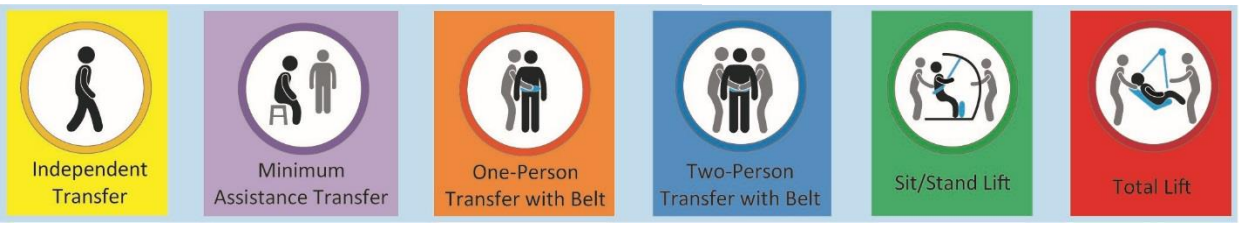


It's Your Move: Evaluating Improvements to Client Handling Practices in Alberta

Final Report
October 31, 2017

Report Completed by:
Renee Misfeldt, Senior Research & Evaluation Consultant, Health Systems Evaluation and Evidence
Meaghan Brierley, Research & Evaluation Consultant, Health Systems Evaluation and Evidence
Mahnoush Rostami, Research & Evaluation Consultant, Health Systems Evaluation and Evidence
Mahmood Zarrabi, Senior Health Economist, Health Technology Assessment and Innovation
Michael Smeland, Lead, Ergonomics and Safe Client Handling, Workplace Health and Safety
Deborah Goodwin, Senior Ergonomist, Workplace Health and Safety
Shimei Yu, Senior Analyst, Clinical Workforce
Siegrid Deutschlander KTE & Evaluation Associate, Alberta Cancer Legacy Fund, AHS
Sara Mallinson, Senior Research & Evaluation Consultant, Health Systems Evaluation and Evidence
Shawn Sklar – Research Coordinator, Health Systems Evaluation and Evidence

Project Team Members

Co-PIs

Siegrid Deutschlander	KTE & Evaluation Associate, Alberta Cancer Legacy Fund, AHS
Michael Smeland	Lead, Ergonomics and Safe Client Handling, Workplace Health and Safety, AHS
Renee Misfeldt	Senior Research & Evaluation Consultant, Health Systems Evaluation & Evidence
Sara Mallinson	Senior Research & Evaluation Consultant, Health Systems Evaluation & Evidence

Co-Investigators

Deborah Goodwin (Lead, Workplace Health & Safety Advisor)
Senior Advisor, Ergonomics, Workplace Health and Safety, AHS
Mahnoush Rostami (Lead, survey analysis)
Research & Evaluation Consultant, Health Systems Evaluation & Evidence, AHS
Shawn Sklar (Lead, database preparation)
Research Coordinator, Health Systems Evaluation & Evidence, AHS
Meaghan Brierley (Lead, qualitative analysis)
Research & Evaluation Consultant, Health Systems Evaluation & Evidence, AHS
Mahmood Zarrabi (Lead, economic analysis)
Senior Health Economist, Health Technology Assessment and Innovation
Lawrence So (Lead, workforce database analysis)
Interim Executive Director, Clinical Workforce Planning, AHS
Shimei Yu (Senior Consultant, workforce database analysis)
Senior Analyst, Clinical Workforce Planning, AHS

Acknowledgements

We thank management and staff for sharing their valuable time and insights to speak with us about the It's Your Move (IYM) Safe Client Handling program at their sites between June and November 2016. Implementing new programs across large organizations is complex, and all participants provided insight to help answer what makes a safe patient/client handling program work, for whom, in what circumstances, why and how. With this complexity in mind, we would also like to thank our team members for their insightful and invaluable contributions to this study, and the realist evaluation community for their dedication to responsible innovation through inclusive evaluation strategies.

This evaluation was funded by the Government of Alberta OHS Futures – Research Funding Program (www.work.alberta.ca/ohsfutures).

Alberta Government

Table of Contents

Summary

This report outlines our evaluation of the It's Your Move (IYM) Safe Client Handling program implemented at AHS from 2010-2015. We analyze administrative, economic, survey (n=392), and interview (n=100) data to present the changes in injury claims, cost benefits, and barriers and facilitators to the uptake and sustainability of this safe patient/client handling program at acute care sites. We show the relationships between IYM uptake by staff in different units and the components defined in the literature as necessary to the successful implementation of patient/client handling programs.

We found the following:

- Staff trained in the IYM program had fewer patient handling injuries overall.
- The overall cost of the program was higher than the savings over the first six years of the program (2010-2016).
- The gap between cost and saving will narrow over time.
- We confirm and add to existing evidence on successful safe patient/client handling programs. *All* of the following components need to be addressed to ensure a safety culture in health care: 1) management commitment and support, 2) organizational policy, 3) equipment, 4) training, 5) regular assessment tools, 6) resource staff, 7) safety culture, 8) unit communications, 9) area design, 10) human resource capacity, and 11) customization.
- Conducting a large scale evaluation of this nature was challenging because of incomplete internal records (implementation, administrative data and economic data), and a low survey response. Moving forward, improving the consistency of the data collected would provide a more comprehensive picture of the program, and support ongoing decision-making and actions for its improvement.

We end the report with evidence-based recommendations that emerged from our data and were verified by key stakeholders that address each of the components of a safe patient/client handling program.

1. Introduction

1.1. Injuries and Costs Associated with Patient Handling Activities

Health care providers have one of the highest rates of work-related injuries of any profession. They are especially at risk for injuries related to patient handling (Amick et al 2007). These injuries are more pressing issue for health care providers working in acute care settings (Choi & Brings 2015). Four times as many workers suffer injuries with days away from work in hospitals than other industries, with nursing staff accounting for half of these absences (Occupational Safety and Health Administration 2011).

Out of all health workforce injuries, patient handling tasks (lifts, transfers, repositioning) are major contributors to musculoskeletal injuries among frontline healthcare staff (Buckle 1987; Miller 2004; Smedley 1995; Lee & Lee 2017; Nelson et al 2006). These types of injuries not only occur most frequently, they are also the most expensive. For 2007, Alberta Employment and Immigration reported that the lost-time claims for healthcare staff were 59% higher than the provincial average with almost half of these (44%) related to patient/client handling (Alberta Government 2009).

There is a wealth of evidence showing that safe patient/client handling protocols, formal policies (e.g. zero lift policies) and equipment (e.g. ceiling lifts) reduce injury rates among health care providers in acute care settings (Lee & Lee 2017; Nelson et al 2006; Olinksi & Norton 2017). Installing patient lifts, for instance, has been linked to reductions in injury rates, worker's compensation costs, and lost workday injury rates (Li et al 2004).

Finally, the introduction of safe patient/client handling protocols and equipment reduces the costs associated with injuries (Alamgir et al 2008; Chhokar et al 2005; Hunter et al 2010; Tompa et al 2010). The systematic review by Tompa et al (2010), with three health care studies, concluded that there was 'moderate evidence that ergonomic interventions are worth undertaking for economic reasons' in the health care sector (p. 230).

1.2. Components of the IYM Safe Patient/Client Handling Program

The IYM program was grant-funded between 2010 and 2015 and covered the IYM program team, a staff training program, equipment purchase, and post-secondary training. The funding further covered the salary of workers attending the training, and the installation of major lift equipment and minor mobile lift equipment to support and promote training. Starting in 2010 with 10 sites, the initiative was progressively rolled out across the province over the 5 years to 93 acute care sites, as well as to 20 long term care and home care. By the end of the year 2016 a total of 19,665 acute care staff finished at least one session of the training. The total number of trainees in both acute care and community care were added up to $28,479 by March 2015. The proportion of acute care staff that completed the training per total of trained staff is about 69%.

The IYM program has two major components:

1) **Equipment**: The program provided major ceiling lift equipment and other minor equipment[1]. Sites across the province requiring a ceiling lift were identified through a needs analysis conducted by AHS Capital Management and the IYM implementation team. Vendor training accompanied installation. Some, minor equipment (e.g., runway slider sheets and slide boards) were provided for all sites that received training to support and promote the dissemination of the program across the province and to promote safe patient/client handling.

2) **Training**: During the funded project implementation period (2010-2015) the IYM program delivered training programs for existing AHS staff and contributed to post-secondary education for health care students.

    a. ***Staff Training Program****:* During the funding period, the IYM program included in-person theoretical and practical sessions for staff, train-the-trainers, and master trainers. Train-the-trainers and master trainers acted as on-site resources and educators for the ongoing sustainability of the program. Every site in Alberta offered training sessions, some as often as weekly over a full year, in order to provide access to all staff on site. The on-site classes included: principles of good body mechanics; a Functional Assessment Algorithm (FAA);[2] Functional Assessment Record (FAR);[3] logo details and use;[4] safe patient/client moving techniques, and use of major and minor equipment.

    b. ***Post-secondary Training***: The intent of post-secondary training was to ensure that students were trained in IYM before their placement in AHS facilities. The grant for this program concluded December 31st, 2015.

After funding for IYM ended, all training costs were transferred to individual sites. The risk assessment forms and logos were updated to improve usability and continue to be made available on the units. Where the original program had both theory and practical content delivered in-person, the updated program uses two mandatory online modules, and practical content delivered in-person. The Workplace Health and Safety (WHS) Ergonomics team from AHS now focuses on delivering IYM Master Trainer sessions where the Master Trainers teach other champions or frontline staff and are seen as a site/zone

[1] "Major" equipment is defined as equipment that costs over $5500 while minor equipment costs less than $5500.
[2] The IYM Functional Assessment Algorithm provides a set of standardized mobility tasks for safe patient handling. FAAs also outline the correct equipment and number of staff required for safe patient handling.
[3] The IYM Functional Assessment Record was originally used to document the transfer status of a patient as part of the patient's chart at admission (AHS 2016). In 2016 the Functional Assessment Algorithm and Functional Assessment Record were merged into the Functional Transfer Record due to the overlap of these and other patient assessment forms.
[4] Logos are pictorial representations and sets of criteria for safe patient handling in different scenarios. For instance, the criteria for Independent Transfers includes clients who 1) can bear their body weight through part or parts of their body; 2) is cooperative, predictable and reliable in physical and mental performance; and 3) can safely relocate themselves with or without the use of assistive devices (Alberta Health Services 2011).

resource for the IYM program. The addition of these resources and dedicated Master Trainers is to help with program sustainability and ownership across the province.

Since 2015, the WHS Ergonomics Team revised, developed and maintained a sustainable program by having all information related to the theory of the program delivered through multiple online modules. This allows for consistency of message and customizable learning programs that are more relatable to AHS staff. For the practical hands on training, focus was put on delivering IYM master trainer sessions for staff to teach other master trainers, champions, and frontline staff. This allows for Master Trainers and Champions with firsthand knowledge the ability to answer specific questions related to the area and help in the customization of the program to best meet demands. In the spring of 2016 the AHS Ergonomics Team launched the WHS YouTube channel that hosts 19 short videos that provide education on a variety of safe client handling activities.

1.3. It's Your Move Program Implementation

Policies: There were several key policies and events that underscored IYM's inception and rollout. In 2002, Work Safe Alberta became a branch of the Alberta Government with the goal of reducing the risks of injuries for Alberta workers by 40% (Work Safe Alberta 2008). Work Safe Alberta issued the "No Unsafe Lift" workbook, which provided a provincial framework for healthcare employers on the development and implementation of "… comprehensive musculoskeletal injury prevention programs for their facilities" (Work Safe Alberta 2008 p. 2). The document outlines the key features of an effective musculoskeletal injury prevention program and contains templates and references for customization.

***It's Your Move* was implemented between 2010 and 2015 at acute and continuing care sites across Alberta. The program continues without external funding to train staff and create resources to meet the constantly changing healthcare environment.**

The implementation team trained 28,479 healthcare workers and installed 1400 ceiling lifts at 113 AHS sites (AHS 2015). The program continues to be sustained through online and practice-based recertification modules.

The provincial *Occupational Health and Safety Act, Regulation, and Code*, obligates employers to protect the health and safety of their employees at the workplace (Government of Alberta 2009a). This includes making certain that all reasonably practicable measures and workforce training opportunities are used to reduce or eliminate musculoskeletal injuries. Under this *Act*, employers must also provide preventative work measures (altered work procedures, mechanical aids and personal protective equipment).[5] In addition to complying with this *Act*, AHS has a responsibility to follow the Alberta Employment and Immigration's *Health Compliance Strategy* (Government of Alberta 2009b). Complying with these legislated requirements demonstrates AHS's commitment to a comprehensive safety culture for patients and providers (AHS 2009).

[5] Occupational Health and Safety Code Part 14, 210(3) and 211.1(1) and 211.1(2)c.

