OHSAH

EVALUATION OF THE RESIDENT LIFTING SYSTEM PROJECT,

ST JOSEPH'S HOSPITAL, COMOX, BC

Report prepared by:

Occupational Health and Safety Agency for Healthcare in BC (OHSAH)

in collaboration with St. Joseph's Hospital

December 2000

Preamble

The Occupational Health and Safety Agency for Healthcare in BC (OHSAH) was approached by the Chief Executive Officer of St. Joseph's Hospital in Comox, British Columbia to assist in conducting an evaluation of the Resident Lifting System Project implemented in the Extended Care Unit of the hospital with funding from the BC Workers' Compensation Board.

OHSAH was established in July 1999 following 1998 contract negotiations between the healthcare unions and healthcare employers in BC. OHSAH is jointly governed by an equal number of union and employer representatives. OHSAH's mission is to work with all members of the healthcare community to develop guidelines and programs designed to promote better health and safety practices and safer early return-to-work; to promote pilot programs and to facilitate the sharing of best practices; and to develop new measures to assess the effectiveness of programs and innovations in this area. With this mandate, OHSAH was delighted to have the opportunity to be involved in the evaluation of this WCB-funded initiative in Comox, B.C.

A preliminary report on this project, "*St. Joseph's General Hospital – Resident Lifting System Evaluation*" was compiled by **Don Tait**, **Penny Hacking** and **Teresa Colby**, staff members at St. Joseph's Hospital (with considerable assistance provided by all members of the Resident Lifting System Steering Committee, including **Eric Macdonald**, **Sandy Woiden**, **Jean Turner**, **Joy Leblanc**, and **Laura Charbonneau** of St Joseph's, **Pierre Darcy** and **T Saravan-Bawan** of the WCB, **Mike Arbogast** of HEABC and **George Szender** of Angel Accessibility). This was submitted to the BC WCB in the spring of 1999, but it was recognized that further work was necessary to reach firm conclusions on the effectiveness and cost benefit of this endeavour.

In the spring of 1999 OHSAH agreed to help in this endeavour, assigning the task to **Lisa Ronald**, a Research Assistant with OHSAH completing her Masters degree in the Department of Healthcare and Epidemiology at the University of British Columbia. Working under the direction of **Dr. Annalee Yassi**, the founding Executive Director of OHSAH, an epidemiologist and occupational physician, and **Dr. Robert Tate**, Biostatistical Consultant from the University of Manitoba, both with extensive experience in analyzing the effectiveness of interventions in healthcare, a coding form was developed and, as described at length in this report, all injuries pre- and post-intervention were analyzed and recoded. Assistance in this work was also provided by OHSAH staff members **Michelle Mozel** (also a Masters student at UBC) and **Jacqueline Sewell** (Physiotherapist on secondment to OHSAH). In addition, considerable assistance was provided in conducting this evaluation from the St. Joseph's staff members Penny Hacking, Teresa Colby and especially Don Tait.

The economic evaluation of the project was conducted by **Dr. Jerry Spiegel**, with assistance in data collection from Lisa Ronald, Don Tait and his staff. This report is thus a synthesis of the preliminary report, the effectiveness evaluation and the cost benefit analysis endeavours.

OHSAH is currently funding three additional ceiling lift trials in various settings in British Columbia (see OHSAH newsletter Vol.2, No.3). Thorough evaluations, including a cost benefit analysis, will be conducted for each of these. Some of the limitations in the evaluation of the Comox project will be addressed in the subsequent trials.

Executive Summary

It has been well documented that healthcare workers are at high risk for musculoskeletal injuries (MSIs). Manual lifting and transferring of patients and residents represents a major risk factor for MSIs. Mechanical patient lifting equipment is thought to reduce this risk. Because of some concerns regarding floor lift systems, increasing attention has been turned to the use of overhead lifting equipment installed via ceiling tracks as a possible better method to reduce the risk from patient or resident handling. However, there have been few evaluations of such systems, and even fewer attempts to assess the cost benefit ratio from such investments.

Between April and August 1998, 65 ceiling mounted lifts were installed in the Extended Care Unit of St. Joseph's Hospital in Comox, British Columbia, with funding from the BC Workers' Compensation Board. Training was provided and a "no manual lift policy" was implemented. The purpose of the study described in this report is to determine whether replacing the traditional floor lift system that existed at St. Joseph's Hospital in Comox with a mechanical ceiling lift resident lifting system (and related training and no-lift policies) led to a decrease in musculoskeletal injuries amongst staff, and whether it produced economic benefits greater than the cost of the intervention.

Injury data were extracted from injury reports for all staff MSIs occurring in the unit during a three-year period prior to installation of the ceiling lifts and during a 1.5 year follow-up period. A descriptive analysis was conducted for the injuries that occurred pre versus post installation, and injury rates were calculated as the numbers of injuries per 100,000 worked hours. Rates for three pre- and three post-installation intervention periods were compared using appropriate statistical methods described in

this report. A survey assessing the prevalence of MSI symptoms and satisfaction with the system was completed by staff pre and post installation. A survey of residents and/or family members of residents was also conducted to assess comfort and satisfaction.

Costs and benefits attributable to the Resident Lifting System Project were identified and measured for a one-year period preceding and following the intervention. Direct benefits were calculated as the change in MSI-related compensation claims between the two periods. Assumptions regarding time preference and trends in injury rates were explicitly identified and sensitivity analyses carried out to assess the influence of changes in assumptions. Payback periods, benefit cost ratios and internal rates of return were calculated from the perspectives of both the insurer and employer.

The rate of MSI due to lifting/transferring patients was found to be significantly reduced (58% reduction, p=.011) after the intervention. Rates of total MSIs and MSIs due to repositioning did not significantly decline after ceiling lifts were installed, which was understandable as the repositioning slings were found not to be suitable in most cases. The installation of ceiling lifts appeared to have an independent effect on patient lifting-related injuries prior to the training program, with a further reduction following training. In addition, it was found that staff preferred the ceiling lifts to manual methods and fewer staff members reported working in pain following the intervention. Residents were also satisfied and comfortable.

There was a considerable reduction in the cost of compensation claims, by 69% for lift and transfer injuries and by 50% for total MSIs. These direct savings alone produce a payback within four years, and more quickly when the effect of either indirect savings or the trend to rising compensation costs is considered. Over the estimated 12-

year life span of the equipment, the present value of the accumulated claim cost reductions exceeds the investment cost by a factor of 2.5 to 1, representing an internal rate of return of 8.8%. From the perspective of the facility itself, the present value of all direct and estimated indirect benefits exceed that of all costs associated with the intervention by a factor of 6.1 to 1, representing an internal rate of return of 17.9%.

It can be concluded that MSI rates associated with patient lifting and transferring declined significantly following installation of the overhead mechanical ceiling lifts and implementation of the Resident Lifting System program. Further studies are necessary to determine whether the ceiling lifts can also be effective for decreasing injuries related to repositioning patients on this unit. The results of this evaluation suggest that the installation of ceiling lifts in combination with an effective training program produced a strong economic benefit. The cost-effectiveness of the ceiling lifts in reducing MSI makes it worthy of consideration as a standard for new facility construction.

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1. Introduction

1.1 Background

The high rate of musculoskeletal injuries (MSIs) among health care workers is well documented (1-7). Lifetime prevalence rates of back pain greater than 70% have been reported (2, 3), and higher incidence rates of MSIs have been observed in health care workers compared to the general population (6) and to other occupational groups (8, 9). Workers' compensation data in British Columbia (BC) reflect these findings: the overall injury rate for BC health care workers in 1998 was higher than the provincial average (10), with overexertion during patient handling the major cause.

Patient handling is a documented risk factor for MSIs (1, 6, 11-14). Health care workers are often exposed to heavy loads and awkward working postures during patient handling tasks (15) and biomechanical loads during patient handling have been shown to often exceed permissible limits set by the U.S. National Institute of Occupational Safety and Health (NIOSH) and others (16, 17). Health care workers who frequently lift patients (14) and who manually lift patients from the ground (18) have higher rates of MSIs, while manual transfers are also a risk factor for MSIs (11, 18) (particularly when patients lose their balance during transfer or resist the move (11)). Lifting of patients has also been identified as a major determinant of residual back pain (19) and of greater time loss (20) among injured health care workers.

In an effort to decrease the number of patient handling-injuries, some organizations have adopted no-manual-lifting policies (21) and several researchers have emphasized the need for mechanical lifting devices (17, 22, 23). While mechanical ceiling-mounted patient lifting equipment has been increasing in popularity, there is little documentation of this effectiveness. Studies examining staff perceptions about ceiling lifts as compared to floor lifts have reported reductions in perceived effort (24, 25) and in the number of staff required to perform lifts (24). Comparisons between a ward with traditional floor lifts and a modern ward with ceiling lifts reported that nursing aids on the modern ward spent less time lifting per shift and that less time was required per lift (23). A substantial decrease in back-compressive forces when using a ceiling lift as compared to manual methods has also been reported (26). This study was therefore conducted, first, to assess the impact of replacing a traditional floor lift system with overhead ceiling lifts on musculoskeletal injuries in an Extended Care Unit (ECU) of a B.C. hospital.

While some evidence suggests that the economic benefits of ergonomic interventions can exceed their costs by producing reductions in work-related injuries (27-29), relatively few such economic evaluations have been reported (30). The pressures of rising costs attributable to work-related injury and illness in the health care sector in British Columbia make this question highly relevant in considering opportunities to invest in prevention. An economic analysis was therefore conducted to assess the economic impact of the Resident Lifting System Project.

1.2 The "Resident Lifting System Project"

The "Resident Lifting System Project" was initiated in the ECU of St. Joseph's hospital through funding provided by the Workers' Compensation Board of British Columbia, with the objective of reducing musculoskeletal injuries to staff and improving the quality of care for residents. As the major component of the project, mechanical ceiling lift devices were fitted within preexisting structures in all patient bed and bathing rooms, replacing a traditional floor lift system. (Figures 1.1 – 1.5 illustrate the use of a ceiling lift to move a patient from a chair to a bed.) Ceiling lifts could not be fitted into patient toilet rooms due to incompatibility with the existing doorway structures. (See Appendix A.1 for schematic diagrams of the ceiling lift installations at St. Joseph's)

All 124 residents required a wheelchair, 98% of which required caregiver assistance to transfer to a wheelchair or to reposition themselves. The ECU had five mechanical floor lifts, one manual transfer aid, and four beds serviced by two ceiling mounted lifts. A total of 30 registered nurses (RNs) (13 full-time [FT], 5 part-time [PT], and 12 casual), 73 long-term care aides (LTCAs) (39 FT, 8 PT, and 26 casual) and 5 activity aides were employed in the ECU at the time of installation.

Upon completion of the Resident Lifting System Project, 65 ceiling mounted lifts were installed in 62 resident rooms and three bathing rooms, thus providing access for all 124 residents plus the one respite care bed. Approximately 60 new slings of four different types were obtained for the project (universal, hammock, hygiene, and positioning). Preliminary use of the positioning slings suggested that the slings were of limited use for repositioning of residents in long-term care (except in the cases of bed to/from stretcher moves and for one heavy paraplegic patient who resided on the ECU), thus were moved to a different unit in the hospital. (Repositioning slings, which are wider and which have a greater number of attachment points, have since been developed and are being pilot-tested at the ECU.)

Training in the use of the ceiling lifts began on an ad-hoc basis, with training being conducted as needed by the ceiling lift supplier and by personnel already familiar with the use of the equipment. In June 1999, RNs attended one of three four-hour in-service sessions of a Musculoskeletal Injury Prevention Program (MSIP) course (developed on-site). A similar course was provided to LTCAs between September and November 1999, where LTCAs attended one of ten sessions offered at the unit. The course covered all aspects of patient handling and emphasized new policies, including a no manual lifting policy that was initiated in March 1998 and a new transfer belt policy establishing the use of transfer belts during patient transfers. (See Appendix A.2 for a summary of the informal ceiling lift training program and the formal MSIP training program, as obtained from the original report prepared by St. Joseph's staff). At the time of the training sessions, a total of 34 RNs were employed in the Unit (12 FT, 7 PT, and 15 casual), as were 87 LTCAs (40 FT, 9 PT, and 38 casual), and 8 activity aides (6 FT and 2 PT). The number of patients designated as requiring lifts (as opposed to transfers) had increased by approximately 10 percent from the pre-intervention period. Equipment located within the unit post-installation (other than ceiling lifts) included 2 floor lifts and 2 sit-to-stand transfer aids.

