

Investing in Quality Improvement:

Economic impact of the St Joseph's Health Centre Patient-Centered Falls Prevention Project

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Prepared by:
Andrew Mendlowitz
Ruth Croxford
Laura Maclagan
Dr. Wanrudee Isaranuwatjai

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The Problem

Estimates of acute care patients who experience a fall during an inpatient stay range as high as 15% and are among the most frequently reported incidents.¹ Falls may result in fractures, lacerations, or internal bleeding, leading to increased health care utilization.² As many as 30% of inpatient falls result in an injury.² Estimates of the frequency of hospital inpatient falls resulting in serious injuries range from 4 to 6%.² Falls can also cause indirect psychological effects by instilling a fear of falling within a patient.³ This negative effect can further contribute to reduced mobility and loss of function in a patient.³ Research shows that close to one-third of falls can be prevented by managing a patient's underlying fall risk factors and optimizing the hospital environment.⁴ A rapid scoping review of fall literature also revealed the association between inpatient falls and higher costs of care which were in line with this report's findings (Appendix A).

St. Joseph's Health Centre Patient-Centered Falls Prevention Project

The St Joseph's Health Centre (SJHC) Patient-Centered Falls Prevention project focuses on reducing inpatient falls that result in injury by establishing a more efficient, sustainable, collaborative and engaging approach to transitional care unit (TCU) patient care.⁵ The project is a multi-factorial quality improvement (QI) initiative focused on fall prevention through a revamping of fall risk assessment screening, creation of patient-centered fall prevention plans and coordination of care rounds specific to raising awareness around those patients at a higher risk of falling.^{5,6}

The project was originally implemented within the TCU at the SJHC as part of the IDEAS (Improving and Driving Excellence Across Sectors) Advanced Learning Program. IDEAS is a comprehensive, evidence based QI training program for Ontario's health care professionals. Funded by the Ontario Ministry of Health and Long-Term Care and delivered in partnership with The Institute for Health Policy, Management and Evaluation at the University of Toronto, Health Quality Ontario, and the Institute for Clinical Evaluative Sciences, along with the six medical schools in Ontario, IDEAS is designed for front line clinicians and administrators to improve the quality of patient care. An essential component of the Advanced Learning Program (ALP) is the team based applied learning project. Over the five-month program, project teams identify an issue and develop, implement and report on a QI project in their own organization or local health system.

During the course of IDEAS, the SJHC project team achieved a 33% decrease in overall falls and a 50% decrease in falls resulting in serious injury on the TCU.⁵ The QI changes introduced during the IDEAS project have since been implemented in the day to day operations of other units at SJHC.⁶ More specifically, the project has since spread to SJHC's Medicine Department where a large proportion of patients at a high risk for falls are admitted.⁶

Potential Economic Impact of the Project

Almost 8,000 in-hospital falls that resulted in injury were reported in Ontario hospital discharge records from April 2010 to March 2016. Of those, approximately 65% contained a diagnosis code indicating serious injury. In-hospital falls

resulting in serious injury were determined to cost an additional average of approximately \$21,000 to a patient’s cost of care in Ontario, while falls resulting in non-serious injury cost an additional average of \$13,000. †

In comparing a 9-month pre-project implementation period to an 18-month post-project implementation period, the SJHC’s TCU data demonstrated a 50% reduction in falls resulting in serious injury. This possible benefit could translate to a potential cost-savings estimated at **\$8,860,000** per year if this patient-centered falls prevention project were to be implemented across Ontario (Appendix C). The estimated change in yearly provincial cost of in-hospital falls resulting in serious injury following fall prevention program implementation can be seen in Figure 1. There are limitations of this analysis as it did not consider variation between institutions that might implement the fall prevention project. This study made a number of assumptions including: each program would have the same impact on in-hospital falls resulting in serious injury; the impact would be immediate and constant over time; and the program would be implemented within similar facilities and infrastructures as those found at SJHC. Overall, at a unit level, it is estimated that the QI fall reduction initiative project translates to a potential cost-savings of approximately **\$5,800** per month for the SJHC’s TCU (Appendix D).