Program Implementation: The IYM program was funded under Alberta Health's Health Workforce Action Plan (HWAP), specifically the Reducing and Avoiding Injury Initiative (RAII) (AHS 2009). The IYM Program was preceded by a 1-year planning stage to secure funding and design a comprehensive program followed by implementation over 5 years (2010-2015).

In April 2008, AHS WHS planned a comprehensive initiative with staff training and equipment purchases (in particular ceiling lifts) for improved patient/client handling. Lifts in particular are considered by WHS to be one of the most important and impactful engineering control (interview, WHS leadership).

The IYM Steering Committee and implementation team completed an environmental scan to assess existing programs in other provinces for consistency with the criteria outlined in the "No Unsafe Lift" workbook (AHS 2009). The IYM program was then modeled on the Transferring Lifting Repositioning© program in Saskatchewan (Saskatchewan Association for Safe Workplaces in Health 2013) and proceeded in four phases (see Appendix A for more details).

In 2010 WHS rolled out the IYM program at small rural centres across the province. As an incentive to get their staff trained, the program also supplied minor equipment (e.g., runway slider sheets, slider boards, etc.) to sites where the program was being implemented and paid for back-fill salary for trainees. The acute care sites in AHS offered numerous training sessions to train at least 80% of all healthcare staff at a site with some sites as often as weekly over a full year. At the end of December 2014, the last IYM training sessions from grant funding were done, which meant the end of the IYM training team positions. By July 2015, continuation of the IYM program had fully transitioned to the internal WHS Ergonomics team without any additional human and financial resources.

In January 2015, the AHS WHS Ergonomics team worked with the AHS Safe Client Handling team to transition ownership of the program. During this time the majority of frontline training was stopped to review the program and make revisions to increase accessibility, improve consistency of the content, and improve participation tracking by developing online learning modules. As well, face-to-face training sessions were revised for ongoing safety training for AHS healthcare workers. On June 30, 2015 the HWAP grant ended along with remaining six Safe Client Handling team member positions attached to the grant. Individual sites absorbed the continuous training costs.

Implementation Context: There were also several key events that influenced the timing and comprehensiveness of the implementation of the IYM. In 2008 Alberta centralized the existing health regions into a new "superboard" - Alberta Health Services. This process led to major communication and implementation challenges (Born, Sullivan & Bear 2013). In 2009 the H1N1 pandemic took priority over other WHS initiatives including IYM. Several key areas were therefore not introduced during this time-the most notable of which was the drafting of an AHS safe patient/client handling policy.[6]

[6] The AHS WHS Policy Level 1 was created Sept 30, 2009 to contain working stating that AHS will "equip workers with the training and resources needed to be competent and work safely." By extension this WHS policy incorporates patient handling.

2. Methodology: Evaluation Activities

The mixed-methods evaluation was a joint study between Health Systems Evaluation and Evidence (HSEE) and the WHS Ergonomics team from AHS. Our evaluation focuses on the IYM program's uptake among staff, changes in injury claims, and cost benefits.

2.1. Evaluation Objectives and Questions

In 2016 HSEE initiated and evaluation of the *It's Your Move* program. We designed the study to address the following evaluation questions:

1) Has staff training and equipment supply resulted in the uptake and sustainability of safe client handling practices?
    a. What are the differences in uptake between sites and units?
    b. What are the barriers and enablers to uptake from the leaders and staff perspectives?
    c. How has the uptake of safe client handling practices been sustained?

2) What are the cost-benefits of the *It's Your Move* program to date?
    a. What is the change in disabling injuries that can be attributed to the program?
    b. What are the costs (initial and ongoing investment) and benefits (e.g. reduction in Worker's Compensation Board injury claims, payouts and lost caregiver days) of the program to date?

3) How can program impact be assessed on an ongoing basis using current databases?

2.2. Evaluation Approach

To identify the differences in uptake between sites and units, and barriers and enablers to the uptake of safe patient/client handling, the evaluation was informed by a realist evaluation approach. Realist evaluation delves into "what works, for whom, in what circumstances, why, and how" through context-mechanism-outcome (CMO) configurations. Essentially, contexts are the circumstances within which individuals respond to a program, and the mechanisms represent the motivations for staff to act on the program or not. Defining the context and mechanism helps explain the program outcomes. The findings are used to make recommendations and inform future strategies for the long-term success of the program.

Table 1 outlines the stages taken for the evaluation. In Stage one we completed a literature search and identified nine key components for safe patient/client handling programs for further exploration. In Stage two the surveys and interview guides were used to assess the salience of the nine components for staff and the extent to which they influenced the use of the program. Stage three is the analysis of data through the creation of CMO configurations to inform "what works, for whom, in what circumstances, why, and how" and in turn, the evaluation recommendations.

Table 1: Process of Realist Evaluation

Stages	Activity
Stage 1) Identifying program theories/components	A realist synthesis of patient/client handling programs (Thomas & Thomas 2014), and the "No Unsafe Lift" workbook (Work Safe Alberta 2008) provided the nine key components for effective programs.
Stage 2) Collecting data to test the theories/components	Data from survey and interviews were collected from AHS staff. Administrative and economic data were collected from current and past AHS and WCB databases.
Stage 3) Analyzing context, mechanism and outcome configurations	The data was analyzed for context-mechanism-outcome configurations—the causal explanations for the observed phenomena.
Stage 4) Interpreting the analysis to support or refute the program theories/components	The context-mechanism-outcome configurations were used to support the results of the evaluation: barriers and enablers to program uptake, and sustainability.

Source: Pawson and Tilley (2004)

2.3. Methods

We used a mixed-method approach that included quantitative data (e.g., staff survey, administrative databases), and qualitative data (e.g., staff interviews, internal document review) to evaluate the impact of the IYM program at AHS acute care sites across Alberta. We defined acute care as those units with the primary purpose "to improve the health [of the patients] and whose effectiveness largely depends on time-sensitive and, frequently, rapid intervention" (Hirshon et al 2013 p. 386). They include emergency medicine, trauma care, pre-hospital emergency care, acute care surgery, critical care, urgent care, and short-term inpatient stabilization. These types of acute care units align with the Alberta Management Information System Chart of Accounts (2016-2019) (Government of Alberta 2016).

2.3.1. Administrative Data

We conducted a longitudinal cohort study of AHS staff to examine the effectiveness of the "It's Your Move" program over 6 years (April 2010 to March 2016). As noted above, training by WHS for the original program ended in January 2015 and a revised program began at the beginning of 2017. The administrative data therefore only examines those trained in the original IYM program. All AHS employees who attended the "It's Your Move" training from April 2010 to March 2016 were tracked in the "It is Your Move (IYM)" database. The WCB database included the claim records of all AHS employee for each month and captured all AHS workers and volunteers at all facilities and workplaces operated by AHS. As well, work-related injuries and illnesses resulting in time loss, modified work, and/or medical treatment beyond first aid were reported to the WCB. In total, five databases were cross-referenced to get employment information on the AHS workforce: "It's Your Move,"AHS's ePeople system, WCB, AHS's My Safety Net (MSN)[7] database, and MedGate.

[7] MSN first started Nov 30, 2015 in the southern part of Alberta. It went live in all of Alberta on May 16 2016 (personal communication: Michael Smeland, Lead, Ergonomics and Safe Client Handling, Workplace Health and Safety)

The analysis excluded AHS staff in departments without patient/client handling services (e.g., information technology, administration) as confirmed by the high staff numbers in these departments who have never taken any IYM courses. AHS staff who took at least one IYM course, that is trained staff, constitutes the comparison cohort to understand the effects of the program on injury prevention. The final study population comprised 410,079 person-years. The exclusion criteria are presented in Appendix B.

The WCB database showed three injury categories that may result in a change of employment and/or medical costs: all work related injuries (e.g., patient-handling injuries, exposures, patient-to-staff aggression and urgent safety issues; disabling injuries (e.g., injury claims approved by WCB for AHS requiring modified work or lost work time); and patient-handling injuries that occurred when employees handled, moved or repositioned patients (Government of Alberta 2009a).

On the WCB claim form for injury reporting, claimants describe in their own words how the injury occurred. The descriptions do not always clearly explain what happened and widely differ in detail and clarity. When filtering patient/client handling from other injuries, we used the root cause of the injury from these claims. For example, a staff member was injured as a result of slipping on ice while moving a patient does not count as patient/client handling injury because the root cause of the injury was slipping on ice. The injury descriptions were stored in MedGate and MSN for Edmonton and Calgary only and cross-referenced with the WCB database for these 2 zones. We also created a second definition of patient handling injuries that was implied by WCB accident codes, so we could calculate a patient-handling injury rate for the entire province. We compared the two patient handling definitions and found that over 82% of the patient-handling injuries fall in the following types of accident codes: Overexertion-NEC, Overexertion-UNS, Overexertion-lifting and Overexertion-pull/pushing object. To get the patient-handling injuries for the remaining three zones, the data analysts used the injury codes provided by the WCB.

During the implementation of the IYM program, WHS leadership encouraged staff to report all injuries including "report only" (e.g. no aid required). It was hoped that early reporting would help to identify potential hazards in the workplace before serious injuries occurred putting staff on sick leave (e.g., lost work time, modified work, etc). The analysts expected an increase in injury rates for "no aid required" claims that are not tracked in the WCB database, but a decrease in the number of injuries resulting in modified work and lost time. Injury rates were calculated by dividing the number of injury claims by the sum of the person-year at risk of getting injured (Peck et al 2013). Incidence rate ratio (IRR) was used to compare the injury rates between staff who took the IYM course and staff who did not, using a Poisson model (Mufty et al 2015). We also stratified the study population by staff who were injured prior to taking the IYM course (and therefore more likely to get injured again than staff who were not).

To investigate injury rates further, we stratified the population by sex, age, job group, location, zone and location (urban or rural). Demographics such as age and sex were considered because both factors may affect the likelihood of having a patient/client handling injury (Kjellberg et al 2003; Pompeii et al 2009). Similarly, we accounted for the work location and job group because the IYM course was implemented differently across the province and over time. All statistical analysis was performed using Stata SE version 13.

2.3.2. Economic Analysis

The objective of the economic impact of IYM program is to determine cost of implementing and operationalizing the IYM program within Alberta Health Services acute care settings and its associated direct and indirect benefits including reduced injuries, reduced claims paid out to injured staff, and reduced workdays lost. We conducted the economic evaluation from the Alberta government's perspective; therefore, all cost incurred to Workers Compensation Board (WCB), Alberta Health and Alberta Health Services were included in the evaluation. We consulted with the IYM managers and financial staff to determine the cost of the program. Our evaluation is also based on the administrative data available through AHS's ePeople system, the WCB, AHS's My Safety Net and Medgate to ascertain data on the effect of the program on worker injury. The key economic findings of that analysis are used here. Due to limitations that the evaluation group had encompassed regarding accessing disaggregate data at site and/or zone level, the report focuses on the economic impact of the IYM program.

2.3.3. Staff Survey

We used IYM program records and findings from our literature review to design the survey. Content and wording was developed in partnership with the *It's Your Move* team at WHS to ensure that they accurately reflected the goals of the program. Survey statements were rated on 5-point Likert scales (1 = strongly disagree to 5 = strongly agree). The survey also included open-ended questions probing topics (Appendix C).

We organized our analysis under four outcome headings:

- **Outcome one:** Proper use of equipment
- **Outcome two:** Proper use of body mechanics
- **Outcome three:** Enabling staff to work more safely by themselves
- **Outcome four:** Enabling coworkers to work more safely with their patients and other staff

Recruitment: We distributed the survey to 85 acute care sites with 524 acute care units in August 2016**.** People were invited to complete the questionnaire online using REDCap.[8] AHS Provincial Research Administration assumed the distribution of the questionnaire to the IYM implementation sites in four AHS zones with approval from the site operational managers. The Northern Alberta Clinical Trials and Research Centre managed survey approval in the Edmonton zone. In an attempt to improve the response rate, we sent out a reminder, advertised the study in the WHS safety newsletter and extended the deadline twice. The survey closed in mid-October 2016.

Sample: Out of a potential 24 thousand respondents, we received 842 fully completed surveys (a 3.1% response rate). There were an additional two hundred and eight partially completed surveys, giving a total of 1050 participants. We selected surveys completed by people who were trained in the IYM program and worked at acute care units, as well as respondents from emergency and trauma departments for full analysis (n=392). The overall response rate was disappointingly low. Two important

[8] REDCap use a secure web application for building on-line surveys (https://www.project-redcap.org/)

factors that may have affected participation include, survey length and AHS operational requirements to distribute surveys via managers rather than directly to potential respondents.

Statistical analysis: We completed a descriptive analysis to summarize the participants' characteristics, and report their experiences with the IYM program (Appendix D). We used t-test and chi-square tests to identify differences between groups for program outcomes, and the statistical association between variables. We also analyzed how uptake of the program differed across various demographic groups including age, gender, unit experience, and professional experience (Appendix E). All analyses were conducted using SPSS IBM, version 9. We used a significance level of .05 (2-sided testing) and 95% confidence intervals.