Figure 1.1: Using a ceiling lift to move a resident from chair-to-bed, Stage 1

Figure 1.2: Using a ceiling lift to move a resident from chair-to-bed, Stage 2

Figure 1.3: Using a ceiling lift to move a resident from chair-to-bed, Stage 3

Figure 1.4: Using a ceiling lift to move a resident from chair-to-bed, Stage 4

Figure 1.5: Using a ceiling lift to move a resident from chair-to-bed, Stage 5

2. Evaluation of Effectiveness

2.1 Methods

Injury reports for all musculoskeletal injuries were examined retrospectively for approximately three years preceding the installation of the ceiling lifts and for a period of approximately 1.5 years post-installation. A coding form was developed to systematically code the information available in the historical injury reports (see Appendix A.3). The coding form included fields for recording risk factors of the injured worker (i.e. age at time of injury, occupation date of MSIP training, years of experience at the hospital, and previous history of similar injury) and with the incident (i.e. date and time of accident, body area injured, number of workers involved, task being completed at time of injury, contributing causes to the accident, and type of mechanical lift or transfer device used). Fields indicating whether the ceiling lift was "installed and functioning in the area where the accident occurred" were dropped because injury reports did not record room numbers where the incident occurred.

Three periods of similar time lengths were identified: pre-intervention period 1 (April 1, 1995 – September 19, 1996); pre-intervention period 2 (September 20, 1996 – March 31, 1998); and post-intervention period 1 (August 21, 1998 – March 31, 2000). Injuries occurring during the intervention period (April 1, 1998 – August 20, 1998) were excluded from the analyses because it could not be determined if the injury occurred before or after installation of the ceiling lifts at the location of the incident. MSI rates were calculated for the three study periods based on the number of MSIs per 100,000 worked hours. The full study period was then further divided into six time intervals (three pre- and three post-intervention periods) and pre- versus post-intervention rates were compared using Poisson regression, with the level of statistical significance set at p=0.05.

A staff survey was designed (prior to ceiling lift installations) to determine history of pain and injury, preferred patient handling techniques, and perceived exertion during various patient lifts and transfers (see Appendix A.4). This survey was administered to all FT, PT, and casual RNs, LTCAs and nursing assistants in February 1998, 3 months prior to the installation of the ceiling lifts, and re-administered again 15 months post-installation. Descriptive statistics were calculated to compare caregiver demographics, recent pain and injury history, perceived workload and perceived exertion before and after overhead ceiling lift installation. Surveys assessing perceived levels of comfort while being lifted were also distributed to residents/family members of residents pre- and post-intervention, and some descriptive statistics were calculated (see Appendix A.5).

2.2 Results

2.2.1 Injury Epidemiology

A total of 237 MSIs were documented during the 5-year period (excluding 24 MSIs occurring during the four-month installation period). As documented in Table 2.1, the majority of injured workers were aged 25 years or older, had been employed at the hospital for a period of greater than one year, were LTCAs, and were employed on a permanent full-time or part-time basis. There did not appear to be major changes in these distributions in the pre- versus the post- intervention intervals. Comparisons of the injured worker population to the limited data available for the entire ward staff population (including injured and non-injured workers) suggest that the ratio of casual to permanent full-time/part-time workers employed at the unit increased slightly pre- versus post-intervention (i.e. casual workers represented 35% of the staff pre-installation and 41% post-intervention). The proportion of MSIs experienced by permanent staff appeared to be slightly higher than the proportion among casual staff in both the pre- and post-intervention periods. In contrast, the ratio of LTCAs to RNs employed did not shift markedly pre- versus post-intervention (i.e. RNs represented 28% of the staff pre-intervention and 27% post-intervention). A greater proportion of LTCAs were injured than were RNs at this unit, in both the pre- and post- intervention periods.

Table 2.1: Injured worker demographics, pre versus post-intervention periods

	Pre-Intervention, Period 1 (April 1, 1995– Sept. 19, 1996) N=61		Pre-Intervention, Period 2 (Sept. 20, 1996-March 31, 1998) N=95		Post-Intervention Period 1 (Aug. 21, 1998-March 31, 2000) N=81	
	n	%	n	%	n	%
Age of injured worker						
< 25 years	1	1.6	5	5.3	7	8.6
25 – 45 years	35	57.4	55	57.9	45	55.5
> 45 years	23	37.7	29	30.5	27	33.3
Unknown	2	3.3	6	6.3	2	2.5
# of years injured worker employed at the hospital						
< 1 year	2	3.3	11	11.6	4	4.9
1-5 years	29	47.5	35	36.8	25	30.9
> 5 years	28	45.9	47	49.4	46	56.8
Unknown	2	3.3	2	2.1	6	7.4
Occupation of injured worker						
Registered Nurse (RN)	8	13.1	12	12.6	7	8.6
Long-term care aide (LTCA)	49	80.3	78	82.1	65	80.2
Other	2	3.3	4	4.2	7	8.6
Unknown	2	3.3	1	1.1	2	2.5
Employment status of injured worker						
Full-time / Part-time	42	68.9	73	76.8	52	64.2
Casual	19	31.1	22	23.2	29	35.8

As shown in Table 2.2, the majority of workers injured during the study period reported experiencing pain in the shoulder and back regions (particularly the lower back), followed by the upper limbs, with a slight decline in the proportion of injuries to the lower back and an increase in injuries to the shoulder region following intervention. The majority of injuries occurred between 10 AM and 6 PM, reflecting the periods when patient handling activities were greatest, and a higher proportion of injuries appeared to occur when tasks were unassisted (i.e. only one worker involved). There was a decreasing trend in the proportion of injuries occurring in patient rooms (other than repositioning in bed) and an increasing trend in the proportion of injuries occurring in areas other than patient bed- or bathing rooms (i.e. where ceiling lifts were not installed).

Table 2.2: Injury demographics, pre versus post-intervention periods

	Pre-Intervention, Period 1 (April 1, 1995–Sept. 19, 1996) N=61		Pre-Intervention, Period 2 (Sept. 20, 1996-March 31, 1998) N=95		Post-Intervention Period 1 (Aug. 21, 199 March 31, 200 N=81	
	n	%	n	%	n	%
# of injured workers reporting previous similar pain or discomfort	25	41.0	34	35.8	31	38.3
Unknown	2	3.3	7	7.4	7	8.6
# of reports listing the following body areas as being injured:						
Neck	4	6.6	8	8.4	9	11.1
Shoulder	21	34.4	21	22.1	31	38.3
Back	24	39.3	43	45.3	23	28.4
Upper back	1	1.6	4	4.2	4	4.9
Mid back	4	6.6	5	5.3	2	2.5
Lower back	20	32.8	35	36.8	18	22.2
Upper limbs / digits	9	14.8	20	21.1	16	19.8
Lower limbs / digits	8	13.1	11	11.6	2	2.5
Hip / buttocks / groin	7	11.5	12	12.6	11	13.6
Unknown	2	3.4	1	1.1	2	2.5
Time when pain or discomfort first noticed						
Midnight to 6 AM	8	13.1	10	10.5	6	7.4
6 AM to 10 AM	9	14.8	11	11.6	9	11.1
10 AM to 2 PM	22	36.1	30	31.6	23	28.4
2 PM to 6 PM	11	18.0	12	12.6	20	24.7
6 PM to Midnight	5	8.2	25	26.3	11	13.6
Unknown	6	7.4	7	7.4	12	14.8
# of workers involved in task at time of injury						
1	30	49.2	50	52.6	44	54.3
2+	27	44.3	33	34.7	20	25.9
Chronic (no acute event listed)	1	1.6	6	6.3	10	12.3
Unknown	3	4.9	6	6.3	7	8.6
Areas where injuries occurred (patient-related)						
Patient rooms, repositioning patient in bed	16	26.2	30	31.6	25	30.9
Patient rooms, other	30	49.1	36	37.9	20	24.7
Patient bathing rooms	1	1.6	3	3.2	1	1.2
Other areas	4	6.6	7	7.4	12	14.8
Unknown, non-patient-related or chronic	10	16.4	19	20.0	23	28.4

Table 2.3 summarizes contributing causal factors in reported MSIs, with multiple causal factors listed for individual injuries. As shown in Table 2.3, neither equipment nor environment-related factors represented major causal factors for MSIs pre- or post-intervention. Resistive behaviours by patients represented the major patient-related causal factor, followed by patients slipping or falling unexpectedly, and patient's heavy weight. There was a decreasing trend in the proportion of injuries attributable to procedural error by staff and use of poor body mechanics, with an increasing trend in the proportion of injuries attributable to a previous injury. There were two injuries post-intervention associated with use of the ceiling lift equipment.

Table 2.3: Contributing causal factors of reported MSIs (with multiple causes per injury)

Contributing Factors in Causing Injury (as described in the injury reports)	Pre-Intervention, Period 1 (April 1, 1995- Sept. 19, 1996) N = 61		Pre-Intervention, Period 2 (Sept. 20, 1996- March 31, 1998) N = 95		Post-Intervention Period 1 (August 21, 1998 March 31, 2000) N = 81	
	n	% of cases	n	% of cases	n	% of case
Equipment-related factors						
Not functioning properly / broken	5	8.1	6	6.3	4	4.9
Not available at time	-	-	3	3.2	-	-
Incorrect attachments on equipment	-	-	2	2.1	3	3.7
Not adjustable as required	1	1.6	2	2.1	2	2.5
Environment-related factors						
Obstacles on path	-	-	1	1.1	1	1.2
Slippery floors	-	-	1	1.1	2	2.5
Cramped working area	1	1.6	5	5.3	5	6.2
Necessary assistance unavailable	2	3.3	1	1.1	-	-
Patient-related factors						
Fell / slipped unexpectedly	10	16.4	10	10.5	6	7.4
Resistive	10	16.4	24	25.2	20	24.7
Misunderstood instructions	1	1.6	3	3.2	4	4.9
Heavy	8	13.1	14	14.7	5	6.2
Flaccid / weak	3	4.9	10	10.5	5	6.2
Stiff / rigid	1	1.6	5	5.3	3	3.7
Emergency situation	2	3.3	1	1.1	2	2.5
Caregiver-related factors						
Fatigued / distracted / in pain	4	6.6	7	7.4	1	1.2
Procedural error	25	41.0	31	32.6	14	17.3
Used poor body mechanics	13	21.3	19	20.0	10	12.3
Previous injury	6	9.8	13	13.7	24	29.6
Poor communication / teamwork	2	3.3	2	2.1	-	-

2.2.2 Injury Outcomes

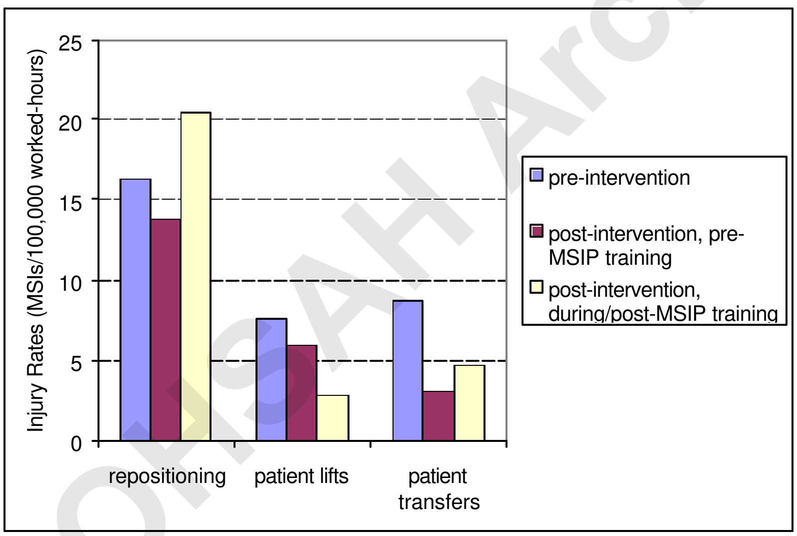
As summarized in Table 2.4, total MSI rates declined slightly but not significantly (p=0.72) with an average total rate of 40.8 MSI/100,000 worked hours pre-intervention and 38.7/100,000 worked hours post-intervention. A marked decline was observed in lifting/transferring MSI rates, from 16.3 pre- to 8.1/100,000 worked hours post-intervention (p=0.011), with a specific decline for patient lifting MSIs of 7.6 to 4.3 (p=0.135). A slight but not significant (p=0.48) increase was observed in rates of repositioning MSIs (16.3 vs. 17.2). Slight increases pre- versus post-intervention were also observed in rates of MSIs from other causes. Time-loss injuries followed similar, though less marked, patterns.