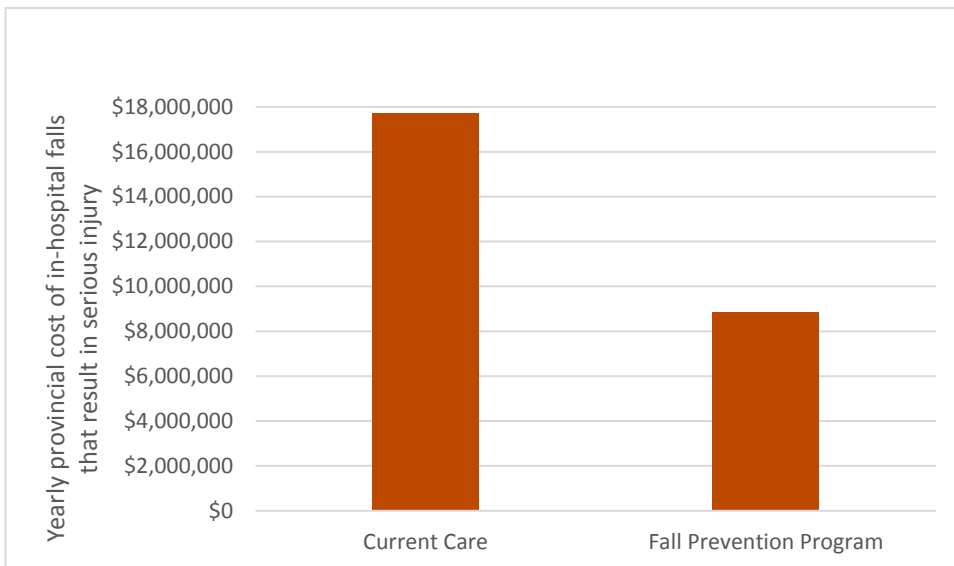


Figure 1: Estimated yearly provincial costs of in-hospital falls resulting in serious injury associated with current care and the implementation of a fall prevention program. This figure indicates Ontario’s current yearly provincial cost associated with the utilization of hospital resources attributed to an in-hospital fall resulting in serious injury and the yearly cost under the scenario of fall prevention program implementation across the province. Yearly costs were derived from Ontario hospital records documenting an in-hospital fall resulting in serious injury from April 1, 2010 to March 31, 2016. This difference translates to a potential cost-savings of \$8,860,000 per year following program implementation (Appendix C).

† Additional costs are based on the difference in average resource intensity weight associated with the usage of hospital resources between those who suffered an in-hospital fall and those who did not.7 (See Appendix B for more information)

Appendix A – Rapid Scoping Review

In a study by Bates et al, based on chart reviews and data from 1987 – 1991, it was estimated that an in-hospital fall was associated with an additional cost of \$4,200 and an increased hospital length of stay of 12 days when compared to hospitalized patients who did not suffer a fall.⁸ Applying the health care inflation rate between 1991 and 2014, this translates to an additional cost of \$6,400 per fall.

A recent study by Morello et al reported a 1.2% rate of in-hospital falls.⁹ The study showed that in-hospital falls were associated with an adjusted increase in length of stay of 8 days, and an adjusted increase in additional hospital costs of \$5,700.⁹ In this study, falls were identified by medical record reviews, daily verbal reports by ward nurse unit managers, hospital incident reporting and administrative databases.⁹

A report from London, Ontario documented 7,592 inpatient falls over 2009-2014 for a large urban acute care teaching hospital located in Canada.¹⁰ Of these reported falls, 31% resulted in injury with 29.3% indicative of minor injury and 1% indicative of serious injury/death.¹⁰ Previous work performed by one of the authors found that a fall resulting in serious injury caused an additional hospital stay of 34 days and were associated with additional hospital costs of \$30,696.¹⁰

In-hospital fall literature tends to cite fall rates of 2% and higher. The 1.2% rate reported in Morello et al was the lowest fall rate observed during the rapid review. Ontario administrative databases indicate that there were a total of 5,382,400 inpatient admissions over 6 years⁷, and assuming an inpatient fall in 1% of them, that would equate to 53,800 corresponding hospital stays. In the data used to generate this report's cost-estimates, 7,769 administrative data records were indicative of an in-hospital fall. Based on this information, it appears that falls are underestimated in Ontario's administrative data and likely only those with the most serious injuries are well-reported.

Data for this report estimated an additional 16 days in alternative length of care hospital stay attributed to an in-hospital fall resulting in injury. This is similar to the additional stay reported by Bates et al, and twice as high as that reported by Morello et al.^{8,9} It is important to note that both the Bates and Morello studies reported hospital length of stay, rather than alternative length of care stay which is specific to SJHC patients.^{8,9} This may have contributed to this report's additional cost associated with fall injury being 2 - 4 times higher than that cited in existing literature.