2.3.4. Interviews

Qualitative semi-structured interviews were used to gain a more in-depth understanding of the IYM program from the perspective of program users. The interview guide asked interview participants to discuss the barriers, enablers, and unintended consequences of the IYM program (Appendix F). The interview guide was based on the same theoretical foundations for good patient handling practices as the survey (Thomas & Thomas 2014; Work Safe Alberta 2008).

Sampling and Recruitment: We sampled for maximum variability by approaching different sites and staff through purposive sampling (Manzano 2016; Weiss 1998). To achieve a broad range of views on the program and outcomes, we included sites from all AHS zones in urban (n=6) and rural locations (n=8). We interviewed staff (n=93) from different acute care units included ambulatory (n=5); emergency/trauma (n=10); medical (n=6); surgical (n=14); combined medical/surgical (n=41); operating room/recovery (n=8); and pediatric (n=9). We further interviewed administrative and safety staff, as well as IYM trainers responsible for training staff across units (n=7) (Appendix G).

We also asked IYM program managers for their recommendations of sites they interpreted as more or less successful after program implementation. Decisions made about interview locations were confirmed with the evaluation team. The interviewer then contacted the respective site managers about the study, and asked for 8-10 staff per unit from diverse professional backgrounds (7-9 RN, licensed practical nurses, and health care aides/nursing assistants, allied health staff, and 1-2 managers).

Context-Mechanism-Outcome Analysis: The interviews were transcribed verbatim and imported into qualitative analysis software (NVivo 10). All of the open-ended survey comments were also imported into NVivo. These imported source transcripts and comments were assigned classifications based on profession, unit, years of experience and rural/urban context. Field notes and larger team discussions were not imported into NVivo, yet did inform the initial CMO configurations. These CMO configurations were created by the lead researcher for the interviews and revised and refined through agreement within the evaluation team. The Centre for Advancement in Realist Evaluation and Syntheses also provided guidance for CMO construction.[9]

[9] Dr. Justin Jagosh (personal communication and realist evaluation mentoring) April-June, 2017, Centre for Advancement in Realist Evaluation Synthesis (CARES).

The WHS members on the evaluation team read draft reports to further confirm the accuracy of the program theories from an ergonomic perspective. The interview results inform the barriers and enablers for IYM uptake and sustainability.

2.3.5. Ethics

The evaluation project team obtained ethics approval from the external Conjoint Health Research Ethics Board at the University of Calgary. The project also received subsequent internal AHS approval from Research Administration as an additional step in the ethics approval process. This step was newly implemented in 2016 to promote a standard research approach at AHS sites. And amendment to include the focus group as part of our integrated knowledge translation strategy was made in 2017.

3. Results

In this section we present the findings from the administrative data analysis, the economic analysis, the survey and the interviews.

3.1. Injury Rates Broken Down by IYM Training

We present three groups of injuries (e.g. all injuries, disabling injuries, patient handling injuries) to establish a baseline data for future evaluations, especially as the IYM program becomes more integrated into an overall "culture of safety" within AHS. The overall injury rate, for instance, which includes other injuries with different root causes than patient handling (e.g. sharps injuries) may slowly decline as AHS staff become more aware of possible workplace risks and risk mitigating controls. We also separated out the disabling injuries, defined by an injury that results in workdays lost and/or change in staff duties or modified hours, to highlight the influence of the IYM program on workforce productivity issues. That said, we focus our discussions on the patient handling injuries, especially when it relates to geographic and demographic differences.

3.1.1. Injury Rates for AHS Staff by IYM Training Status

We found differences in patient handling injury rates between those that were trained on the IYM program (1.07%) and those that were not (1.16%) between 2010 and 2016. This indicates that overall, staff trained in the IYM program had fewer patient handling injuries (Table 2). Staff who trained were 7% less likely to have patient handling injuries than those who did not receive training.

Table 2: Injury Rates for AHS Employees by IYM Training Status (2010-2016)

	No Training			Training			P-Value[10]	IRR[11]
	# of Injuries	Person year[12]	Injury Rate	# of Injuries	Person year	Injury Rate		
All Injury	11513	312217	3.69%	2273	89543	2.54%	<0.001	0.69
Disabling Injury	7967	312217	2.55%	1644	91544	1.80%	<0.001	0.70
Patient Handling Injuries	3610	312217	1.16%	1023	95351	1.07%	0.04	0.93

Note: The following are the definitions used in the data analysis:
All Injury: All workplace incidents, including patient-handling injuries, exposures, patient-to-staff aggression and urgent safety issues that result in time loss, modified work, and/or medical treatment beyond first aid
Disabling Injury: Injury claims approved by WCB for AHS requiring modified work or lost time from work
Patient Handling Injury: Injuries that occur when employees handle, move or work with patients, usually while using equipment.

There was a large and significant difference in the average days lost due to patient handling injuries between AHS employees who were trained in the IYM program (8.6 average days) and those who were not (13.46 average days) between 2010-2016 (Table 3). Having IYM training led to a 36% reduction in the average number of days lost. However, having IYM training led to an increase on the number of days that AHS employees worked on modified work status (Table 5).[13] Indeed, staff who received training were 17% more likely to go on modified work than those that did not.

[10] P value is the statistical test for significance for the differences in injury rates between staff who received IYM training and those who did not.
[11] The incident rate ratio (IRR) is the ratio of two incidence rates occurring at any given point in time.
[12] A person-year is an estimate of the actual years at risk of injury for all working staff (Windeler & Lange 1995). Using person-years rather than counting the numbers of employees is a means of calculating the length of employment for each staff (e.g., including terminated, leave of absence, newly hired, or transferred staff within AHS).
[13] One possible explanation for the differences in modified work rates is that when the IYM program was being rolled out, AHS WHS was also working to increase the offer of modified work for any worker injured and unable to do their regular duties. Increased modified work is considered a 'good' metric when compared to lost time hours. It might be that in areas where managers were dedicating resources for their staff to complete IYM training, they were also more active in other parts of the health and safety program including offering modified work (personal communication Deborah Goodwin, Senior Ergonomist, Workplace Health and Safety).

Table 3: Average Days Lost by IYM Training Status by Type of Injury (2010-2016)

	No Training			Training			P value	IRR
	Total	# of Injuries	Average days lost	Total	# of Injuries	Average days lost		
Disabling Injury	134756	7967	16.91	15712	1644	9.56	<0.001	0.57
Patient Handling Injuries	48583	3610	13.46	8802	1023	8.60	<0.001	0.64

Note: The following are the definitions used in the data analysis:
Disabling Injury: Injury claims approved by WCB for AHS requiring modified work or lost time from work
Patient Handling Injury: Injuries that occur when employees handle, move or work with patients, usually while using equipment.

Table 4: Average Number of AHS Employees on Modified Work by IYM Training Status (2010-2016)

	No Training			Training			P value	IRR
	# of Staff on Modified Work	Person year	Injury Rate	# of Staff on Modified Work	Person year	Injury Rate		
Disabling Injury	4486	312217	1.44%	996	91544	1.09%	<0.001	0.79
Patient Handling Injury	1927	312217	0.62%	637	95351	0.67%	<0.001	1.17

Note: The following are the definitions used in the data analysis:
Disabling Injury: Injury claims approved by WCB for AHS requiring modified work or lost time from work
Patient Handling Injury: Injuries that occur when employees handle, move or work with patients, usually while using equipment.

3.1.2. Urban and Rural

When the patient handling injury rates are broken down by geography, an interesting situation emerges. Both urban and rural areas had differences in patient handling injuries related to IYM training. In the case of rural areas, staff trained in the IYM program had more patient handling injuries (1.08% for no training compared to 1.29% for training); however, the difference was not statistically significant (p value = 0.05) (Table 5). Conversely, staff working at urban sites were significantly less (12%) likely to have patient handling injuries due to IYM training.

Table 5: Rural and Urban Injury Rates by IYM Training Status (2010-2016)

	No Training			Training			P value	IRR
	# of Injury	Person year	Injury Rate	# of Injury	Person year	Injury Rate		
Urban								
All Injury	10165	282433	3.60%	1765	76832	2.30%	<0.001	0.64
Disabling Injury	7039	282433	2.49%	1259	78685	1.60%	<0.001	0.64
Patient-handling Injury	3264	282433	1.16%	834	81698	1.02%	<0.001	0.88
Rural								
All Injury	1348	31915	4.22%	508	13634	3.73%	0.02	0.88
Disabling Injury	928	31915	2.91%	385	13937	2.76%	0.40	0.95
Patient-handling Injury	346	31915	1.08%	189	14628	1.29%	0.05	1.19

Note: The following are the definitions used in the data analysis:
All Injury: All workplace incidents, including patient-handling injuries, exposures, patient-to-staff aggression and urgent safety issues that result in time loss, modified work, and/or medical treatment beyond first aid
Disabling Injury: Injury claims approved by WCB for AHS requiring modified work or lost time from work
Patient Handling Injury: Injuries that occur when employees handle, move or work with patients, usually while using equipment.

3.1.3. Zone Differences

There were differences among the AHS Zones (South, Calgary, Central, Edmonton and North) in patient handling injury rates (Appendix H). Both Calgary and Edmonton Zones had positive changes in patient handling injury rates between those that were trained and those that were not. Staff trained in the IYM program in the Central and North Zones had higher rates of patient handling injuries; staff in the Central Zone who were trained in IYM were 23% more likely to have patient handling injuries. Finally, staff in the South Zone who had IYM training had a slightly higher rate of patient handling injuries than those who did not; however, this difference was not significant.

3.1.4. Patient Handling Injury Rates in Different Sites

There were some differences within the different sites (Appendix I). There were some visible variations in terms of the effect of IYM training on different sites. Three patterns were seen: sites where IYM training helped reduce the injury rate; sites where no significant difference was seen in injury rates between those who were trained and not trained; and sites where the injury rate significantly increased among those who received the training. There was a significant difference in the patient handling injury rates within the Glenrose Rehabilitation Hospital. Those who were trained in the IYM program had a patient handling injury rate of 1.25% compared to 0.73% of staff who did not receive training. South

Health Campus not only had the highest injury rate for a site but did not have any reductions in patient handling injuries due to training.[14]

3.1.5. Gender Differences

Overall men had a much higher patient handing injury rate than women in the non-trained category (1.83% versus 1.04%). However males had a lower rate in patient handling injuries than women after training. IYM training also led to significant differences in patient handling injuries for males while there were no significant differences for females. Male staff who received training were 61% less likely to have a patient handling injury which was statistically significant. By contrast, female staff did not have any significant difference in patient-handling injury rates between those who were IYM trained and not trained (Appendix J).

3.1.6. Age

Overall, the IYM training did not influence patient handling injuries across the age groups. The only exception was for staff 30 years and under, where training resulted in a rate of 0.77% compared to 1.06% for those not trained (Appendix K); the IRR also shows that those who were trained were 28% less likely to have patient-handling injury than those who did not receive IYM training. Providers over 50 who were trained on the IYM program had slightly higher patient handling injury rates; however this difference was not significant.

3.1.7. Job Group

We found that the IYM program influenced the injury rates for certain job groups. Healthcare aides are the main workforce that practice patient handling. They showed significant reduction in injuries (Appendix L) and those who received training were 16% less likely to have patient-handling injuries. Licensed practical nurses, had lower rates of injuries after IYM training; however this difference was not significant. Other provider groups such as physical therapists and registered nurses demonstrated slightly higher injury rates with registered nurses having a 6% higher rate with training.

[14] The explanations for any differences in rates may depend on the context of the facility. For instance, South Health Campus opened at the same time IYM was being implemented, so it never functioned without IYM as part of its program (e.g. there was no pre-condition that it was changing from) (personal communication: Deborah Goodwin, senior ergonomist, Workplace Health and Safety, AHS).