Table 2.4: Injury rates by task being completed at time of MSI, pre versus post-intervention periods

Task Being Completed at Time of MSI	Pre-Intervention, Period 1 (April 1, 1995– Sept. 19, 1996)		Pre-Intervention, Period 2 (Sept. 20, 1996- March 31, 1998)		Post-Interventio Period 1 (August 21, 199 March 31, 2000	
	n	# of injuries/ 100,000 worked-hours	n	# of injuries/ 100,000 worked-hours	n	# of injuries 100,000 worked-hou
All Reported MSIs	61	32.8	95	48.7	81	38.7
Repositioning residents	24	12.9	38	19.5	36	17.2
Lifting/ transferring residents	27	14.5	35	18.0	17	8.1
Lifting	13	7.0	16	8.2	9	4.3
Transferring	14	7.5	19	9.7	8	3.8
Other, non-patient related	6	3.2	9	4.6	10	4.8
Other, patient related	1	0.5	5	2.6	5	2.4
Chronic (no acute event specified)	1	0.5	8	4.1	13	6.2
Not able to determine from injury report	2	1.1	0	0	0	0
Time-Loss MSIs Only	19	10.2	37	19.0	38	18.2
Repositioning residents	12	6.4	17	8.7	18	8.6
Lifting/ transferring residents	5	2.7	14	7.2	8	3.8
Lifting	3	1.6	7	3.6	5	2.4
Transferring	2	1.1	7	3.6	3	1.4
Other, non-patient related	0	0	2	1.0	3	1.4
Other, patient-related	0	0	3	1.5	3	1.4
Chronic (no acute event specified)	0	0	1	0.5	6	2.9
Not able to determine from injury report	1	0.5	0	0	0	0

As shown in Figure 2.1, the installation of ceiling lifts appeared to have an independent effect on patient lifting-related injuries prior to the training program. Follow-up after the training showed a sustained declined in patient lifting-related injury rates while patient transferring and patient repositioning-related injury rates increased. Since the number of designated lifts post-ceiling lift installation had actually increased (due to changes in patient acuity), the observed rate of decline in patient lifting-related MSIs is likely underestimated (assuming an increasing trend in such MSIs prior to the installation).

Figure 2.1: MSI rates (#MSIs per 100,000 worked-hours) for pre-intervention, post-installation (pre-training) and post-installation (during/post-training) periods



2.2.3 Staff and Resident Survey

A total of 58 caregivers (37 LTCAs [64%], 12 RNs [21%], and 9 unspecified [16%]) completed the pre-intervention survey and 50 staff members (37 LTCAs [74%], 8 RNs [16%], and 5 unspecified [10%]) completed the post-intervention survey. Those staff members reporting "ever having experienced a patient handling injury" decreased from 75.9% pre-intervention to 62.0% post-intervention. Staff members who reported experiencing "soft tissue pain in the last six months which has interfered with their daily routine or lifestyle" decreased from 60.3% to 50% one year post ceiling lift installation. Staff members reporting that they "have worked at the hospital while in pain" decreased from 72.4% to 66%. Staff members who reported that they preferred using mechanical lifting equipment over manual methods for moving residents from bed to wheelchair increased from 39.7% to 64% post-installation. (See Appendix A.6 for a summary list provided by staff at St. Joseph's comparing the advantages and disadvantages of the ceiling mounted resident lifting system and the traditional portable floor model mechanical lift system (as presented in the original report prepared by St. Joseph's staff)).

A total of 20 resident surveys were completed pre-intervention (by 12 residents and 8 family members of residents) and 20 surveys completed post-intervention (by 15 residents and 5 family members). Residents stating they were satisfied with the way they were moved increased from 80% to 95% after the ceiling lift installation, and that they felt comfortable while being moved also increased (65% pre- vs. 80% post-intervention).

3. Evaluation of Cost-benefit

3.1 Methods

In its simplest form, cost-benefit analysis (CBA) "attempts to weigh all the impacts of a program to assess whether it is worthwhile, i.e. whether its benefits exceed its costs" (31). Accordingly, CBA is the appropriate technique to use in evaluating whether the Resident Lifting System Project at St. Joseph's Hospital produces economic benefits greater than the intervention's costs.

To ensure that the evidence generated by economic evaluations is credible, guidelines for conducting and critically appraising such studies have been generated to assess the validity of the results produced. The methodology for this study has been prepared in line with the evaluation criteria developed by Drummond *et al.* (32), which is included as Appendix A.7 for the benefit of the reader.

A description of the Resident Lifting System Project is presented in Section 1 and evidence regarding its effectiveness in reducing MSI is presented in Section 2. This Section considers all costs and benefits attributable to the intervention.

To assess the effectiveness of the program, the economic evaluation design focuses on two time periods: a 12 month period following the installation of the ceiling lifts (August 21, 1998 to August 20, 1999) and an equivalent comparison period (April 1, 1997 to March 31, 1998) preceding the intervention. To ensure that the periods examined are indeed distinct, the time interval when the installation was itself occurring is not included in either of the study periods.

The direct benefit of the intervention was considered to be the cost reduction associated with all permanent and casual employees' MSI-related time loss compensation claims. The total costs of claims initiated in each period were documented from compensation records and then compared. To ensure that absolute claims amounts were comparable despite slight variation in the total hours worked in the two periods, the claims paid in the pre-intervention were adjusted by applying the actual cost per 100,000 hours to the number of hours worked in the post-intervention period.

Recognizing the general trend toward increases in compensation costs that existed just prior to the installation of ceiling lifts and has continued in the health care sector (10), a sensitivity analysis considers the implications of a comparison period with costs that are 40% greater that what had existed during the pre-intervention period.

Analysis was conducted from the perspectives of both the insurer, who is responsible for providing compensation payments to injured workers, and the employer (i.e. facility administration), who must consider a wider range of costs (including maintenance and operating charges) and benefits (including indirect effects, conservatively estimated to be double that of direct benefits (30).

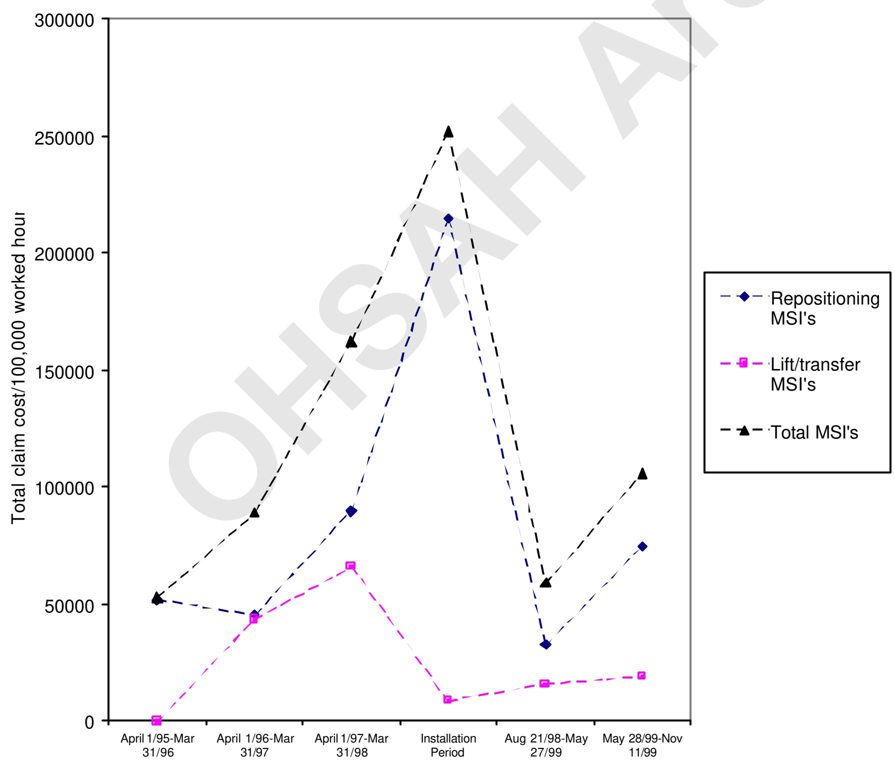
The project's payback period was determined to consider the time it would take to recover the capital investment amount. To more comprehensively assess the economic value of the project, benefits and costs of the intervention were measured over the estimated twelve-year lifespan for the ceiling lift equipment. Time preference was considered by applying a 4% discount rate. All benefits and costs were expressed as present values, so that benefits could be analyzed in comparison to costs (expressed as a benefit-cost ratio) and an internal rate of return for the investment could be calculated.

3.2 Results

3.2.1 Overall Reduction to Payback Period and Internal Rate of Return

Prior to the installation of the ceiling lifts, MSI-related compensation costs per 100,000 hours worked at the Extended Care Unit had been rising steadily (Figure 3.1). However, following the intervention, the costs of lift/transfer and all MSI-related compensation claims declined sharply (Table 3.1). While the incidence of "lift/transfer" claims decreased by 58% (24 to 10), the costs per 100,000 hours worked were reduced by 69% ($65,997 to $20,731).

Figure 3.1: Total claim cost/100,000 worked hours †‡



* Based on cost incurred up to time of evaluation
† Cost calculations are for all costs associated with MSIs to permanent and casual staff.
‡ There was missing cost data for two claims at the time of the evaluation (one repositioning claim and one patient-related other claim occurring during the post-intervention period)

Table 3.1: Costs associated with staff MSIs, pre versus post-intervention

MSI injuries	Total worked hours	Total Claims	Total Cost $	Average cost per claim $	Cost per 100,000 worked hours $
(April 1, 1997 – March 31, 1998) Pre-intervention					
All	126,369	61	205,043	3,361	162,257
Lifting/ transferring		24	83,400	4,537	65,997
Repositioning		25	113,435	3,475	89,765
Non-patient		6	882	147	698
Patient, other		2	7,326	3,663	5,797
Chronic		4	0	0	0
(August 21, 1998 – August 20, 1999) Post-intervention					
All	130,963	45	123,119	2,736	94,010
Lifting/ transferring		10	27,150	2,715	20,731
Repositioning		21	65,112	3,101	49,718
Non-patient		7	9,961	1,423	7,606
Patient, other		2	20,027	10,014	15,292
Chronic		5	868	174	663

*Based on all costs incurred for claims initiated in period (one patient, other claim still open in post period)
Cost calculations are for all costs associated with MSIs to permanent and casual staff.