Based on this rapid review, our estimate of additional length of stay associated with fall injury does correlate with what is reported in other studies, but estimated fall costs are higher, with the exception of the London, Ontario report.¹⁰

Appendix B – The Current Care Scenario

This appendix reports assumptions, information used and calculations made for the following variable:

- Estimate of the total cost of in-hospital falls resulting in serious injury *without* implementation of a falls prevention program similar to the SJHC Patient-Centered Falls Prevention project

Assumptions and Information

Current care scenario:

- Number of in-hospital falls resulting in serious injury for Ontario:
 - Falls resulting in serious injury were used to ensure that if a fall did occur in an Ontario hospital, it would very likely be recorded in a patient's hospital discharge abstract and therefore not at risk of being underrepresented in administrative data
 - 7,769 patients in Ontario had a record documenting in-hospital fall from April 1, 2010 to March 31, 2016⁷
 - 65% recorded a serious injury with the remaining 35% recording a superficial injury
 - Therefore, the number of in-hospital falls resulting in serious injury over the six-year period is 5,050 ($7,769 \times 0.65$)
- Additional costs associated with the usage of hospital resources attributed to an in-hospital fall resulting in serious injury:
 - Resource Intensity Weights (RIW) were used to calculate additional hospital resource utilization and additional costs associated by patients who suffered a fall resulting in serious injury during their hospital stay in comparison to those who did not
 - In-hospital falls resulting in serious injury were associated with a mean RIW difference of 3.70 (95% confidence interval of 3.34 – 4.04)
 - For the years 2010/11 – 2014/15, the average costs per RIW in Ontario was \$5,690, with variation from year to year between \$5,631 to \$5,746⁷
 - Therefore, the additional average cost associated with an in-hospital fall resulting in a serious injury (in one hospital stay) is \$21,053 ($3.70 \times \$5,690/\text{RIW}$)
- Over a six-year period (from April 1, 2010 – March 31, 2016) *without* the implementation of SJHC falls prevention project across Ontario:
 - The additional cost associated with 5,050 in-hospital falls resulting in serious injury was estimated to be \$106,317,650 ($5,050 \times 3.70 \text{RIW} \times \$5,690/\text{RIW}$)