3.2. Economic Evaluation[15]

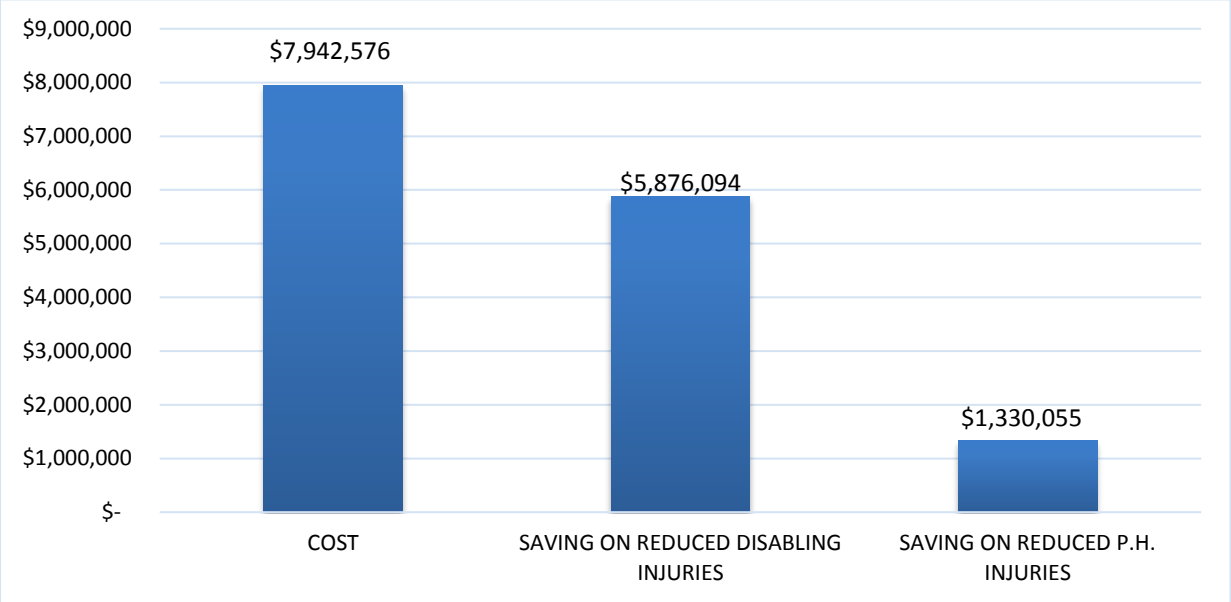
The findings from this report indicate the total cost of the program was higher than its combined direct and indirect benefits for the first six years after the implementation of the program in 2010. The total cost of the program in acute care settings was estimated $7,942,576 during the first six years of the program and its total direct and indirect benefits was estimated $5,876,094 attributed to reduced disabling injuries (including patient-handling injuries as well) among staff that completed the IMY program for the safe client handling techniques and procedures during the same time period. The benefits attributed to reduced patient handling injuries only were estimated $1,330,055 (Figure 1).

Furthermore, we forecasted the future cost of the IMY program for continuous provision of the education to new hires and also to those who need to renew the training due to change in their work duties, discipline and unit care. The estimated cost of the program is $697,106 for the time period from 2017-2022. It is a significant reduction in the cost of the program compared to its first six years mainly due to changes in the learning modules and delivery modes. Assuming that the benefits of the program will keep the same pace year over year, we expect the gap between benefits of the program and the cost to narrow over time and in certain scenarios the benefits may outweigh the costs by 2022.

A sensitivity analysis was conducted to determine variation in results due to uncertainty in the backfill rate for filling in for injured workers. We estimated the cost saving attributed to disabling injuries can change in the range $6.2 – $5.4 million dollars when the backfill rate varies in the range 100% to 75%, the similar changes in saving attributed to reduced patient handling injuries is in the range $1.45 – $1.14 million dollars, respectively (see Appendix M for more details).

[15] This evaluation and report was conducted by Mahmood Zarrabi with support from Michael Smeland, lead Ergonomic and Safe Client Handling, and Deborah Goodwin, Senior Ergonomist, Workplace Health & Safety Provincial Programs; Lawrence So, Executive Director, Shimei Yu, Senior Analyst, and Mark John Anderson, Senior Advisor from the Clinical Workforce Planning department; Shawn Sklar, analyst, and Renee Misfeldt, Senior Research and Evaluation Consultant from the Health Systems Evaluation and Evidence department.

Figure 1: Cost and Saving of the IYM Program (2010-2016)



Note: The cost and saving were not adjusted for a time difference discount factor. P.H. stands for patient-handling. Saving on reduced P.H. is a subcategory of overall saving and so it should not be added up to the saving on reduced disabling injury to avoid double counting

3.2.1. Cost of IMY Training Program

A breakdown of the cost of the IYM program included the cost of staffing, the development of a learning module, the delivery of the training during in-hand practice sessions, and educational supplies. In addition to the training, equipment needs to be employed in a joint fashion with training techniques for an effective safe client handling; those patient lift equipment includes minor floor lift and mobile lift equipment and major ceiling life equipment, which are installed up on ceil over patient's bed.

Cost of the training program is a mix of fix and variable costs. A variable cost is a cost that varies by volume of activities, which in this case by number of educational sessions and trainees. The fixed cost of the training program, which does not vary by volume of activities, includes the cost of developing the training program, need assessment, user fee, and training instructors who are hired to provide hands on practice educational sessions to eligible staffs. The variable costs of the training includes cost of delivering the educational sessions to staffs, salaries of instructors and support staff, and backfill cost for staff away from work while attending the educational sessions.

This evaluation does not include cost of equipment and their impact on worker injury because the limitations on data do not allow an assessment on impact of equipment.[16] Therefore, the evaluation has limited its scope to cost and impact of the IYM training program alone.

The only fixed cost of the training program was $240,000 that was paid to the Saskatchewan Association of Health Organizations for the rights for using their TLR© program. The purchased program was then modified and customized by in-house experts for AHS' needs and work environment. The cost of the modifications and customization was assumed to be zero dollars because it was done using in-house resources that had zero opportunity cost to AHS.

The variable cost of the IMY program includes staffing and backfill costs. The program employed about 6 trainers - the number of trainers varies by year of the program and volume of educational sessions delivered in each year – one project manager, and an administrative clerk. Appendix N shows the variable cost of the IYM staffing. The staffing cost was calculated based on the hours each member of the team contributed to the program; therefore the cost varies by year.

The estimated cost of staffing in Appendix N was for the entire IYM program and therefore included training to both staff within acute care settings and communities. Given that the acute care staff that completed the training consist of 69% of total trainees, the total staffing cost for acute care settings was $2,265,977. Similarly, the fixed cost that can be allocated to acute care settings is $165,722, which is 69% of the total $240,000 fixed cost.

Another variable cost that should be taken into account is the backfill cost that occurred to the program for filling in for trainees while they are away from work attending training sessions. Since the duration of the training was 6 hours, staff that attended the training had to take a whole day off and substitutes were used to fill in their positions for a whole day. The estimated backfill cost was $5,510,877. The breakdown of the backfill cost is summarized in Appendix O.

The total fixed and variable costs of the program for the acute care staff are added up to $7,942,576 including cost of staffing, training, backfill costs and the user fee. Given the total number of trained staff (not trainees) by 2016 was 19,665, the average cost of training per trained staff was $403.90. However, some of the trained staffs repeated the training; thus the total number of trainees was higher than 19,655; thus, the average cost paid out per trainee was lower than $403.90.

3.2.2. Influence of IYM Training on Workers Compensation Claims Paid Out

Reductions in overall injury rate, in particular disabling injury, led to reductions in the WCB payments. The overall claims paid out for patient handling injuries (both trained and untrained staff) was $24,614,373 for 2011-2016 (Appendix P). The claims paid out to trained staffs on average was $1,310 lower than that of untrained staff. Moreover, the reduced claims paid out was higher among staff with

[16] It is important to note the lack of data availability on injury rates and claims paid out to injured workers prior to the implementation of the IYM program and also the limitations on the existing data regarding exact location where ceiling and mobile lift equipment were installed and that how effectively the equipment have been used by both trained and untrained staffs have negatively impacted rigorousness of this evaluation. This evaluation did not assess impact of the lift equipment on worker injury and so cost-effectiveness of the whole program, e.g. both the training and the equipment together, is yet to be determined

disabling injury with an average of $1,923. The difference between claims paid out for patient-handling injuries was $211 (Table 6).

Table 6: Average Claims Paid Out in 2010-2016

	Average Claims Paid Out (Untrained Staff)	Average Claims Paid Out (Trained Staff)	Difference
Disabling Injury	$ 7,239	$ 5,316	$ 1,923
Patient-handling Injury	$ 5,359	$ 5,149	$ 211

Given the difference in claims paid out to trained and untrained staff, we estimated the total cost saving attributed to reduced disabling injuries was $3.2 million dollars for the time period 2010-2016. The cost saving due to reduced patient handling injuries was $215,538 for the same time period.

3.2.3. Influence of IYM Training on Productivity

The report by the Clinical Workforce Planning department showed the IYM program has had an impact on worker's productivity by reducing number of workdays lost and by impacts on modified hours and duties of injured staff. The total saving attributed to increased productivity is up to $2.7 million dollars, of which $1.1 million dollars attributed to reduced patient-handling injuries (Table 7).

Table 7: Saving Due to Reduced Workdays Lost

	Average Workdays Lost (Untrained Staff)	Average Workdays Lost (Trained Staff)	Difference	Average Hourly Wage*	Backfill Rate**	Total Saving
Disabling Injury	16.91	9.56	7.36	$32.18	90%	$2,714,803
Patient-handling Injury	13.46	8.60	4.85	$36.16	90%	$1,114,517

Average hourly wage was calculated based weighted hourly wages of injured staff by job category.
** Backfill rate was obtained through a survey from a focus group of managers in acute care units.
(Source: The report on injury rate by the Clinical Workforce Planning department)

The reduction in number of injured staff with a need to modified work hours and/or duties is an indicator of increase in labor force productivity. Overall, a lower percentage of trained staff had modified work and duties compared with untrained staff (Table 8). However, the modified work among staff with patient-handling related injuries is roughly the same between trained and untrained staff.

Table 8: Average Modified Work by Type of Injury

	Untrained Staff			Trained Staff		
	# of Modified Work	Person-year	Rate	# of Modified Work	Person-year	Rate
Disabling Injury	4486	312217	1.44%	996	91544	1.09%
Patient-handling Injury	1927	312217	0.62%	637	95351	0.67%

Source: The report on injury rate by the Clinical Workforce Planning department, AHS

3.2.4. Cost and Benefit Forecast

The major spending on the IYM program occurred during the early years of the program while the benefits of the program were yet to be realized over a longer period of time. Assuming the IYM program continues to provide the training to new staff entering AHS and those who need to repeat the training for coming years, we anticipate that the following resources will be required:[17]

- 1.0 FTE Instructor per year
- 0.05 FTE Admin Support per year
- 20 days hands on practice face to face educational sessions per year
- Travel time for the instructor, hotel accommodation, car rental, and meals

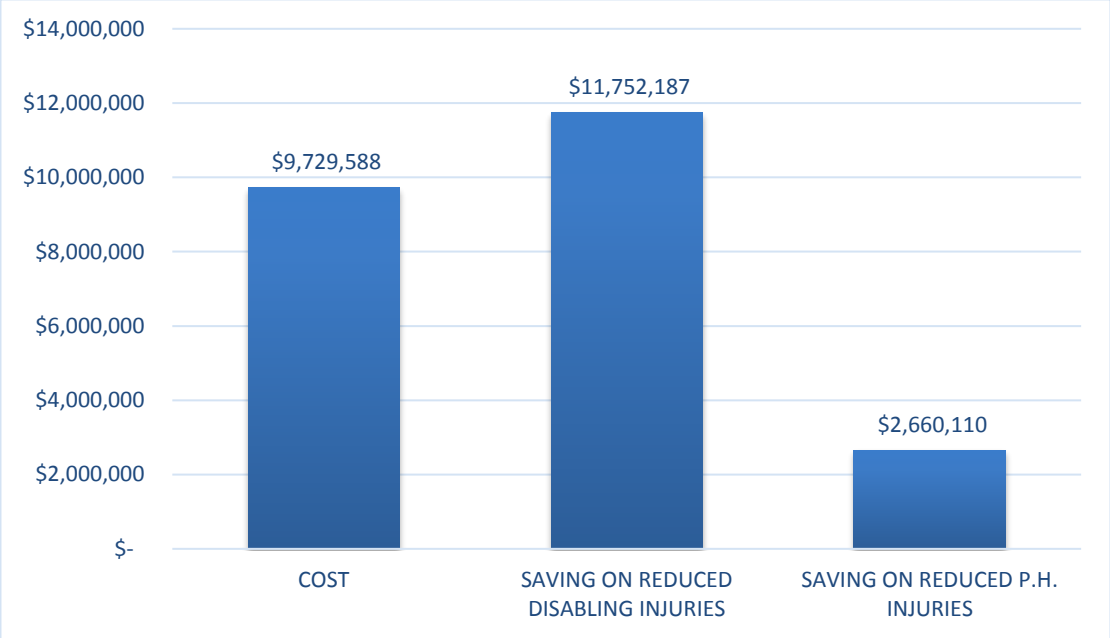
We assumed there will be no backfill cost for continuing the program as the training will either be provided on-site for 2-4 hours or it will be online which takes about 30 minutes.

We estimated the long-term costs and benefits of the program using a simple forecasting model. We assumed the benefits of the program will remain the same over the next six years of the program from 2017-2022 as they were for the first six years.[18] We estimated the operational cost of the program for the next six years will be about $697,106. That extra cost will bring up the total cost of the program to $8,639,682 for the entire twelve years of the program from 2010-2022. The detailed forecasted costs of the IYM program are available in Appendix Q.