3.2.2 Economic Evaluation from WCB Perspective

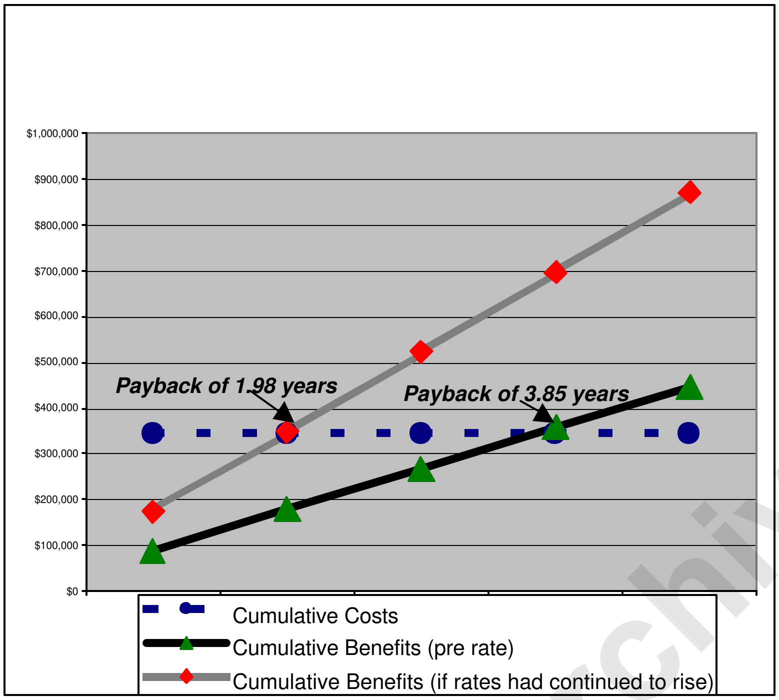
The Resident Ceiling Lift Project was financed as a one-time capital expenditure of $344,323 provided as a grant by the insurer, the B.C. Workers' Compensation Board. The net reduction in the cost of claims filed in the study period following the intervention (Table 3.2) was $59,282 for lift/transfer MSI-related claims exclusively and $89,378 for all MSI-related claims. Taking this latter figure, which incorporates the contribution from both reduced MSI incidence and reduced duration of claims, a payback period of 3.85 years can be estimated for the investment. However, if it is assumed that in the absence of the intervention, the compensation payment situation would have continued to worsen, the payback period would have been within two years, as is illustrated by Figure 3.2.

Table 3.2: Costs and consequences of intervention from insurer perspective

	Lift / Transfer MSI-related Claims Costs	All MSI-related Claims Costs	Payback period estimate***
Pre-intervention	$ 83,400	$ 205,043	-
Adjusted* Pre-intervention	$ 86,432	$ 212,497	-
Post-intervention	$ 27,150	$ 123,119	-
Reduction in cost	$59,282	$ 89,378	3.85 years
If claims rates has risen**	$121,005	$ 297,496	-
Post-intervention	$ 27,150	$ 123,119	-
Reduction in cost	$93,855	$ 174,377	1.97 years

* Experience based on 126,369 total hours worked adjusted to reflect 130,963 total hours worked
** Estimated costs if MSI-related claims costs had continued to increase at a rate of 40% greater
*** Comparison of all MSI-related claims costs saved compared to the capital costs of $344,323 for the intervention

Figure 3.2: Payback from WCB perspective (non-discounted costs and benefits)



It should be noted that the use of the "payback" as the measure for evaluating the intervention tends to understate the full economic value of the installed ceiling lifts, which will continue to produce benefits for a much longer period. For example, over the projected 12-year life span for the equipment, a present value stream of $872,372 in savings can be estimated to result from the investment as a result of reduced claims costs, producing a benefit-cost ratio of 2.53, or an internal rate of return (rate of interest that would equate the discounted present value of expected future receipts to the present value of cash outlays) of approximately 8.1% per annum. Figure 3.3 and 3.4 show the flow of cumulative costs and benefits.

Figure 3.3: Cumulative present value costs and benefits from WCB perspective

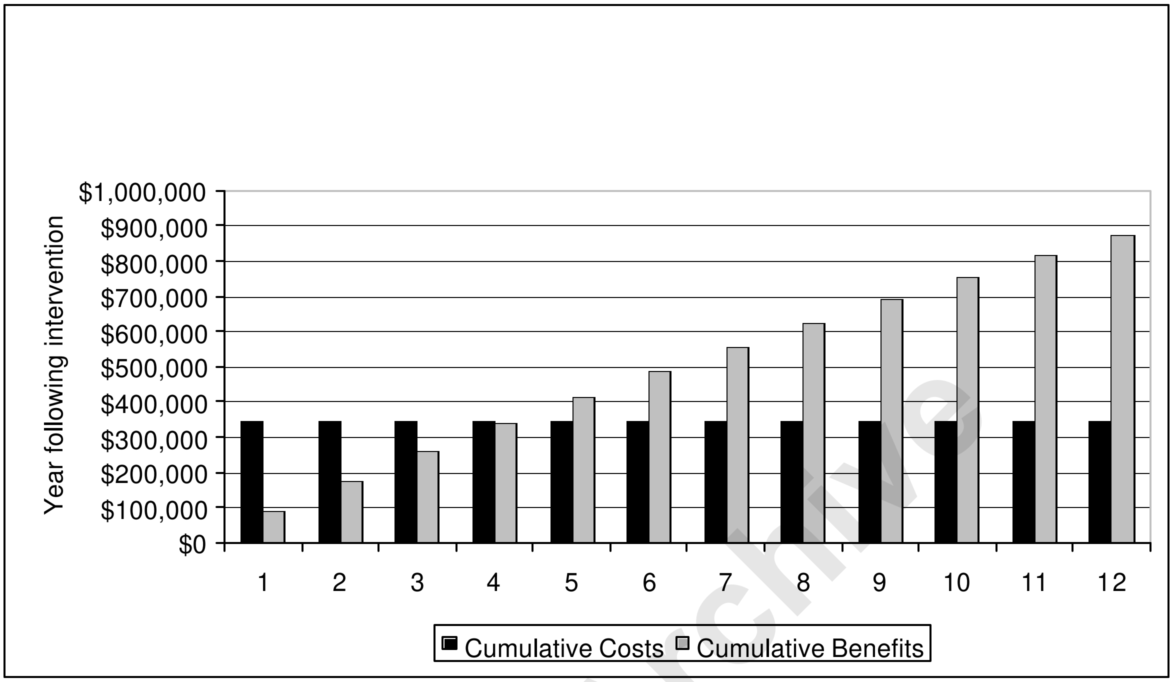
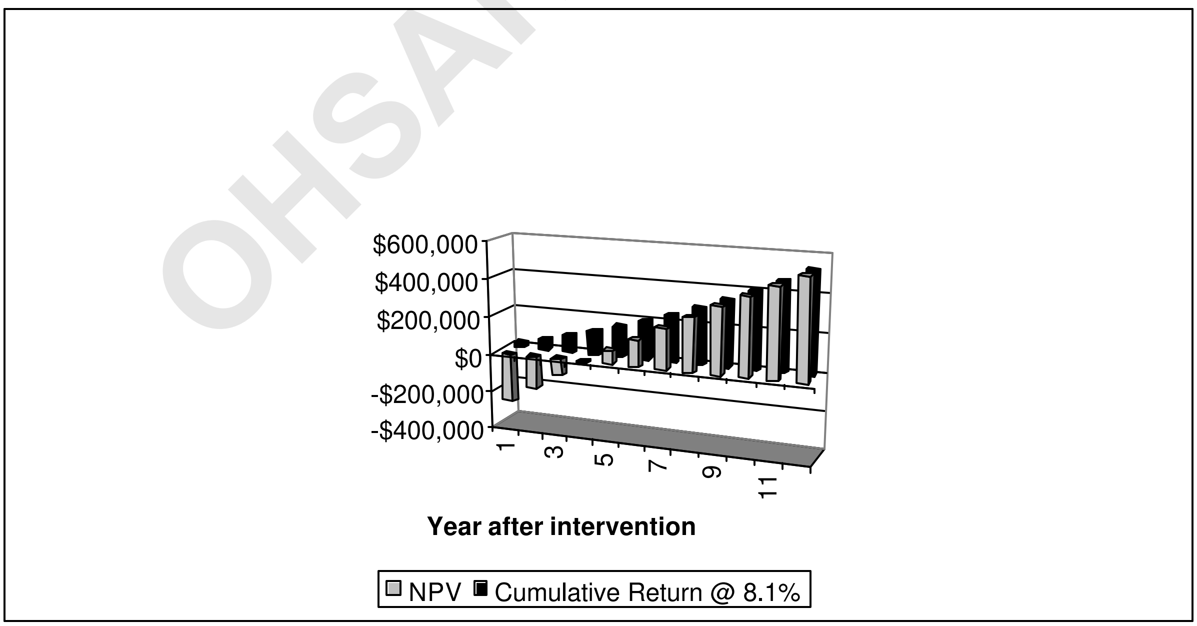


Figure 3.4: Comparison of net present value (NPV) with investment at derived internal rate of return of 8.1% from WCB perspective



3.2.3 Economic Evaluation from Facility Perspective

Economic evaluations are relative to the viewpoint explicitly identified. While it is appropriate for the WCB to consider the effect of providing a one-time grant and then consider the impacts on claims costs, other viewpoints should be considered as well. For example, facilities must pay various operating costs (energy, maintenance, training) beyond the capital investment but they also derive indirect benefits over above the savings from averted compensation claims and the value of redeployed equipment no longer needed following the intervention. Table 3.3 identifies the costs that have been actually incurred in implementing the Resident Patient Lift Project. To consider the capital equipment costs from the facility administrator point of view, an annuitized cost estimate has been derived; expressing would have to be spent annually to be equivalent to a payment of the initial capital investment for the project. The capital cost of $344,323 is then represented by annuitized costs of $38,155, assuming a twelve-year life span for the equipment and a 4% interest rate. This estimate does not consider any residual value for the equipment, and thus is a very conservative way of analyzing cost, as this is reduced by the residual value estimated to be left.

Table 3.3: Costs considered in economic evaluation of the ceiling lift intervention

Cost Element	Cost per unit	Number of units
Operating Costs		
Large Batteries	$50	70 units, replaced every 2nd year
Small Batteries	$3	70 units, replaced every year
Labour costs for Maintenance	$25/hour	70 units, 3 hours each
Miscellaneous Materials	$20/unit estimate	70 units
Cost of Redeployed Equipment		
Floor lifts redeployed to other units	$2,500	2 units
Training		
Training conducted regardless	No charges included	No incremental sessions
Staff Planning		
Savings in reduced time to schedule floor lift deployment	No charges included	No units measured
Capital Costs		
Installation of ceiling lifts and tracking	$344,323	Installation of 65 units with 5 back-up lifts
Annuitized costs assuming a 12 year life span @ 4% interest rate	$38,155	Equivalent cost for budgeting capital on an annual basis

Figure 3.5: Cumulative present value costs and benefits from facility perspective including indirect benefits estimated at pre -intervention claims rates