Appendix C – Scenario with Ontario-wide implementation

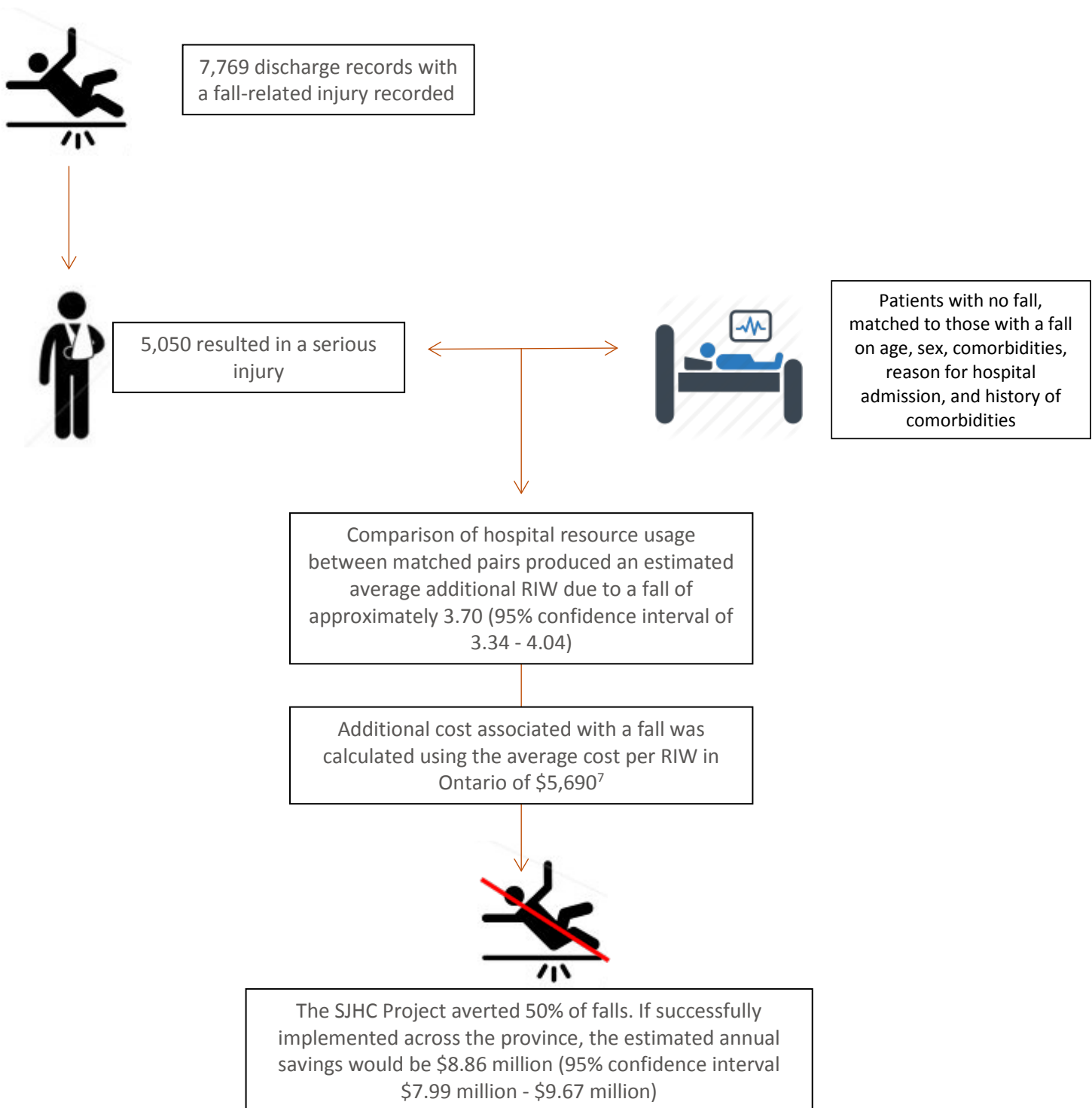


Figure 2: Graphical representation of the method used to derive an Ontario-wide estimate of the potential cost-savings associated with implementation of the SJHC Falls Prevention Project.

Ontario-wide implementation of the Fall Prevention Project Scenario:

- Reduction of in-hospital falls resulting in serious injury due to the fall prevention project:
 - Based on SJHC TCU fall data, there were 5 in-hospital falls resulting in serious injury recorded over a 9-month period prior to program implementation and 5 falls resulting in serious injury recorded over an 18-month period post program implementation.
 - These estimates correspond to a decrease of 50% in falls resulting in serious injury per month after project implementation $((5/18)/(5/9))$
 - Applying this reduction to Ontario's total amount of falls resulting in serious injury (Appendix B), an estimated decrease of 2,525 in-hospital falls that result in serious injury would remain $(5050 - (0.50(5050)))$
 - Applying the same mean RIW difference (3.70) associated with falls resulting in serious injury from the *current care scenario* 2,525 falls would translate to an additional 9,342.5 RIWs $*2,525*3.70$
- Over a six-year period (from April 1,2010 to March 31,2016) *with* the implementation of the SJHC fall prevention project across Ontario it is estimated that:
 - There would be 2,525 in-hospital falls resulting in serious injury
 - Using Ontario's average cost per RIW from Appendix B (\$5,690), the additional costs associated with the 2,525 in-hospital falls resulting in serious injury is estimated to be \$53,158,825 $(2,525*3.70RIWs*$5,690/RIW)$

Cost-savings calculation: Potential cost savings from implementing the SJHC project across Ontario:

= \$106,317,650 - \$53,158,825

= \$53,158,825 over a 6-year period

= **\$8,859,804 per year (95% confidence interval of \$7,997,769 - \$9,673,948 per year)**

Appendix D – Scenario with implementation in the SJHC TCU

SJHC specific savings scenario

- Prior to project implementation, the SJHC's TCU data recorded 5 in-hospital falls resulting in serious injury over a 9-month period
 - Applying the same mean RIW difference (3.70) associated with falls resulting in serious injury from the *current care scenario*, 5 in-hospital falls resulting in serious injury translates to an additional 18.5 RIWs (3.70×5)
 - Using Ontario's average cost per RIW from Appendix B (\$5,960), this translates to an additional cost of care of \$105,265 over 9 months of \$11,696 per month ($\$5,690 \times 18.5/18$)
- Post project implementation, the SJHC's TCU data recorded 5 in-hospital falls resulting in serious injury over an 18-month period
 - This translates to an additional cost of care of \$105,265 over 18 months or \$5,848 per month ($\$5,690 \times 18.5/18$)

Cost-savings calculation: Potential cost savings specific to the SJHC's TCU due to the implementation of their fall prevention project:

= \$11,696 per month - \$5,848 per month

= **\$5,848 per month (95% confidence Interval of \$5,279 – \$6,385 per month)**

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