Assuming the benefits of the program will keep the same pace for the next six years, we estimated the total benefits of the program attributed to reduce disabling injuries will add up to $11,752,187 for the same time period. The saving attributed to reduced patient handling injuries will add up to $2,660,110 for the same time period (Figure 2). In summary, the benefits of the program will outweigh the costs over time, if the benefits realized over early years of the program keep the same pace over time.

[17] Source: Michael Smeland, Lead Ergonomic and Safe Client Handling, Alberta Health Services
[18] We used a 6-year forecast time period because it is roughly matches the life time of the equipment have been installed and used in the acute care units.

Figure 2: Forecast on Cost and Saving of IYM Program (2010-2022)



Note: The cost and saving were not adjusted for a time difference discount factor. P.H. stands for patient-handling. The costs and benefits in Figure 2 were not adjusted by a discount factor. Saving on reduced P.H. is a subcategory of overall saving and so it should not be added up to the saving on reduced disabling injury to avoid double counting

Overall, the IYM program has cost more than it has saved money in the early years of the program. However, we anticipate the benefits of the program will grow more over time and the annual operational cost of the program will decrease over time and therefore the gap between the cost and benefits will narrow, and in certain conditions the program will be cost-saving in long-run.

Nonetheless, both monetary and non-monetary benefits of the program should be taken into account to conclude whether the program is economical or not. This evaluation did not include any non-monetary benefits of the program such as improved safety culture, work place health and safety, and provider satisfaction. Furthermore, this evaluation did not include any private or out of pocket cost incurred to injured workers.

3.3. Differences in Uptake Between Sites and Units

This section presents differences in program uptake between primary sites, nursing units, urban-rural, and zones only from survey. For further differences between demographic characteristics and program uptake, please see Appendix R, Table 4.

3.3.1. Primary Sites

In survey, we examined the differences between primary site (hospital, healthcare centre, community healthcare) and program outcomes. We only found statistically significant results between primary site and using body mechanics. Nursing staff working in a hospital, were more likely to know how to properly use the IYM equipment in different circumstances than staff working in different settings ($\chi 2=4.63$, p-value=0.03).

3.3.2. Acute Care (Nursing In-patient) Units

There were no significant differences between medical, surgical, medical-surgical, pediatric, and intensive care units related to the use of good body mechanics. However, we did find statistically significant differences related to using equipment, and having a sense of working more safely. Nursing staff working in medical units were more likely ($\chi 2=5.5$, p-value=0.02) to use the equipment properly. They were also more likely to believe IYM enabled them to work more safely by themselves (p-value=0.001), with their patients, and with other staff (p-value=0.001) compared to other nursing care units. We also found nursing staff who worked on ICU, were less likely to believe IYM enabled them to work more safely by themselves (p-value=0.007), with their patients, and with other staff (p-value=0.001) compared to other nursing care units.

3.3.3. Urban and Rural Sites

We found no statistically-significant differences among staff in rural and urban sites for the program uptake (e.g. proper use of equipment, proper use of body mechanics, working safely in the units). To understand the rural-urban differences between sites for the defined outcomes, we used the combined medical/surgical units as proxy for a rural site (we did not ask for site name in survey due to confidentiality reason). Medical/surgical units are only associated with rural sites. We found no statistically significant differences among staff in rural and urban sites for the defined outcomes. To understand the rural-urban differences between sites for the defined outcomes, we used the combined medical-surgical units as proxy for a rural site (we did not ask for site name in survey due to confidentiality reasons). Medical-surgical units are only associated with rural sites. We found no statistically significant differences among staff in rural and urban sites for the program outcomes.

3.3.4. Zonal Differences

Our analysis of the survey related to zonal differences showed that nursing staff in the Edmonton zone were less likely to believe IYM enabled them to work more safely by themselves (p-value<0.001), with their patients, and with other staff (p-value<0.001), compared to the other four zones.

3.4. Enablers and Barriers to IYM Uptake and Sustainability[19]

Our analysis of barriers, facilitators, and sustainability flows from the analytical framework of successful patient/client handling (Thomas & Thomas 2014; Work Safe Alberta 2008). The enablers of and barriers to IYM uptake are reported below along with other considerations for successful IYM implementation.

3.4.1. Management Commitment and Support

Our survey analysis showed that the reinforcement of the IYM program, and support of IYM training—by management—can positively influence staff use of equipment, staff use of body mechanics, and staff feeling they are working more safely by themselves, with other staff, and with patients (Appendix S, Table 5).

The critical need for supports and resources for managers was raised by the interview participants. Consistent supports and effective strategies are needed by managers for dealing with conflict and non-compliance. This includes a dedicated IYM policy, training programs for staff who do not comply with safe patient/client handling, and regular visits by leadership to demonstrate support for IYM as a priority.

Dedicated management attended to the resources needed by the IYM program (e.g., equipment, staff training, staff resources), and the motivations of staff to use these resources, including customization of the program to unit routines. During the interviews, participants also noted that when management demonstrated support for the program, staff felt protected, and encouraged, to use the IYM resources.

Managers in particular noted the importance of ongoing regular supports by leadership: "I think that if the It's Your Move program were coming into the department on regular intervals, like quarterly or bi-annually or something, to say we just want to do an assessment of how things are going and provide you some support as we go along with this, then I think that would really help the department."

Managers further reported that they needed support to meet the costs of sustaining and renewing patient/client handling equipment. They also noted a lack of resources and techniques to deal with non-compliant staff. The challenges of non-compliance created frustrations for those who attended to the IYM program: "I know it's frustrating for me when it's not followed through—the people that don't do it, or use lifts by themselves, or don't use the right slings—there's no real repercussions for that."

[19] We only report the statistically-significant results of the survey analysis relating to the enablers and barriers to program uptake. For detailed statistical analysis of the survey including statistics and p-values please view the Appendices x-xx.

3.4.2. Organizational Policy on Safe Patient Handling

Having policies on safe patient handling was viewed as a potential resource for managers and staff looking to support and promote the IYM program and manage conflict. Our survey analysis revealed that having an AHS policy on the IYM program would positively influence staff's sense of working more safely in the units (Appendix S, Table 6).

"It's put on the individual worker: 'you should go get this and you should be up on it', but it's not so much coming down from the hierarchy of saying, 'you know what this is implemented because it's for you guys, it's to provide you, it's to make sure you guys are safe'. And that's what we care about', but that's not there." (Registered Nurse)

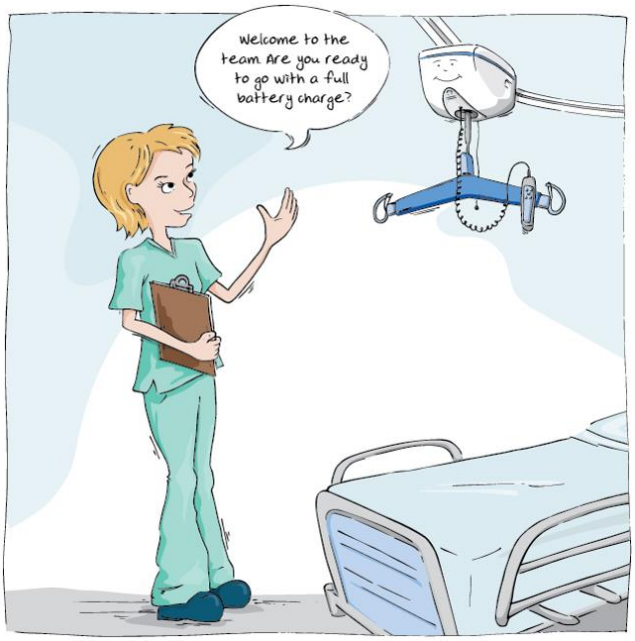
In the interviews staff and managers desired strategies for sustainable and consistent guidance on the IYM program – something that could be addressed through the development and implementation of a formal AHS safe patient/client handling policy. The interview participants reported being unclear about the existence of an IYM policy within AHS. This led to perceptions that the responsibility for the program's success fell on individual staff and managers. The lack of a distinct guidance resulted in escalating discontent on units, staff frustration, job dissatisfaction, and lack of cohesion.

3.4.3. Availability and Use of Equipment

The survey results found a number of statistically-significant findings around the adequate supply of equipment, its storage, and its maintenance. The availability of equipment simply can increase staff use of equipment, and staff's sense of working more safely in the units with themselves, patients, and other staff. Also, having compatible, easily-retrieved, and well-maintained equipment on the unit can positively influence the program uptake; staff use of equipment, staff use of safe body mechanics, and staff feeling they are working more safely by themselves, with other staff, and with patients (Appendix S, Table 7).

"Ceiling lifts are fantastic because you are not hurting or straining yourself moving again a heavier patient who is on a lift and having to move the physical machine—which can be awkward sometimes they don't fit under the beds all the way." (Health Care Aide)

The interview participants in general saw the benefit of equipment to their working processes and appreciated any adjustments to the equipment that improved its daily use: "I think the older [transfer board] was pushing 15-20 pounds. The newer one weighs about 2.5 pounds—introduced it and it works much better." They further acknowledged that some equipment was good for patients through its ease of use: "I mean even to just boost them off the bed is like so easy, it's just kind of they glide up, it's beautiful."



In interviews, staff also discussed basing their decisions about equipment use on interpretations of their own abilities and the weight of the patients or clients. For instance, when staff interpret patients as "light" they at times made the decision to move without equipment. By contrast, staff were more likely to use equipment with bariatric patients: "With the bariatrics I believe [staff are] really… sort of conscientious about that type of client and using it on them, but not so on just the general [patient population]."

The cost of equipment emerged as a deterrent to the use of IYM tools and resources. For instance, some interview participants reported that they hesitated to use disposable equipment because they considered it too costly or wasteful. Another consideration was the unexpected cost of purchasing and maintaining equipment for front-line managers. One interview respondent noted that "adding five dollars per patient for a disposable slider sheet is a lot to add onto patient care."

Two other issues inhibited the availability of equipment during IYM implementation, and have had continued repercussions for the success of the program: 1) grant funded equipment was not available on units until up to two years after the training; and 2) Infection Prevention and Control retracted equipment due to cleaning concerns. For units that experienced a delay between training and receiving equipment, staff noted the effects of IYM training decreasing. As one interview respondent noted: "I became aware of if we don't actually start implementing this real fast on the unit it's going to fizzle out…Getting the actual products took so long and was so convoluted with so many changes after decisions were made that it was almost a year before we got that done."

3.4.4. Availability of Training on Components of IYM Program

In the survey, we examined the impact of training on the program outcomes by comparing trained nursing staff (90%) and untrained nursing staff (10%). We found that training can be a major driver for the IYM program uptake and led to proper use of equipment, body mechanics, and working more safely by themselves, with other staff, and with patients. Moreover, receiving IYM training on new IYM equipment as soon as the unit received it, was important factor which can influence the use of equipment, use of body mechanics, and working safely on the unit. And taking the annual refresher/ recertification courses can positively influence staff use of equipment and staff's sense of working more safely in the units (Appendix S, Table 8, 9).

"Things that I do online and really do hands-on are different. And how to use a lift properly. When I see some of the nurses use them and the way they put a sling on, there are a lot of opportunities to improve…" (Physiotherapist)

The interview participants reported that certain criteria were necessary for effective training on equipment use, assessment tools and body mechanics. First of all, staff were skeptical of how on-line training could be transferred to the "real world" of patient/client handling. Across sites, interview participants noted the value of working with patients during the training, or watching health care aides conduct their work on acute care units. Secondly, staff who had been previously injured responded particularly positively to the training. They appreciated reminders about their own safety, and passed on their knowledge to less experienced staff. Third, it was critical to staff to have management support for training attendance. Fourth, access to on-site trainers and online recertification were valuable reminders to practice good client/patient handling.

3.4.5. Availability and Standardization of Regular Assessment Tools

"And if we're all doing consistently the same thing it will get easier for the client and they'll understand, right? They'll understand." (Physiotherapist)

During the funded implementation period, the IYM program provided tools for regular assessment: the Functional Assessment Record (FAR), Functional Assessment Algorithm (FAA), and logos. These elements are part of a program of continual risk assessment. The survey respondents noted that using FAA, FAR and logos can positively influence staff use of equipment, body mechanics, and working more safely by themselves, with other staff, and with patients (Appendix S, Table 10).

These risk assessment tools provided a resource for encouraging patient and family acceptance of the equipment, and resolving staff differences in opinion about lift choices. These tools also represented organizational support for the program, which helped staff make decisions that aligned with a culture of safety. Standardized risk assessment tools and processes for lifting were also valued. For example, using standardized transfer and lifting processes gave patients a sense of security while being lifted since they knew what to expect.