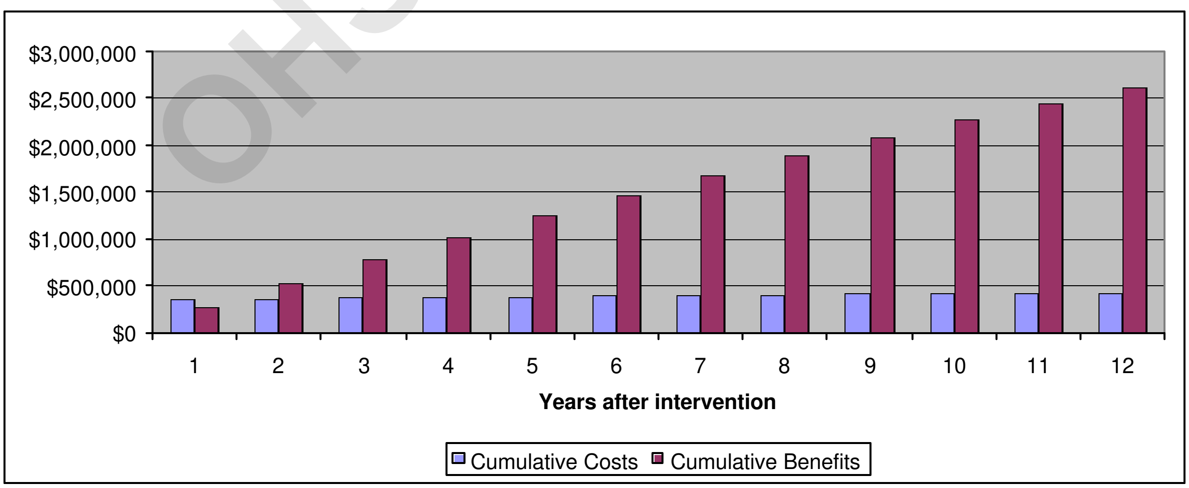
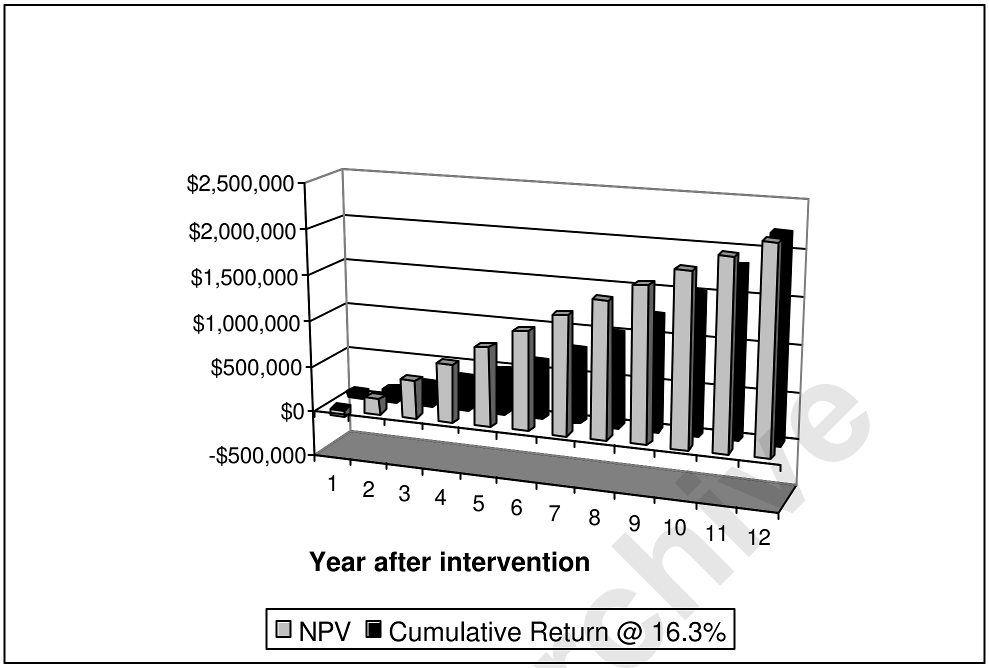


Figure 3.6: Comparison of net present value (NPV) with investment at derived internal rate of return of 16.3% from facility perspective (including indirect benefits)



The flow of costs and benefits from the perspective of the facility is presented in Table 3.4, expressing costs and benefits in present value terms, which discounts future costs and benefits at a rate of 4%. This expresses the preference for realizing benefits immediately and not putting them off for some time in the future.

Table 3.4: Flow of costs and benefits from the perspective of the facility

Present Value calculated at discount rate of 4% **Assuming Pre-intervention Claims rate for comparison** **Indirect costs included**

______________	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12
Present Value (decimal)	1.00000	0.96154	0.92456	0.88900	0.85480	0.82193	0.79031	0.75992	0.73069	0.70259	0.6755642	0.649581
COSTS												
Ceiling Lifts	$344,323	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Large Battery	$1,750	$1,750	$1,750	$1,750	$1,750	$1,750	$1,750	$1,750	$1,750	$1,750	$1,750	$1,750
Maintenance-Labour	$5,250	$5,250	$5,250	$5,250	$5,250	$5,250	$5,250	$5,250	$5,250	$5,250	$5,250	$5,250
Small Battery	$210	$210	$210	$210	$210	$210	$210	$210	$210	$210	$210	$210
Misc Materials	$1,400	$1,400	$1,400	$1,400	$1,400	$1,400	$1,400	$1,400	$1,400	$1,400	$1,400	$1,400
TOTAL COSTS	$352,933	$8,610	$8,610	$8,610	$8,610	$8,610	$8,610	$8,610	$8,610	$8,610	$8,610	$8,610
BENEFITS												
Claims Reduction	$268,134	$268,134	$268,134	$268,134	$268,134	$268,134	$268,134	$268,134	$268,134	$268,134	$268,134	$268,134
Redeployed equipment	$5000											
TOTAL BENEFITS	$273,134	$268,134	$268,134	$268,134	$268,134	$268,134	$268,134	$268,134	$268,134	$268,134	$268,134	$268,134
PRESENT VALUE COSTS	$352,933	$8,279	$7,960	$7,654	$7,360	$7,077	$6,805	$6,543	$6,291	$6,049	$5,817	$5,593
PRESENT VALUE BENEFITS	$273,134	$257,821	$247,905	$238,370	$229,202	$220,387	$211,910	$203,760	$195,923	$188,387	$181,142	$174,175
NET PRESENT VALUE	($79,799)	$169,743	$409,688	$640,404	$862,246	$1,075,556	$1,280,661	$1,477,878	$1,667,510	$1,849,848	$2,025,173	$2,193,755

Benefit-Cost Ratio of Intervention: 6.12
Internal Rate of Return for Investment: 17.9%

Table 3.5 demonstrates the effect of varying assumptions regarding the extent of indirect benefits or what the claims rate would have been without the ceiling lifts. Detailed presentation of the different scenarios is presented in Appendix A.8. Over 12 years, even without including these indirect benefits, $2.6 million savings from reduced claims will be realized following the intervention as compared with present value costs of approximately $450,000 – producing a benefit-cost ratio of 6.12:1. The implied internal rate of return on investment ranges from 6.2% to 22.9%, depending on the assumptions adopted.

Table 3.5: Payback, benefit-cost ratio and internal rate of return* of no-lift policy / installing ceiling lifts when different perspectives and assumptions are applied

	Payback Period	Benefit-Cost Ratio	Internal Rate of Return
1. Insurer/Funder Perspective *Direct capital costs only;* *Direct benefits only (savings from reduced Compensation costs)*			
1a.- comparison to pre-intervention claims rate	3.9 years	2.53	8.1%
1b - comparison if rate 40% worse	2.0 years	4.94	14.2%
2. Facility Perspective *Direct capital costs and costs of maintenance and operation;* *Direct benefits (savings from reduced Compensation) and* *Indirect benefits (reduced disability payments, absenteeism, additional recruitment and replacement)*			
Assumption A: compared to pre-intervention claims rate			
2a direct benefits only	3.7 years	2.05	6.2%
2b indirect benefits included**	1.3 years	6.12	17.9%
Assumption B: comparison if claims rate 40% worse			
2c direct benefits only	2.0 years	3.98	12.2%
2d indirect benefits included**	0.7 years	11.93	22.9%

* Assumes 12-year life span for equipment and 4% interest rate for time preference.
** Indirect benefits assumed to be twice the amount of direct benefits

4. Discussion and Conclusions

Mechanical lifting equipment has been recommended as an effective tool for decreasing the rate and severity of MSIs in health care workers. This study provides supporting evidence for this recommendation as we found that installing overhead ceiling lifts was followed by a decrease in injury rates associated with lifting/transferring of residents. It is noteworthy that neither overall MSI rates nor repositioning-related MSI rates changed pre- versus post-intervention. Although the ceiling lifts are designed for both lifting and for repositioning of residents, the ceiling lifts were actually not utilized for repositioning of residents in this unit due to problems with the repositioning slings. Therefore, the fact that repositioning-related MSI rates remained relatively stable while lift/transfer injuries declined supports the conclusion that the intervention was effective in decreasing lift/transfer injuries. Further follow-up of the injury outcomes on this unit after the new ceiling-lift compatible repositioning slings are incorporated should now be undertaken to assess whether repositioning-related injuries also decline.

There were several, albeit minor, limitations to this evaluation. First, the lack of a control group made it impossible to rule out the effects of external confounders. Second, it was not possible to separate out an effect of installing ceiling lifts alone as opposed to an effect of implementing the training program. However, the decline in lift/transfer MSI rates occurred while there was an increase in rates of other MSIs post-installation, and since implementation of the training program would have been expected to impact rates of all types of injuries it could be inferred that the observed decline in lifting injuries could be attributed primarily to the installation of the lift equipment.

Additionally, the observed decline in patient lifting-related injuries following the ceiling lift installation but prior to training suggests an impact of the ceiling lift equipment on lifting-related MSIs independent of the effects of training. Declines were also observed in transferring-related injuries following the ceiling lift intervention but prior to training, which might be expected since more of the 'borderline' patients who were previously being transferred were now reported to more likely be lifted as equipment was more readily available. Following the training program, a further decline was observed in patient-lifting MSIs while the decreasing trend was reversed for transferring-related injuries. This sustained decline in patient lifting-related injuries compared to the non-sustained declines in transferring and repositioning of residents suggests that the impact of the ceiling lift intervention was enhanced by its combination with training in improved patient handling skills. As well, since more patients were designated as lifts rather than transfers post- versus pre-installation (due to changes in patient acuity levels), the observed rate of decline in patient lifting-related MSIs is likely underestimated (assuming an increasing trend in such MSIs existed prior to the installation). This corresponds with the findings of a recent evaluation at a BC hospital that reported decreases in injuries, time loss and costs related to patient transfers following a combination of mechanical interventions (including ceiling lift installations) and new policies (33). A recent randomized control trial conducted at an acute care hospital in Winnipeg, Manitoba also found that a combined intervention of new equipment and training in safe patient handling was effective in improving the workplace environment for health care workers (34).

An additional weakness of this evaluation was that, due to the method of survey-implementation it was not possible to match the surveys to individuals in the pre- and post-intervention periods. However, it was still possible to ascertain a decreasing trend in the perceived level of pain associated with the job prior to compared to following the intervention. These results suggest that installation of the ceiling lifts has had a positive impact on perceived well-being among staff. Staff also reported a greater preference for using mechanical options as compared to manual options, though it is not possible to rule out an effect of training in this case. Over and above the benefits to workers in reducing the likelihood of injury, the central question underlying the economic analysis of the intervention is whether installing ceiling lifts represents an attractive way to deploy scarce economic resources within the health care sector. From the perspective of the insurer, who is responsible for payments to compensate workers for work-related injuries, the resulting decrease in compensation payments produces a payback within 2 to 4 years while producing benefits over a longer period. Furthermore, the achievement of a return on investment between 8.1% and 14.2% indicates that costs can effectively be avoided through this investment in prevention.

From the perspective of the facility administration, the benefits of the investment in relation to its costs are even more striking – with a return of investment between 6.2% and 22.9% per annum. Furthermore, the assumptions applied to yield this estimate are quite conservative and tend to considerably underestimate the full effect.

It should of course be noted that, in the short run, the reduced costs are in fact realized by the insurer, not the facility, as actual assessment rates are determined by applying the experience of a previous period (27). Nevertheless, it can be assumed that these savings will ultimately be transferred to the facility through reduced. rates paid to the insurer to cover the costs of compensable claims. However, the purpose of the analysis presented above is to present the costs and benefits realized to assess the value of the intervention itself. The indirect benefits (reduced disability payments, absenteeism, costs associated with additional recruitment and replacement of staff, etc.), (30) are realized more immediately. While a conservative estimate of indirect benefits as double the direct costs was applied to this analysis (the literature suggests a factor of these being 2 to 10 times greater), further research into this is warranted. Nevertheless, the benefits described in this case are consistent with the preliminary findings of similar evaluations conducted in Quebec (25).

Other viewpoints can also be considered in evaluating the impact of installing ceiling lifts. From a societal perspective, values could be associated with the benefits personally realized by workers who avoid injury over and above the cost of compensation and who suffer less strain and fatigue. As well consideration can be give to their valuation of the potential for earlier return to work following an injury, due to reduced physical strain. As well, consideration can be given to their valuation of the potential for earlier return to work following an injury.

