Cardiovascular System Disorders, Musculoskeletal System Disorders, Endocrine System Disorders, Mental Health Disorders, Digestive System Disorders, Genitourinary System Disorders, Nervous System Disorders, External Causes (motor vehicle accidents, unintentional falls, other)
<b>Prevalence</b>	Statistics Canada (CCHS) CANSIM Table 105-0503, PHAC Canadian Chronic Disease Surveillance System: Hypertension in Canada (2010), ICES Canadian Cardiovascular Disease Atlas (2006), PHAC using Statistics Canada (CCHS) 2009/10 data, PHAC Health Aging Survey (2008-2009), Statistics Canada (CCHS) PUMF CD (2010), CIHI, Rising Tide Report (Smetanin P <i>et al.</i> , 2008), The life and economic burden of arthritis in Canada (Smetanin P <i>et al.</i> , 2010), The life and economic impact of major mental illnesses in Canada (Smetanin P <i>et al.</i> , 2012), The life and economic impact of lung disease in Canada (Smetanin P <i>et al.</i> , 2011).	Respiratory system disorders, Cardiovascular System Disorders, Musculoskeletal System Disorders, Endocrine System Disorders, Mental Health Disorders, Digestive System Disorders, Genitourinary System Disorders, Nervous System Disorders
<b>Incidence</b>	Statistics Canada CANSIM Table 103-0550, The life and economic impact of lung disease in Canada (Smetanin P <i>et al.</i> , 2011), ICES Canadian Cardiovascular Disease Atlas (2006), PHAC Canadian Chronic Disease Surveillance System: Hypertension in Canada (2010), The life and economic burden of arthritis in Canada (Smetanin P <i>et al.</i> , 2010), The life and economic impact of major mental illnesses in Canada (Smetanin P <i>et al.</i> , 2012), Rising Tide Report (Smetanin P <i>et al.</i> , 2008).	Cancers, Respiratory System Disorders, Cardiovascular System Disorders, Musculoskeletal System Disorders, Endocrine System Disorders, Mental Health Disorders, Digestive System Disorders, Genitourinary System Disorders, Nervous System Disorders.

## The Impact of the CFHI Health Care Collaborations and Initiatives

**Table 3** Risk Factor Prevalence Data Sources

Property	Data Source	Risk Factor
<b>Prevalence</b>	CTUMs	Smoking status and history
	Statistics Canada (CCHS) CANSIM Table 102-0501	Second hand smoke exposure, obesity (body mass index), physical inactivity, alcohol consumption, fruit and vegetable consumption, stress, socioeconomic status

**Table 4** Emergency Department Utilization Data

Property	Description	Data Source
<b>Length of Stay</b>	Length of Stay in the Emergency Department in Ontario and Alberta by disease, gender, age and triage level	Canadian Institute for health Information
<b>Number of visits</b>	Total Number of Visits to the Emergency Department in Ontario and Alberta by disease, gender and triage level	Canadian Institute for health Information

## D EMERGENCY DEPARTMENT TRIAGE LEVELS

Canadian Triage and Acuity Scale (CTAS) group's patients into five categories<sup>13</sup>:

- **CTAS I – Resuscitation:** requires resuscitation and includes conditions that are threats to life or imminent risk of deterioration, requiring immediate aggressive interventions
- **CTAS II - Emergent:** requires emergent care and includes conditions that are a potential threat to life or limb function requiring rapid medical intervention
- **CTAS III - Urgent:** requires urgent care and includes conditions that could potentially progress to a serious problem requiring emergency intervention
- **CTAS IV - Less urgent:** requires less-urgent care and includes conditions related to patient age, distress, or potential for deterioration or complications that would benefit from intervention or reassurance within one to two hours
- **CTAS V – Non-urgent:** requires non-urgent care and includes conditions in which investigations or interventions could be delayed or referred to other areas of the hospital or health care system

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<sup>13</sup> R. Beveridge, "The Canadian Triage and Acuity Scale: A New and Critical Element in Health Care Reform, "Journal of Emergency Medicine" 16 (1998): pp. 507-11.