The regular assessment tools were also used to resolve patient handling disputes between staff: "To prove your point sometimes it's good to sit down with someone and say okay, let's go through this and this is why. Some people need that visual: 'this is why we do this right?' So I do use that and in the past probably six months I've used it quite a bit. Just to prove your point."

There were some barriers noted in the interviews to staff use of the IYM regular risk assessment tools. These included perceived replication of information and processes by the forms and logos, the tacit knowledge of experienced staff, lack of trust in the logos, and interpersonal challenges related to interpretations of scope of practice. In some instances, the logos were not integrated into regular staff routines. Often staff would resort to white boards for patient information.

Experienced staff who had completed an initial assessment, did not universally attend to the printed algorithm to complete reassessments. Experienced staff discussed having committed the algorithm to memory, and using their "common sense," "tacit knowledge," and "time" to make patient handling decisions. By contrast, inexperienced staff and students needed the algorithm for continued and consistent support of their patient handling learning.

"I honestly say I don't even look at them [logos]. Just because I know they're very poorly done [by staff], so it honestly would trick me more than it would help me … I would go and ask my colleagues before I trusted them." (Registered Nurse)

A lack of trust in the logos was viewed as a barrier to their consistent use. On some units, logos were a burden to their daily routines and the "extra step" of changing the logos on these units was not completed, making the logos frequently inaccurate. In turn, staff trusted verbal communication more than the visual communication of the logos. These routine inaccuracies undermined trust in the logos as an assessment tool.

The interview participants also raised concerns about the redundancy of communications surrounding patient mobility. The FAR and FAA were given low priority for some staff because they interpreted other written forms (e.g. intake forms) as already addressing IYM information. Repetitive forms led to

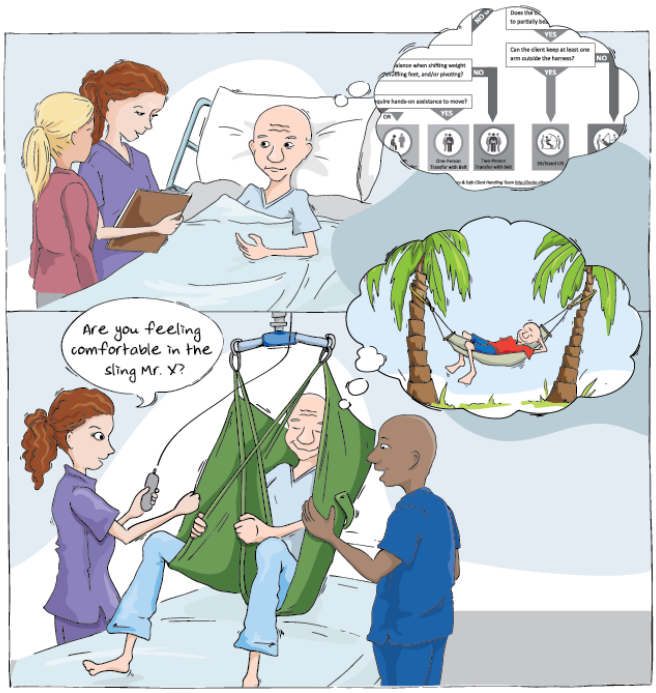
frustrations with additional paperwork, and more work finding ways to integrate the program. As one interview participant noted the Functional Assessment Record: "repeats the fall risk information as well as just general patient information … So I see the value in it being right there to read because it all relates to the transfer. However I don't know if we need to double chart everything because that is a lot of extra work for our staff right?"

Finally, interpretations of who had responsibility for patient handling was an issue for assessment tool use. For example, health care aides were not allowed to take responsibility for adjusting forms and logos, influencing their use of the tools: "when we did our training they said I could fill out the form, but I couldn't sign it because I wasn't a licensed professional, which made sense, but then I thought well, that's kind of silly then to have me do it at all. Because why is somebody else going to sign my work?"

3.4.6. Availability of Resource Staff

The survey respondents reported that easy access to IYM information and guidelines can positively influence staff use of equipment, staff using proper body mechanics, and staff working more safely by themselves, with other staff, and with patients. They also noted that having a specific IYM champion in the unit can positively influence use of equipment, staff's sense of working more safely in the units (Appendix S, Table 11). The value of having resource staff available was also raised in the interviews. Train-the-trainers were sought-after by managers to ensure the continuity of knowledge on units over time. When IYM funding ended for training, train-the-trainers and champions acted as resources to sustain the IYM program. However, a high turnover rates of trainers on a unit was an important issue for the sustainability of the IYM program.

Like trainers, IYM "superusers" guided staff on the effective use of specific equipment: "We are a superuser with that product type, so we know all about it, we have been trained by [the manufacturer] representative … staff that have happened to miss that education day can come to us for any questions." Other important resources for safe patient/client handling processes were manufacturers, educators, and fellow staff. For instance, equipment manufacturers completed training sessions on units, provided the opportunity for staff to become "super users" and attended to the usability and improvement of equipment.



High turnover rates for staff and IYM trainers can contribute to a loss of safe patient/client handling knowledge on an acute care unit. High turnover rates, and in turn, a lack of on-site support to answer questions and to assess hands-on recertification, were blamed for the lack of success of the program on units where train-the-trainers had been lost due to attrition. Another reported issue was a lack of

awareness about the availability of resource staff and program champions at a site or in a unit.

3.4.7. Safety Culture

The results from the survey revealed that informing patients and families about IYM, and having their support, can have positive effects on program uptake: use of the equipment, use of safe body mechanics, and working more safely on the units. Patient and family acceptance supported staff to feel more comfortable making patient handling decisions that used equipment and aligned with the regular assessment practices of the IYM program. In the survey, feeling comfortable asking for help with patient handling processes also can have a positive influence on staff equipment use and working more safely in the units with themselves, patients, and other staff for program uptake (Appendix S, Table 12).

"You are so much more rushed in the real world. Sure, you can go through this education course and be like this is a hazard, this is a hazard and everything is a hazard. But I feel like using it in real life it's going to be or has to be a culture change, and it's just not there yet." (Registered Nurse)

Staff reported a lack of attention to the time and reinforcement needed to implement new practices. At all professional experience levels, and on all unit types, staff valued repeated training in equipment and body mechanics. Reminders about safe body mechanics were viewed as demonstrations of the organization caring about staff safety, and providing staff with opportunities to continue thinking about their own practices.

"Well, it (IYM) supports our staff actually… It's not an option and it's not when it's convenient. Like we do it and I think it's become culture now. It was who we are." (Unit Manager)

The IYM program was also viewed as potentially or actually contributing to a safety culture on acute care units. Interview participants reported that the program made staff recognize their safety first and acted as a continual reminder to shift to a safety culture over time. The ongoing promotion of the IYM program is needed to shift workplace culture to promote safe client/patient handling. The interview participants noted that once equipment and IYM processes becomes part of taken-for-granted routines, both patients and staff will expect their use. It is also important to recognize that staff will adopt and prioritize safe patient/client handling processes and equipment that are easily integrated into their current work processes.

"In our 8 hour shift we barely have enough time to get everything that we need to get done. So when you are adding these extra things on top of it, it just compounds the stress that we all feel, to the fatigue to the burnout…that doesn't always translate to proper body mechanics because you just need to get it done." (Registered Nurse)

The issue of time emerged in several contexts within our analysis. Survey results showed that having enough time in the daily tasks can positively influence staff use of equipment, staff use of safe body mechanics, and staff's sense of working more safely in the units. Many interview participants noted that having the time for safe patient/client handling was challenging, especially in units with staff shortages or with high patient/client turnover. According to the survey respondents having enough time for daily tasks positively influenced staff use of equipment, staff use of safe body mechanics, and allowed staff to feel they worked more safely in the unit by themselves, with patients, and with other staff. In interviews, having enough time for safe patient/client handling supported a sense of safety on the unit through

adequate training and reinforcement to support the confident use of equipment and proper body mechanics.

> **"Why bother going all the way over to get the equipment? There will be eight to twenty people in the trauma room…there're people to lift the patient over and it's not like there's just two of us." (Unit Manager)**

Staff who reported a lack of organizational supports described the IYM program as an imposed constraint on their time rather than a means to increase their safety on the unit. Time considerations were often unit-specific. For instance emergency units may not use equipment due to urgent patient needs and because they often have adequate staff available to move patients manually. Staff on these units reported that manual mobility was more efficient than using the equipment.

> **"I love our physiotherapists… if I have one say 'okay, you need to do this' or 'you need to do that' I'm like 'okay, no problem'." (Registered Nurse)**

Teamwork featured prominently in the interviews as important to the success of the IYM program, providing a strong underlying mechanism for transcending interprofessional challenges. The interview respondents raised the importance of their colleagues for mutual support for safe patient/client handling and reinforcing best practices through shared knowledge and mutual respect. For instance, there were differences in the prioritization and use of the IYM program related to provider groups. Some groups, such as physiotherapists, described their extensive training in patient mobility, and were highly respected for their abilities by their nursing colleagues, yet felt excluded from the IYM program development and implementation. Another provider group, health care aides, were respected for their transfer and lift abilities, yet described times when they had little help to complete lifts: "I think if its constantly reiterated that its everybody's job to make sure that everybody is safe all the time and that if somebody needs help, then you don't say to them 'okay, well, go find another aide' or 'I'm too busy' or 'I've got to do this and you'll have to wait until you find somebody else who can help you'. I think that sort of behavior needs to stop."

> **"So the team work culture and the care aide culture helps in the moves…And if it only takes a few minutes for the RN and the LPN to assist with the lift once everything is ready and set up. It is not a big burden, and we do move a lot of patients." (Educator)**

3.4.8. Communications on Expectations and Procedures

The quality and type of communications processes and tools influenced IYM uptake within a unit. The survey analysis showed incorporating IYM during bed huddles and during safety rounds and/or staff meetings can have a positive effect on staff equipment use, safe body mechanics and working more safely in the unit. Moreover, being part of IYM development can influence staff use of body mechanics and working more safely in the unit (Appendix S, Table 13).

According to the interview participants a barrier to the initial uptake of the IYM program was the lack of integration of regular assessment tools and processes into unit communications. Communications about patient handling was most trusted when it was passed verbally between staff during the shift. The logo

was an inconsistently used medium for the communication of patient/client transfer status on units, where staff completed a regular assessment but did not regularly change the logos. Units dedicated to the IYM program actively worked to integrate risk assessment communications into daily routines. For many units this meant using bedside whiteboards[20] to communicate to each other about patient/client lifting.

3.4.9. Area Design

The survey results revealed that having enough space in patient rooms, and dedicated space for storing equipment can positively influences staff use of good body mechanics and working safely on the units. We also found that having dedicated space in close proximity to point of use for storing equipment can positively impact equipment use (Appendix S, Table 14). The interview participants noted issues related to space and the challenges of locating rooms suitable for patients of different sizes and needs. On units without ceiling lifts in every room, careful planning was required to ensure patients who needed such lifts were transferred to those rooms. Ceiling lifts in particular helped with the challenges of limited space in patient rooms and were appreciated for heavier patient transfers. When ceiling lifts were available, the portable lifts were not needed, creating more space for movement within patient rooms.

The working space layout was important for providing the direct inter-personal interactions needed for unit managers to make and communicate decisions regarding equipment supply, access, and staff use. For one thing, in rural sites with smaller facilities unit managers shared the same space as front-line workers from different units. This generated more opportunity for direct interaction and interpersonal relationships with the people who implement the IYM program on the front line. Sharing the same physical working space was a generative force (a precondition) for enabling the success of the IYM program. In urban contexts, while managers described direct contact with unit nursing staff, they did not always express having the ability to communicate with maintenance and laundry. Furthermore, the challenges and successes that staff faced were more readily apparent to rural unit managers because they often shared the same space. Moreover, having compartmentalized space meant a risk of misplaced IYM equipment. One urban interview participant noted that: "I don't know where they [the equipment] go; maybe they go to another unit or maybe they go to another hospital."

[20] Whiteboards are used in Alberta's acute care settings for care providers and families to communicate about patient/client care including medical procedures and care plans.

3.4.10. Human Resource Capacity

In addition to the nine identified factors we found that human resource factors also played a large role in the success of safe patient/client handling. Staff shortages, team-work and workforce turnover influenced the extent to which the IYM program was implemented in the acute care units. Various interview participants noted short staffing impeded the amount of time staff had to complete safe lifts. This was particularly an issue for evening shifts in many of the acute care units. Being short staffed was also raised as an issue for moving bariatric patients: "You're still going to need six staff people to move that person up."

"Now, we set them up for failure a bit in my staffing model and I'll take that. Like on nights, I've got three staff on nights, so how do you do a two-person lift?" (Unit Manager)

3.4.11. Customization of IYM Program and Training

A common refrain among the interview participants is that rather than take a "one size fits all" approach to safe patient/client handling and training, the IYM program needs to be customized to support specific contexts and needs. For instance, staff who did not have "risk assessment" processes (FAA, logos) customized to their daily routines felt they took too long so did not do them. Another issue is recognizing that different units have specific needs related to their patient population, services, space allocation, staffing levels, and so forth.