It is important to highlight that this intervention involved installation of ceiling lifts into an older building. Due to incompatibility with pre-existing structures, some rooms (such as the patient toilet rooms in particular) could not be fitted with ceiling lift tracks. There were some indications of an increasing trend in injuries occurring in rooms where ceiling lifts were not installed, suggesting that some injuries could perhaps have been avoided had ceiling lifts been installed in these areas. Evidence of the economic benefits of installing ceiling lifts alone in reducing MSI makes it worthy of consideration as a standard for new facility construction.

In terms of future studies, this evaluation emphasizes the importance of dividing injury types into task being performed at the time of the injury, particularly when evaluating the effectiveness of specific types of patient handling equipment. Further follow-up of this study unit should also be undertaken to assess the impact of introducing new ceiling-lift-compatible slings for repositioning residents. In conclusion, the results of this evaluation suggest that the installation of ceiling lifts in combination with an effective training program is effective. The cost-effectiveness of the ceiling lifts in reducing MSI makes it worthy of consideration as a standard for new facility construction.

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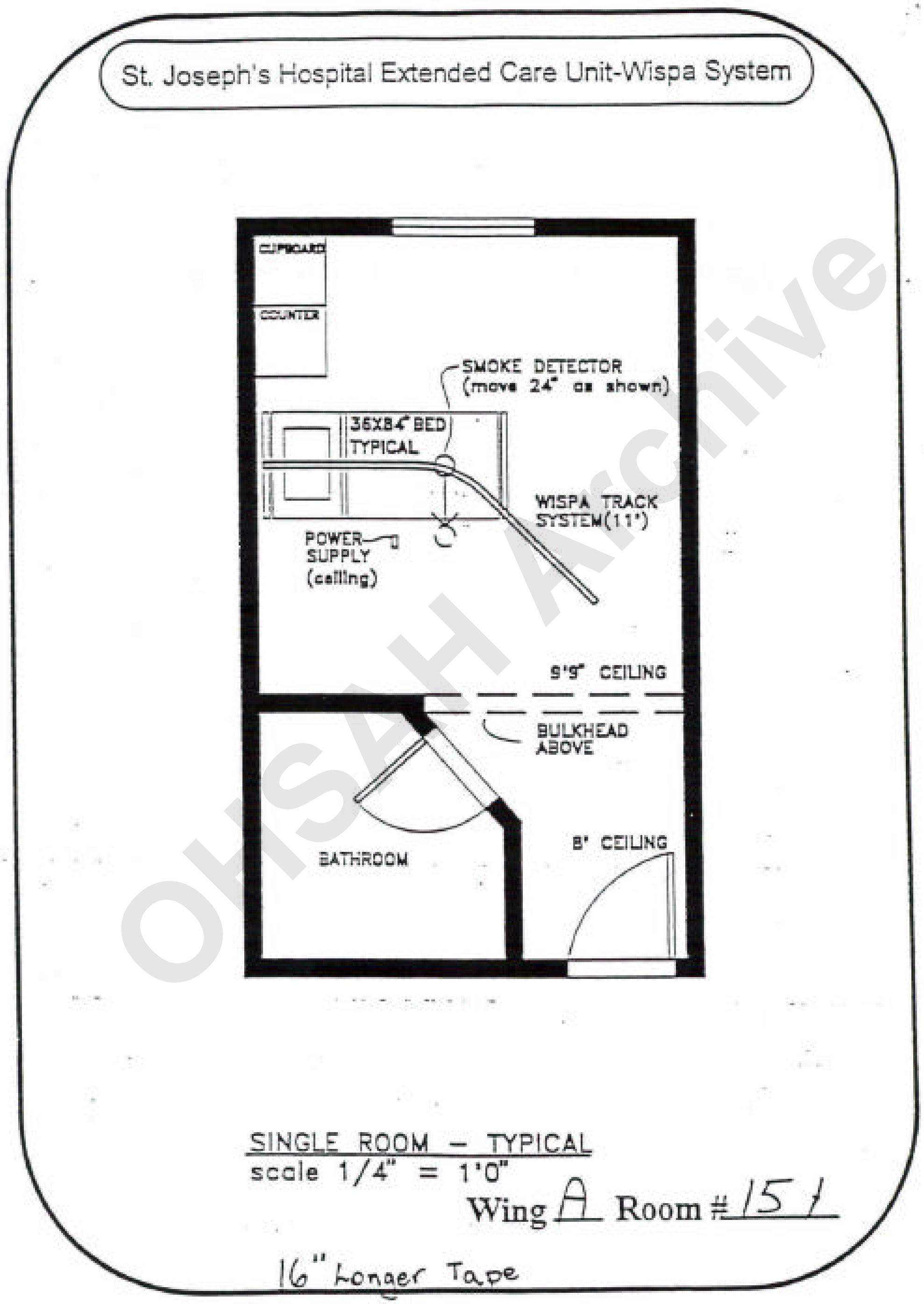
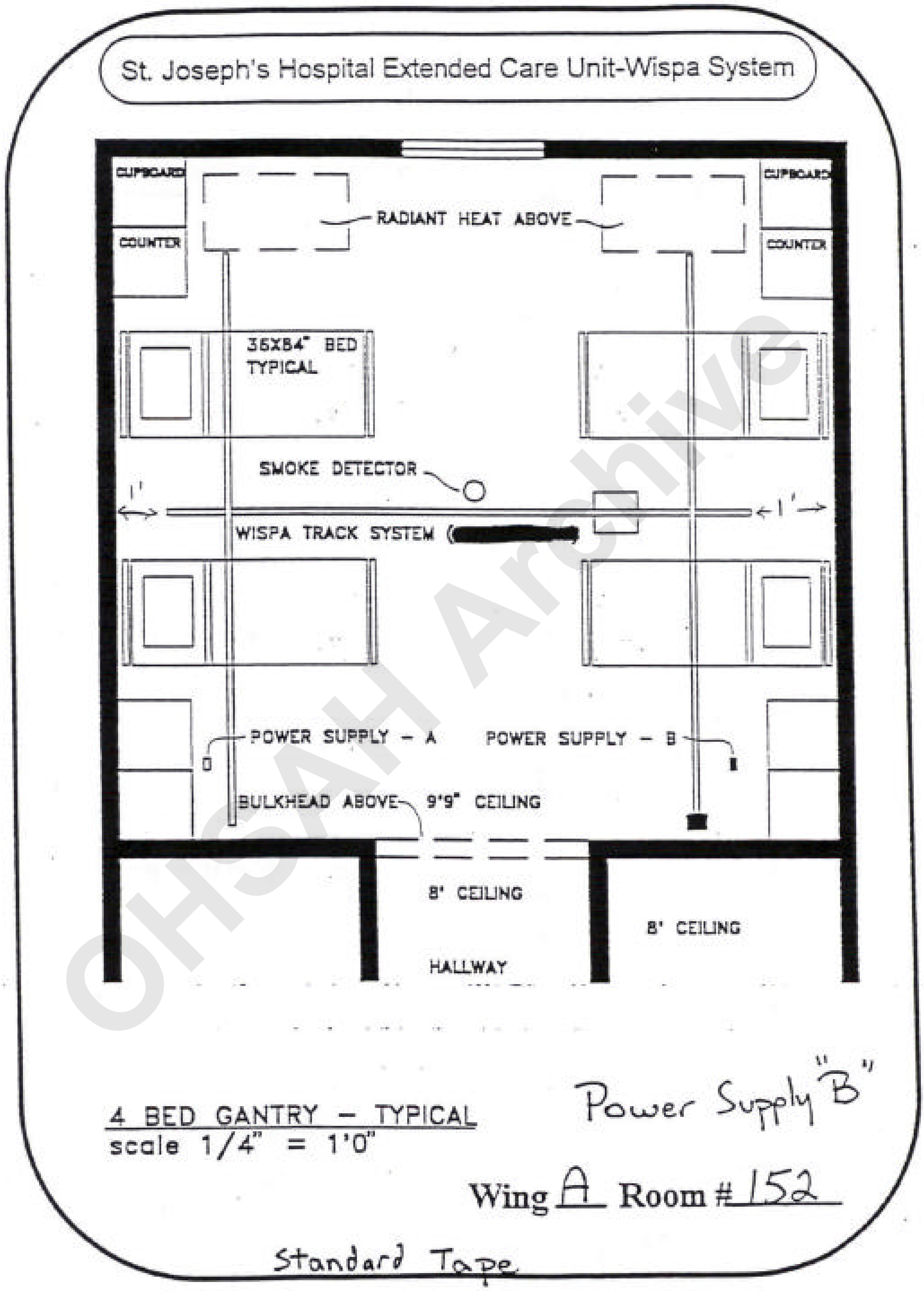
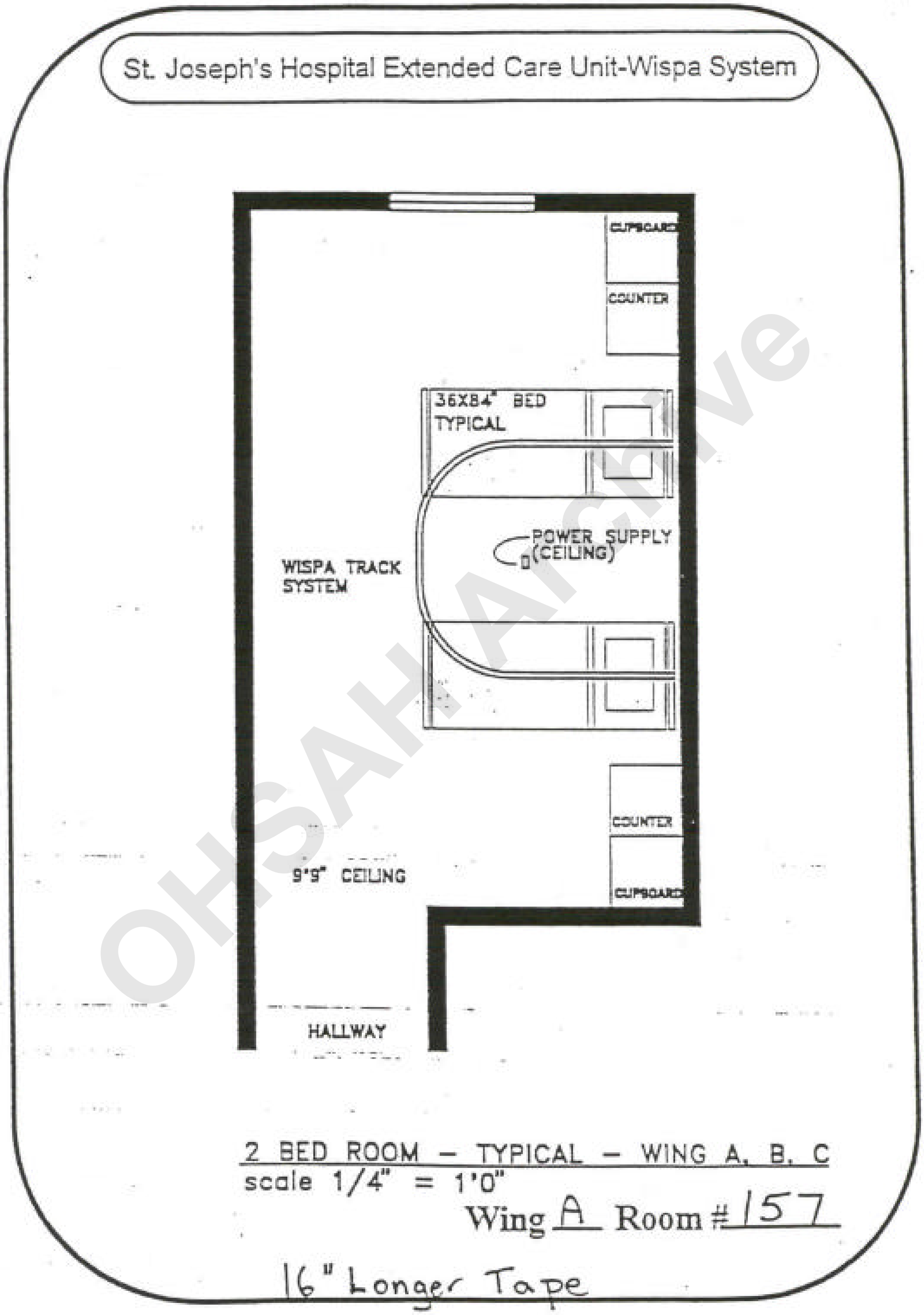
6. Appendices

A.1: Schematic diagrams of the ceiling lift installations at St. Joseph's Hospital

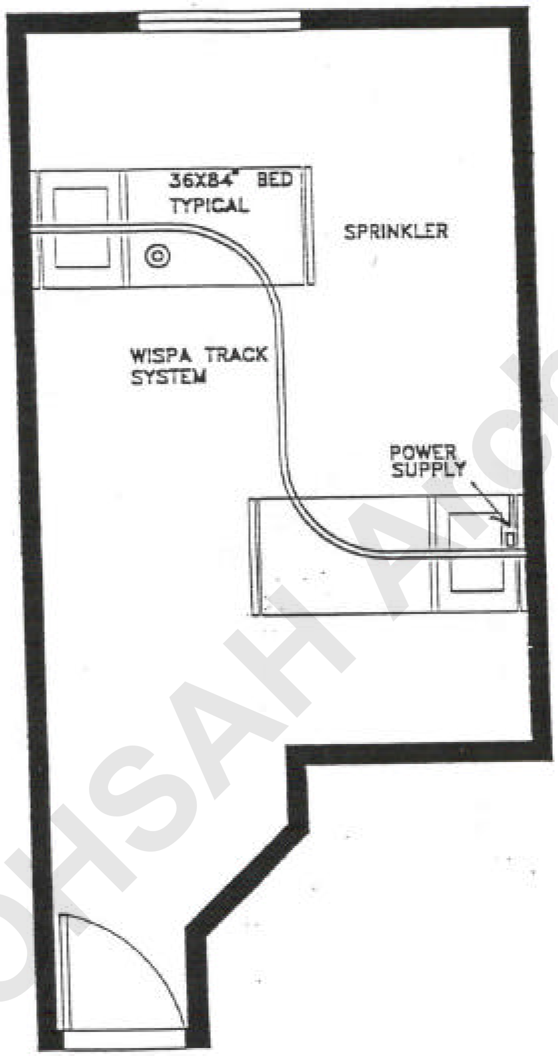



St. Joseph's Hospital Extended Care Unit-Wispa System
CUPBOARD
COUNTER
RADIANT HEAT ABOVE
CUPBOARD
COUNTER
36X84" BED
TYPICAL
SMOKE DETECTOR
1'
1'
WISPA TRACK SYSTEM ([redacted]
POWER SUPPLY – A
POWER SUPPLY – B
BULKHEAD ABOVE
9'9" CEILING
8' CEILING
HALLWAY
8' CEILING
4 BED GANTRY – TYPICAL
scale 1/4" = 1'0"
Power Supply "B"
Wing A Room # 152
Standard Tape



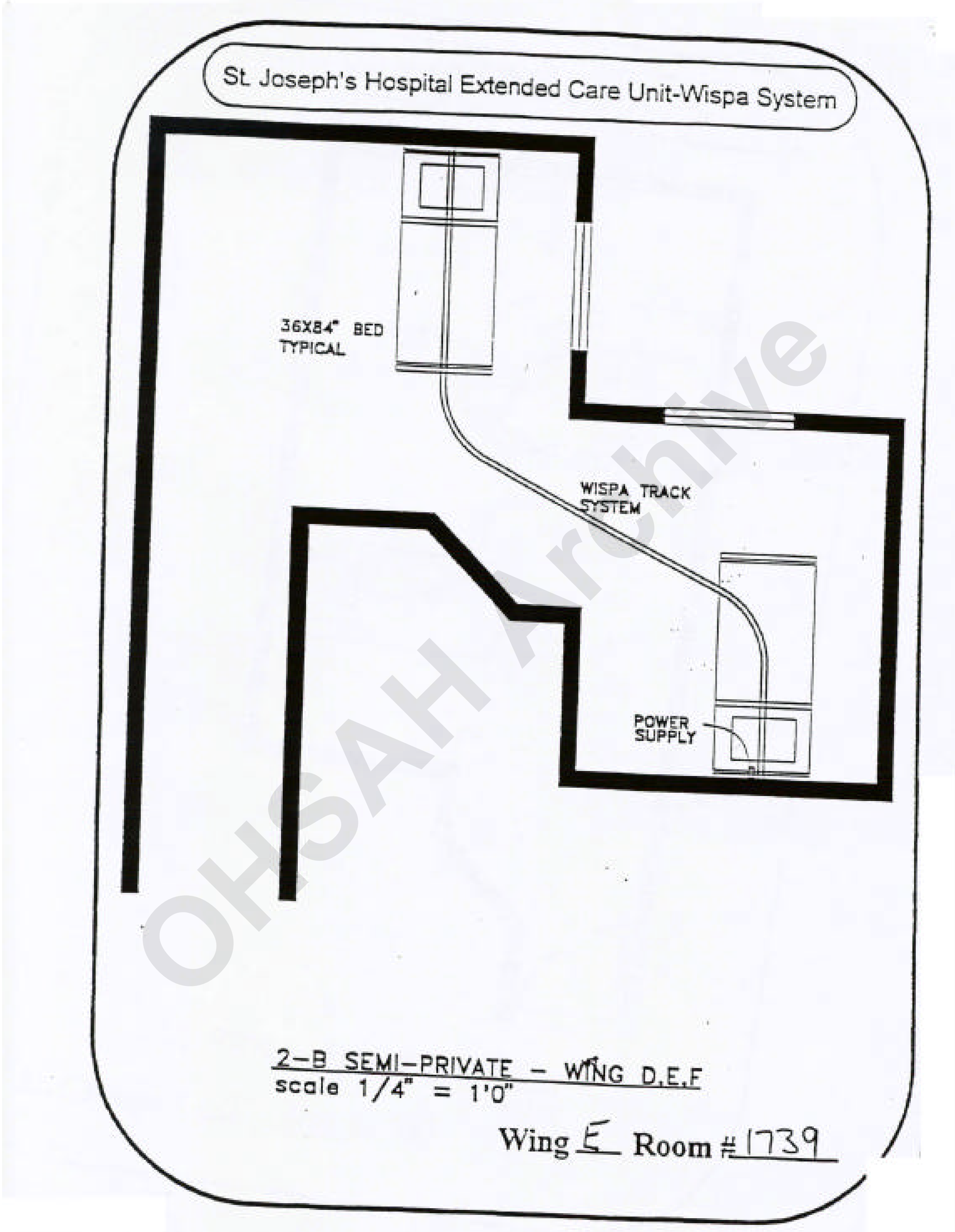
*Note: See comments about this design on page 67 (under "Track Configuration")

St. Joseph's Hospital Extended Care Unit-Wispa System

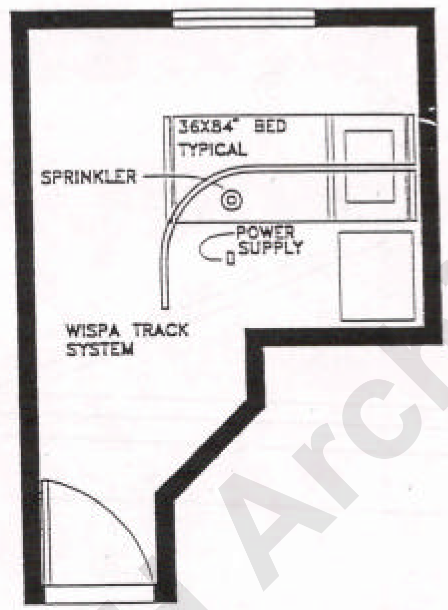


2–C SEMI–PRIVATE – WING D,E,F
scale 1/4" = 1'0"

Wing E Room # 1735


St. Joseph's Hospital Extended Care Unit-Wispa System
36X84" BED
TYPICAL
WISPA TRACK
SYSTEM
POWER
SUPPLY
2-B SEMI-PRIVATE - WING D,E,F
scale 1/4" = 1'0"
Wing E Room # 1739

St. Joseph's Hospital Extended Care Unit-Wispa System



SINGLE ROOM – TYPICAL – WING D,E,F
scale 1/4" = 1'0"

Wing E Room # 1733

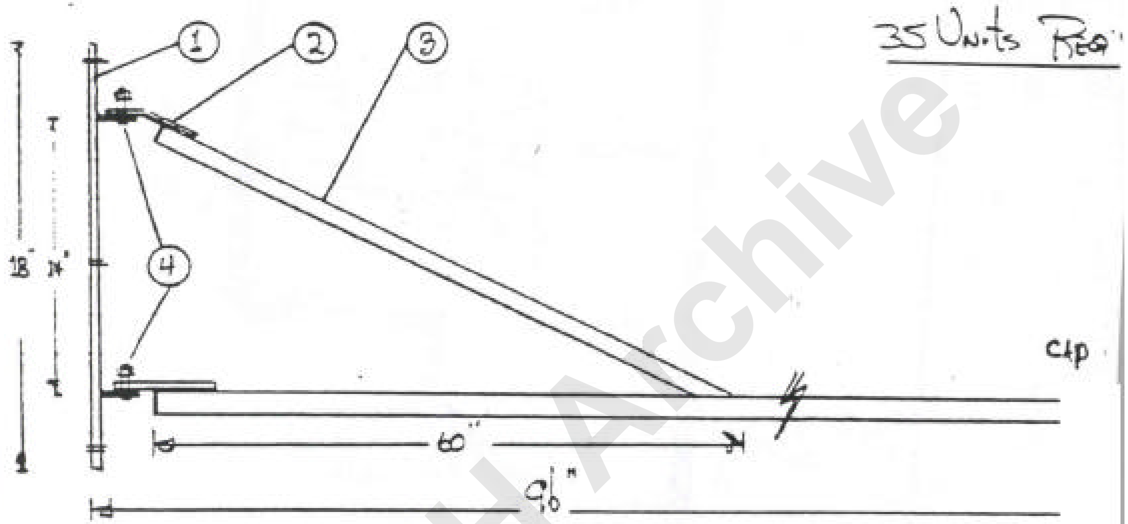
JOB WORK O

V.I. Mechanical #2-731 30th St., Courtenay, B.C. V9N 7S7 Phone 338-9390 Fax 33

Job Number:	Customer: St. Joe's Hospital
Job Name: Curtain Dividers.	P.O. #:

NTS.

35 Units Req'



MATERIALS SCHEDULE

1. 1/4 x 1 1/2" AL. FB.
2. 1/4 x 1" AL. FB.
3. 1" x 1" x .125" AL. SQ. TUBE.
4. 3/8" SS PINS c/w NYLOCK NUT.

* COAT FINISHED PRODUCT WITH 1 CLEAR COAT.

A.2: Description and notes from the informal ceiling lift training program and the formal MSIP training program at St. Joseph's Hospital

RLS TRAINING CHECKLIST

INTRODUCTION - WISPA lifts are the equipment part of the Resident Lifting System. This Pilot project is funded by WCB. The goal of the project is to significantly reduce the rate and severity of MSIP injuries to staff during resident handling.