"I think customization is huge. Any time you can make it applicable to their area creates a buy-in. It also makes the training a little bit more realistic." (Trainer)

During the interviews, nursing staff volunteered terms such as "younger" or "older" to support their explanations for uptake of the program. Staff who described themselves as "older" acknowledged that they were more attentive to the strain of work on their bodies and therefore made efforts to attend to the IYM program and equipment. However, interview participants with longer careers, or graduating before IYM implementation, reported learning different approaches to body mechanics and retraining their bodies to conform to new body mechanics processes. By contrast, employees who had recently graduated were not "…tripped up" by years of practicing previous patient/client handling processes. They also reported that by learning and practicing IYM, they set the foundation for lifelong attention for safe patient/client handling practices.

"I think our staff is pretty good … most of them will ask for help. I'm probably the most reluctant, as a male, to ask for help. That might sound strange—and that I've had to overcome and still have to. Because there's that stereotype of oh, men are strong." (Licensed Practical Nurse)

We also found that there were differences in expectations for male and female staff related to patient handling. Male nurses admitted feeling valued during safe patient/client handling processes, and a willingness to take responsibility helping the team with more lifts than their female colleagues. All nurses stressed a focus on each other's safety beyond issues of gender: "We make sure that they [male nurses] are as much safe as we are … men can get hurt as much as women can."

Another consideration is the integration of the IYM program within unit routines. In urban centres, staff tended to work exclusively at specialized acute care units (e.g. orthopedic and renal units), which have a less diverse patient population and standardized routines. Several interview participants from these units stressed that this gave them confidence in their lifting abilities. By contrast, at rural sites, staff

often worked with a variety of patients from medical-surgical acute care, emergency, and long term care. This diversity in patient handling routines and processes contributed to challenges with overall patient/client handling. They recommended that staff in these units receive reminders and refreshers on the IYM program.

The interview participants recognized that Workplace Health and Safety in AHS has been moving towards a more flexible approach so that training and program implementation are adaptable to different contexts, job groups and demographics.

3.5. Assessing IYM Program Impact

It is important to evaluate the IYM program on an ongoing basis so that modifications can be made to streamline the program and ensure successful patient handling practices in Alberta. The tracking of injury information in the different zones in AHS was difficult due to a number of IT systems (nine different systems across five zones). Prior to 2010, WHS had no cohesive tracking system in place and would need to get all data from WCB on injury claims to produce reports; thus, patient handling information could not be tracked unless data were received from WCB. Since then, AHS has made great strides in tracking injury information by putting in place MySafetyNet (MSN)[21] as a standardized system across the zones. Recently, MSN was rolled out between November 2015 and May 2016 across the five zones. Calgary is the only zone where historical injury information can be pulled into MSN. Now, weekly information on injury reporting is compiled for managers (including patient handling) that can be aggregated in quarterly reports by WHS data analysts.

Going forward, tracking the annual recertification and Master Training courses will also be more standardized. At the time of program funding, training attendance lists were handwritten and emailed or faxed to the IYM training team for entry to a Training Records Excel sheet. This tracking method was vulnerable to error due to illegible handwriting, name changes, errors in staff identification numbers, and difficulty keeping track of the many lists coming in. Since January 2017 staff sign up in AHS's MyLearningLink (MLL) for online modules and to track completion of the in-person practical training sessions; these can all then be tracked electronically and linked to injury rates. The WHS team at AHS also tracks the IYM master training program delivered to post-secondary instructors.

One future step for the WHS system designers is to set up a questionnaire that supplements the injury reporting with more detailed aspects of material handling or patient handling injury. It will provide a better understanding of the circumstances leading to the injury, the training background of the staff and the equipment involved than before.

[21] One reported limitation of MSN is that the injury location cannot be differentiated from the workplace location for unionized staff if these have two positions with different workplaces in AHS (due to the collective bargaining arrangement). Only one position is officially tracked in the system.

4. Discussion

The IYM program was funded in 2009 by Alberta Health and in the subsequent years implemented by AHS in health care sites across Alberta. Despite challenges related to external factors such as the creation of Alberta Heath Services, equipment was set up in various sites across Alberta and front line staff and managers received training on safe patient/client handling. Overall the IYM program had a positive influence on injury rates, including patient handling injuries. At the same time, we found that the monetary benefits did not outweigh the costs at this stage, especially when looking specifically at patient handling injuries.

We identified differences in uptake across zones, sites and units that point to possible "sticking points" for successful program implementation and cost effectiveness. These "sticking points" were revealed in the interviews with acute care managers and staff. For example, while the equipment (e.g. ceiling lifts) and prioritizing staff safety were appreciated by front line staff and managers, the implementation of the IYM program was complicated. For instance, the IYM program may not have been prioritized in units where immediate care is needed (e.g. emergency rooms). Interviewees also noted additional challenges with implementing a safe patient/client handling program in sites with a diverse patient population and care needs (e.g. most rural sites). What emerged therefore is that the implementation and sustainability of the IYM program requires a more nuanced and customized approach that takes into account multiple program components, and differences in needs, expectations, and priorities. Finally, like many large-scale health system transformations the success of any safe patient/client handling program requires significant investment, strong leadership support, and culture change (Cadmus et al 2011; Stenger et al 2007).

The implementation of IYM was not a straightforward process and certainly there are always issues that may crop up in any system change. First, large-scale innovations such as the IYM require ongoing evaluations and quality improvement to identify any emergent issues for successful safe patient/client handling in Alberta. Second, there is room for mutual learning about strategies and practical solutions to various issues. And third, these strategies and practical solutions require flexibility to meet specific challenges.

4.1. Limitations

Limitations for this evaluation included gaps, inconsistencies, and variable quality of the data available for the administrative and economic evaluation, low survey response rate, and conflicting information and missing records about IYM implementation. These issues made it difficult to assemble a comprehensive picture of the outcomes of the IYM program. These limitations are addressed in the recommendations so that all parts of the IYM program (e.g., proposals, interim reports, and contract approvals) be available for analysis moving forward.

Administrative Data: Inconsistencies and variable quality of the data were observed across the five databases required to examine results for the province. The WCB database represented all invoices for all work related injuries, including disabling injuries, but no definition of patient-handling injury was available in this database. MSN data and MedGate data included injury descriptions. However, this data was only available in Edmonton and Calgary. A second definition of patient handling injuries was therefore created to navigate what was implied by WCB accident codes, in order to calculate a patient-

handling injury rate for the entire province. Comparing the two patient handling definitions revealed that over 82% of the patient-handling injuries fell in the following types of accident codes: Overexertion-NEC, Overexertion-UNS, Overexertion-lifting and Overexertion-pull/pushing object.

Economic Data: Worker training per se cannot lead to improvement in workplace safety; therefore training should be accompanied by safe client handling equipment, risk assessment protocols and policies that require safe client handling practices in order to see some benefits. This study was conducted to assess the impact of the IYM training alone, while patient lift equipment was already in place. However, true impact of the IMY training can only be determined when impact of the lift equipment is estimated separately from the impact of the training or at least their impacts to be estimated jointly, for example, using a before-after study type. Both trained and untrained staffs have had access to client handling equipment, but information on whether they used the equipment, how they used it, how often they used it, and for what time period the equipment was available to them was not available to this evaluation.

Some trained staffs have repeated the training, but the analysis by the Clinical Workforce Planning department that was used for this evaluation only included the first count of training for each trained staff, therefore the actual cost of training might be lower than what was reported because cost of repeated training was excluded from the total cost.

Since this evaluation used aggregate data from other reports and sources, it was not possible to conduct a more rigorous evaluation based on individual level data. The individual level data could be at care provider level, care unit level, hospital level, and/or zone level with which it could have bring in more valuable information for decision making regarding true impact of the program, where it has had more impact on some sub-population, and how the impact of the program might have been influenced by other factors such as age, sex, education, job, experience, geography etc.

Finally, we did not apply a discount factor on costs and savings because the data that was available to us were in different time format, that is while some data were annually, others were summed up over several years and so we could not apply discount factor appropriately. This might have had a significant impact on overall results reported in this evaluation because the duration of the time included in the evaluation was long enough to warrant the use of a discount factor and also costs and benefits were not occurred at same periodical intervals. In particular, major cost were occurred in early years of the program while the benefits were realized in a flat rate over time.

Surveys: Our study experienced a high risk of non-response bias resulting from a very low response rate of the survey. The bias resulted from differences between the staff who voluntary responded to the survey and the staff who did not respond, therefore the survey respondents are not representative of the AHS acute care units. Delays in operational approvals, unable to communicate directly with site and unit mangers, and not forwarded the survey to the staff by the mangers are proposed as the reasons for a low rate response rate.

Interview Data: Interviews depended on permissions from site managers, unit managers, and educators who were willing to allow access to unit staff. Those interviewed therefore might be assumed as having a more positive experience with IYM than units that did not agree to be interviewed. Furthermore, while interviews sought diversity, they were not held at every site in the province. To address these issues, interviews were conducted across all five zones, in urban and rural sites, and with as many different

acute types as would allow access over a four month period. We encountered some delays in manager responses, scheduling issues, and no-shows for interviews at a few sites. In some rural sites, site managers were not able to recruit replacement staff, or take any staff off the floor; to increase numbers in rural areas, additional sites had to be recruited due to these staffing challenges in the rural context.

4.2. Stakeholder Engagement and Knowledge Translation

At all stages of the evaluation our work was guided by a team of stakeholders including representatives from Workplace Health and Safety, Health Technology Assessment and Innovation, and Clinical Workforce Planning in AHS. Table 9 describes the range of activities undertaken to engage our partners and refine our reporting and dissemination strategy.

Table 9: Integrated and End of Grant Knowledge Translation Activities

Integrated Knowledge Translation	Description
HSEE Evaluation team meetings	Members of the HSEE team met weekly to discuss their analysis and findings for the data collection conducted in this department.
Whole team meetings: HSEE; Workplace Health and Safety; Health Technology Assessment and Innovation, AHS); Clinical Workforce Planning	The whole team met bi-weekly or as needed to discuss progress and clarify arising issues. These meetings were also supplemented by one-on-one conversations to address specific areas (e.g., research coordination; interview participant recommendations; administrative database integration; history of program implementation).
Focus group with front line staff and managers	An on-line focus group was held on October 8, 2017 with front line managers and staff (n=5) from the participating sites. The purpose of the focus group was to elicit barriers and facilitators to the implementation of the IYM program and to prioritize the recommendations for action from their perspective. The description of the focus group is in Appendix T.
End of Grant Knowledge Translation Activities	
A. Presentations at Conferences ❖ **Canadian Evaluation Society 2017 National Conference, May 1-3 2017, Vancouver BC** ○ **Poster: Elevating Research (and Patients): A Realist Evaluation of Patient Handling** ○ **Presentation: What Makes Patient Handling Successful for Staff? A Realistic Evaluation** **B. Presentations Other** ❖ **Online Presentations to OHS, September, 2017, and stakeholders in Workplace Health & Safety, AHS** **C. Publications:** ○ **Manuscripts are under development**	

5. Conclusion and Recommendations[22]

The following are high-level recommendations for consideration by safe patient/client handling planners, policy makers, researchers, and practitioners from Alberta and other jurisdictions. Addressing all twelve of the recommendation areas requires a multi-stakeholder approach. Diverse interests and expertise in ongoing activities is more likely to ensure that all aspects of a complex program are addressed.

5.1.1. Management Commitment and Support

Supportive management are key to the successful implementation and sustainability of the IYM program. They are key to successful training, equipment maintenance, budgeting and costs, integrating the IYM program into unit routines, and enforcing compliance. They will also be an important resource for organizational policy implementation. However, managers reported that they are often called upon to implement the IYM program without ongoing supports and information. Many managers reported being left on their own to integrate and customize the IYM program. They were also not adequately and consistently informed of the costs associated with implementing the IYM program (e.g. costs associated with equipment maintenance).

Recommendation: Assist managers with staff compliance through resources and applied strategies.

Recommendation: Develop training modules for managers aimed at promoting strategies for IYM implementation and sustainability.

Recommendation: Provide regular meetings and/or other avenues for information exchange for managers to give them regular input into program development/revision and to have access to information and resources.

5.1.2. Organizational Policy on Safe Patient Handling

One of the key components of a successful patient/client handling program is a written policy (Collins 2004; Work Safe Alberta 2008). A safe patient/client handling policy provides a clear understanding of the different components of the IYM program and defines the roles and responsibilities for AHS leadership and front line managers and staff. While it was one of the key elements for phase 2 planning identified within Work Safe Alberta's "No Unsafe Lift" workbook, as of this evaluation no dedicated AHS policy on safe patient/client handling has been introduced. The focus group of front-line managers and providers identified the need for an organizational policy on safe patient handling as a priority for action.

Recommendation: Develop an organizational safe patient/client handling policy to outline the roles and responsibilities of all involved in patient/client handling.

[22] It is important to note that a number of these recommendations are already being addressed by Alberta Health Services since the study began in 2016. Since the grant funding ended in 2015 Workplace Health and Safety, AHS have taken specific actions to improve all of the components of the program and data collection (see Appendix U).

5.1.3. Availability of Equipment

The front line staff and managers in general saw the benefit of equipment to their working processes and appreciated any adjustments to the equipment that improved its daily use. However, they often made interpretations about using the equipment based on their own interpretations of their abilities and the weight of the patients. There were also concerns raised about comfort levels with the costs associated with disposable equipment as well as equipment maintenance.

Recommendation: Be transparent about the costs associated with equipment maintenance and uptake with front line managers.

5.1.4. Availability of Training

There were also concerns raised about the lack of opportunities for hands-on training with equipment and safe body mechanics. For the most part, having the hands-on and repetitive experience with equipment improved comfort and proficiency with patient and client handling equipment such as ceiling lifts.

Recommendation: Incorporate principles of teamwork within the training/recertification programs (e.g. online modules) to clarify roles and responsibilities and to promote safe patient handling programs as team-based.

Recommendation: Provide resources for consistent hands-on training opportunities with equipment with specific attention to rural sites.

5.1.5. Availability and Standardization of Regular Assessment Tools

Staff and managers reported the duplication of IYM assessment tools with other intake forms. Another key issue for the staff and managers was the need to customize assessment tools based on their unit's patient population and service need. For instance, some units did not use the logos on a regular basis due to the urgency of patient needs (e.g. emergency rooms). Moreover, there were concerns that the logos were not regularly updated nor were they necessarily integrated into unit routines.

Recommendation: Refine regular assessment tools to identify and address duplications in staff recording activities.

Recommendation: Provide managers with education and resources to assist them with the implementation tools and processes that support their staff and that work best in their department and site.

5.1.6. Availability of Resource Staff

The availability of resource staff, including train the trainers and "super users" were deemed essential contributors to IYM success. However, there were concerns raised about the availability of these champions, especially in sites and units with high staff turnover.

Recommendation: Leverage the resources available through patient handling equipment manufacturers to support the development of super users and champions on units.

Recommendation: Invest in a team of safe patient/client handling experts to deliver training sessions, address handling and equipment issues on units, customize solutions, and support unit teamwork.

Recommendation: Develop strategies to improve awareness about the availability of resource staff and IYM champions.

5.1.7. Safety Culture

Acute care units in Alberta are increasingly embracing a "safety culture", which prioritizes personal safety. The IYM program is an important factor in this cultural transition. However, there were some issues identified that require attention to ensure that this momentum is maintained.

Recommendation: Promote inclusive decision-making about safe patient/client program development, revision, and implementation to support team-based care.

5.1.8. Communications on Expectation and Procedures

In fragmented/urban contexts, new mechanisms need to be in place to increase social cohesion across the hospital system. There were issues reported that relate to the issue of having consistent means of communicating about safe patient/client handling. These communications may be customized to meet the specific needs of different types of acute care units (e.g. emergency rooms).

Recommendation: Identify avenues for improved communications between unit managers and pertinent departments (e.g. laundry and maintenance).

Recommendation: Explore integrating effective communication about safe patient/client handling processes into unit routines depending on unit activities and hospital design.

Recommendation: Provide managers with strategies to customize unit communications (e.g. whiteboards, digital, visual logos, bed huddles).

5.1.9. Area Design

Having the appropriate space for patient/client handling and appropriate equipment is essential for the success of the IYM program. A lack of space in patient/client rooms, or lack of proximity to equipment storage locations, for instance, inhibited equipment use.

Recommendation: Incorporate and promote the value of ergonomics into the infrastructure design, with staff and patient safety in mind.

5.1.10. Human Resource Capacity

One of the emergent issues raised in the interviews was recognizing the importance of staffing models when implementing safe patient/client handling on a unit. These staffing issues, however, are variable according to the needs and routines of different units and sites.

Recommendation: Consider staffing issues (e.g. short staffing) when implementing safe patient handling programs on a unit/site.

5.1.11. Customization

One sentiment that arose is that training opportunities need to be customized to meet the needs of different sites, units and staff demographics. For one thing, health care aides have a higher rate of patient handling injury than other health care providers, even with IYM training. Given that they are often called upon to conduct most patient handling duties, this highlights the need to explore opportunities for customized training to meet their needs.

Recommendation: Customize training opportunities and tools to address differences in the contexts of different sites (e.g. rural and urban) and units (e.g. pediatrics, emergency rooms).

Recommendation: Complete gender analysis of the patient handling injury rates and training needs.

5.1.12. Consistent and Streamlined Data Collection

There is movement towards consistent data collection for IYM program improvement through the MSN. However, data collection for evaluation purposes might also include the setting of clear benchmarks for continuous quality improvement.

Recommendation: Implement a fully-operational and consistent means of measuring safe patient/client handling program performance related to costs and injury rates, program uptake, and facilitators and challenges.

References

Alamgir H, Yu S, Fast C, Hennessy S, Kidd C, Yassi A. 2008. Efficiency of overhead ceiling lifts in reducing musculoskeletal injury among carers working in long-term care institutions. *Injury*; May 31;39(5):570-7.

Alberta Health Services. 2009. Reducing and Avoiding Injury Initiative/Safe Client Handling Program Implementation Plan (RAII). Edmonton: AHS.

Alberta Health Services. 2011. It's Your Move: Safe Client Handling Resource Manual. http://insite.albertahealthservices.ca/Files/hr-whs-iym-resource-manual.pdf.

Alberta Health Services. 2015. IYM Monthly Status Report of all sites Mar 2015. Workplace Health and Safety Excel document.

Alberta Health Services. 2016. http://insite.albertahealthservices.ca/assets/hr/tms-hr-whs-update-functional-transfer-record.pdf.

Alberta MIS Chart of Accounts. 2013-2014. Health Analytics Branch, Government of Alberta.

Amick et al. 2007. Interventions in Health-Care Settings to Protect Musculoskeletal Health: A Systematic Review. Institute for Work & Health. https://www.iwh.on.ca/system/files/sys-reviews/sys_review_msk_healthcare_workers_2006_0.pdf

Born K, Sullivan T, Bear R. 2013. http://healthydebate.ca/2013/10/topic/politics-of-health-care/restructuring-alberta-health. Retrieved July 17, 2017.

Buckle P. 1987. Epidemiological aspects of back pain in the nursing profession. *Int J Nurs Stud*; 24(4), 319-24.

Cadmus E, Brigley P, Pearson M. 2011. Safe patient handling: Is your facility ready for change? *Nursing Management;* 42(11): 12-15.

Chhokar R, Engst C, Miller A, Robinson D, Tate RB, Yassi A. 2005. The three-year economic benefits of a ceiling lift intervention aimed to reduce healthcare worker injuries. *Appl Ergon;* Mar 31;36(2):223-9.

Choi SD, Brings K. 2015. Work-related musculoskeletal risks associated with nurses and nursing assistants handling overweight and obese patients: A literature review. *Work*; 2015; 53(2):439-48. doi: 10.3233/WOR-152222.

Collins JW, Wolf L, Bell J, Evanoff B. 2004. An evaluation of a "best practices" musculoskeletal injury prevention program in nursing homes. *Injury Prev*; Aug 1; 10(4):206-11.

Government of Alberta. 2009a. Occupational Health and Safety Act, Regulation and Code. http://work.alberta.ca/occupational-health-safety/ohs-act-regulation-and-code.html.

Government of Alberta. 2009b. *Employment and Immigration, Healthcare Industry Compliance Strategy 2009-2011.* October 1, 2009.

Government of Alberta. 2016. *Alberta MIS Chart of Accounts 2016-2019.* Edmonton: Alberta Health, Government of Alberta.

Hirshon JM, Risko N, Calvello EJ, Ramirez SS, Narayan M, Theodosis C, O'Neill J. 2013. Health systems and services: the role of acute care. *B World Health Organ;* May; 91(5):386-8.

Hunter B, Branson M, Davenport D. 2010. Saving costs, saving health care providers' backs, and creating a safe patient environment. *Nurs Econ. Mar*;28(2):130-4.

Kjellberg K, Lagerström M, Hagberg M. 2003. Work technique of nurses in patient transfer tasks and associations with personal factors. *Scand J Work Env Hea*; Dec 1:468-77.

Lee SJ, Lee JH. 2017. Safe patient handling behaviors and lift use among hospital nurses: A cross-sectional study. *Int J Nurs Stud*; Sep 1; 74:53-60.

Li J, Wolf L, Evanoff B. 2004. Use of mechanical patient lifts decreased musculoskeletal symptoms and injuries among health care workers. *Injury Prev*; Aug 1; 10(4):212-6.

Manzano A. 2016. The craft of interviewing in realist evaluation. *Evaluation*; Jul;22(3):342-60.

Miller L. 2004. *Musculoskeletal Disorder Prevention Program – Capital Health*. Edmonton: EWI Works.

Mufty S, Bollars P, Vanlommel L, Van Crombrugge K, Corten K, Bellemans J. 2015. Injuries in male versus female soccer players: epidemiology of a nationwide study. *Acta Orthop Belg*; Jun; 81(2):289-95.

Nelson A, Baptiste AS. 2006. Evidence-based practices for safe patient handling and movement. *Clinical Reviews in Bone and Mineral Metabolism;* Mar 1; 4(1):55-69.

NVivo 10. 2015. NVivo qualitative data analysis Software; QSR International Pty Ltd. Version 10.

Olinski C, Norton CE. 2017. Implementation of a Safe Patient Handling Program in a Multihospital Health System From Inception to Sustainability: Successes Over 8 Years and Ongoing Challenges. *Workplace Health Saf*; Jul 1:2165079917704670.

Occupational Safety and Health Administration (OSHA). 2011. *Safe patient handling programs: Effectiveness and cost savings. Handout, 1-5.* https://www.osha.gov/Publications/OSHA3279.pdf.

Pawson R, Tilley N. 2004. *Realistic Evaluation*. British Cabinet Office. Available at: http://www.communitymatters.com.au/RE_chapter.pdf (accessed 21 September, 2017).

Peck KY, Johnston DA, Owens BD, Cameron KL. 2013. The incidence of injury among male and female intercollegiate rugby players. *Sports Health*; Jul;5(4):327-33.

Pompeii LA, Lipscomb HJ, Schoenfisch AL, Dement JM. 2009. Musculoskeletal injuries resulting from patient handling tasks among hospital workers. *Am J Ind Med*; Jul 1; 52(7):571-8.

Saskatchewan Association for Safe Workplaces in Health. 2013. Transferring Lifting Repositioning (TLR®) program© Evaluation Results – Executive Summary, November 2013. Retrieved from: http://www.saswh.ca/files/Program%20Evaluation%20Results/TLR%20Results/TLR_Program_Evaluation_-_Executive_Summary_Nov_2013.pdf.

Smedley J, Egger P, Cooper C, Coggon D. 1995. Manual handling activities and risk of low back pain in nurses. *Occup Environ Med*; Mar 1; 52(3):160-3.

Stenger K, Mongomery L, Bresemeister E. 2007. Creating a culture of change through implementation of a safe patient handling program. *Crit Care Nurs Clin*; 21(4).

Thomas DR, Thomas YL. 2014. Interventions to reduce injuries when transferring patients: A critical appraisal of reviews and a realist synthesis. *Int J Nurs Stud*; Oct 31;51(10):1381-94.

Tompa E, Dolinschi R, De Oliveira C, Amick BC, Irvin E. 2010. A systematic review of workplace ergonomic interventions with economic analyses. *J Occup Rehabil*; Jun 1;20(2):220-34.

Weiss CH. 1998. Methods for studying programs and policies. Weiss, London, Prentice Hall.

Windeler J, Lange S. 1995. Events per person year--a dubious concept. *BMJ: British Medical Journal.* 310(6977):454-456.

Work Safe Alberta. 2008. *No Unsafe Lift: Workbook.* 978-0-7785-7625-9.

The citation for this report should appear as follows:
Misfeldt, R., et al. 2017. *It's Your Move:* Evaluating Client Handling Practices in Alberta. Final Report. Health Systems Evaluation & Evidence, Alberta Health Services.

Health Systems Evaluation & Evidence
. . . is a research department in Research Priorities & Implementation, Alberta Health Services. Health Systems Evaluation & Evidence includes a team with a unique specialty in workforce research and evaluation—an applied research unit with focus on workforce and health systems issues. The unit has forged strong partnerships with other AHS teams and external entities in pursuit of high quality research and evaluation.

For more information visit our website: http://www.albertahealthservices.ca/research/Page14021.aspx