VOCABULARY

Lift unit

Lifting Tape

Carry Bar

Hand Control

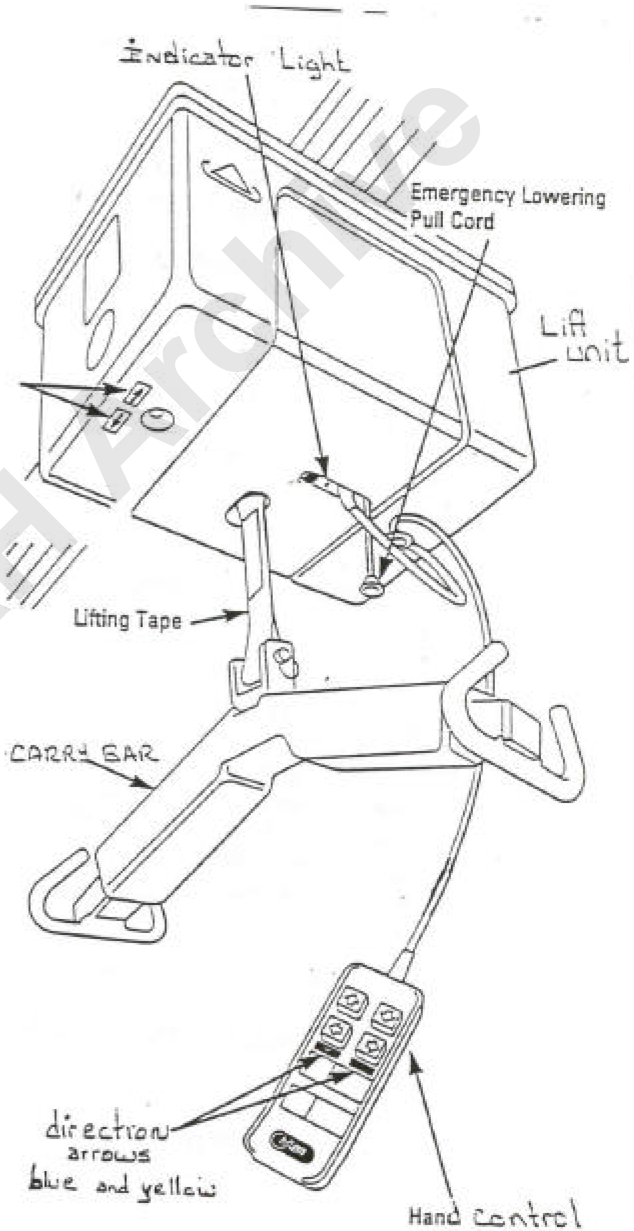
Gantry (walking beam) 4Bed Room

Rails Fixed 1 and 2 Bed Rooms

Power light Green - recharging
Red - low power

Emergency Lowering Cord

Direction Arrows (Blue & Yellow)



OPERATION OF HAND CONTROL

4 BUTTON HAND CONTROL
- Raise & lower carry bar
- Propel lift unit along rail
  Direction of travel indicated by blue & yellow color coding on hand control and lift unit

6 BUTTON HAND CONTROL (gantry rooms)
- Raise and lower carry bar
- Propels lift unit along gantry
  Direction of travel indicated by blue & yellow color coding on hand control and lift unit
- Drives gantry (walking beam) across room from window to door and back
  "W" on handset indicates gantry travel directed towards the window.

CARE OF HAND CONTROL

- Water proof
- Absorbs drop impact
- CAUTION - Do not pull hand control off air lines

RECHARGING LIFT UNIT

SINGLE RAIL ROOMS

- Propel lift units to charging station
- Drive lift unit to gently touch recharge connector in track. Green light indicates lift unit Is charging

GANTRY RAIL ROOMS

- Propel lift units to charging station at the end of gantry
- Drive gantry to charging station
- Lift unit needs to just touch recharging point on track
- Green light on lift unit indicates unit is recharging
- Drive out of recharge station by pushing 'W' on hand control
- CAUTION - Driving further into recharging station may blow the fuse

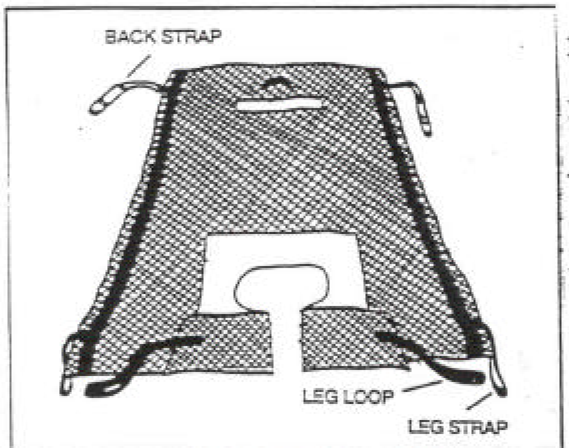
NOTE - Red indicator light on lift unit indicates battery charge is getting low

EMERGENCY LOWERING

If lift unit has a power failure while resident is in lift the resident can be lowered using emergency Lowering cord. Pull gently on Lowering cord while lift tape lowers.

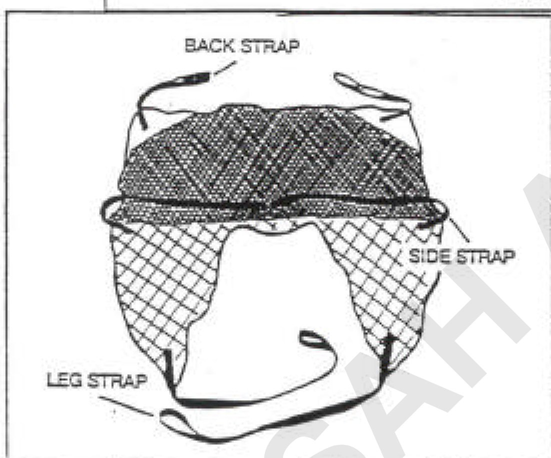
TYPES OF SLINGS

SLINGS - Choice yours unless specified on ADL bedside sheet.



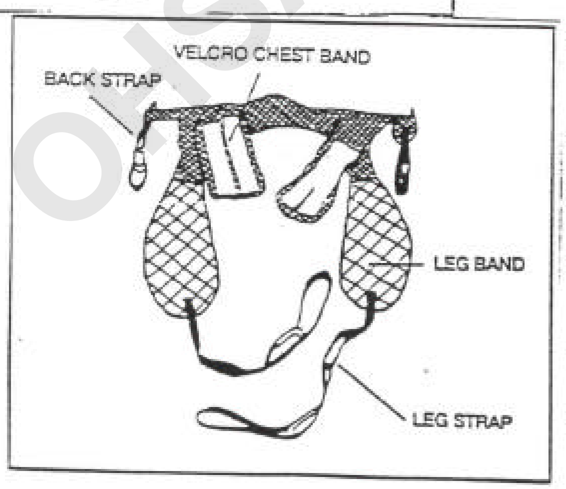
HAMMOCK Maximum Support

Most supportive
- Full body support
- Small opening for Narrow hipped residents won't fall through
- High body tone/stiff



UNIVERSAL

- Supports back & thighs
- Some have long backs for head support
- Residents with slim hips, can slide through hole in bottom

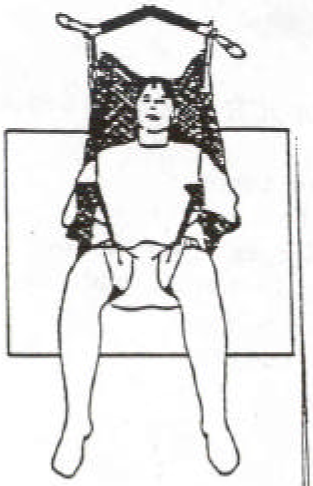


HYGIENE SLING Minimum Support

- Unrestricted access for toilet/ Hygiene
- Easy to slip under seated resident (Quilted thighs, low back)
- Resident need to have head & shoulder control, supports only back and thighs
- Not to be lift sitting in sling

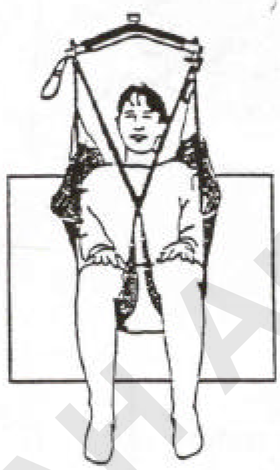
NOTE - leave elbows outside sling

SLING LEG BAND CONFIGURATION



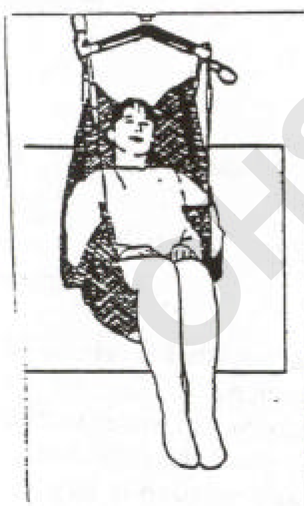
1. Divided Leg "Open"
Provides comfortable, secure support and gives good access for personal hygiene.

DIVIDED LEG OPEN



1. Divided Leg "Crossover"
Provides optimum comfort and security. Leg strap are crossed between individual's thighs before passing leg straps through them.

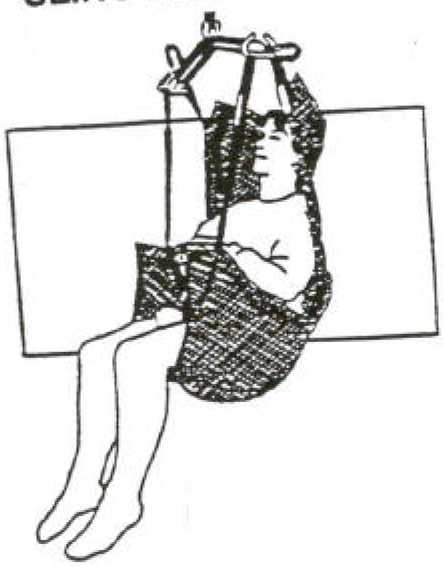
DIVIDED LEG CROSS OVER



3. Closed Leg
Individual's legs are together before passing leg straps under them. Leg loops are crossed under individual's thighs.

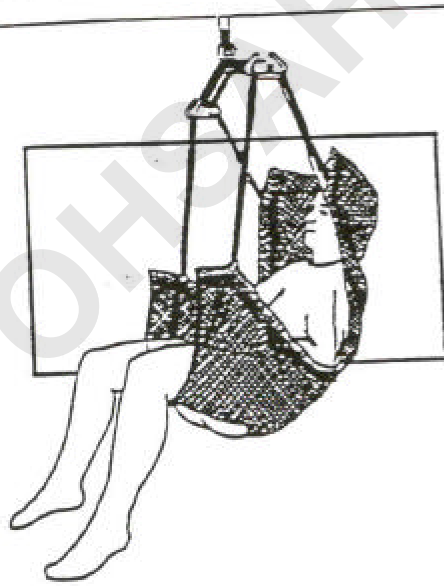
CLOSED LEG

SLING INCLINATION



VERTICAL

1. Vertical
Optimum vertical sitting position is achieved by attaching leg straps to carry bar using longest strap loops and back straps to bar using shortest strap loops.



INCLINED

2. Inclined
The greatest angle of inclination is achieved by attaching leg straps to carry bar using shortest strap loops and back straps to bar using longest strap loops.

DEMO or VIDEO

1. Bed to Wheelchair

2. Reposition in chair

3. Reposition in bed
   Up
   Side to side

4. Pick up off the floor

Practice on each other
1. Sling leg bond configurations

2. Angles of incline

3. Feel difference on your own body between Hygiene
Hammock
Universal

St. Joseph's
GENERAL HOSPITAL

Appendix VIII

St. Joseph's General Hospital, Comox, B.C.

EXTENDED CARE UNIT: MUSCULOSKELETAL INJURY PREVENTION PROGRAM

1999 M.S.I.P. TRAINING : REPORT AND EVALUATION

November 10, 1999

A four-hour, paid, M.S.I.P. training session was made available to each ECU care staff member. The course was written and implemented by the ECU Occupational Therapist , Teresa Colby B.Sc.(O.T.), and the two ECU charge nurses, Penny Hacking RN, BScN, GNC and Toby Hulsen, RN, BScN, GNC. Assistance and input was received from several sources. Sandy Woiden, Director of Resident Services, and the St. Joseph's Hospital Administration supported and financed the training. Jean Turner, Director of Physical Medicine helped to revise resident handling procedures. The ECU registered nurses made excellent suggestions for tailoring the long-term care aid course. Angel Accessibility provided a portable WISPA overhead patient lift unit for the classroom.

The project was initiated in January, 1999, with a goal of teaching in the spring. However, revision of policy and procedure, and production of an ECU M.S.I.P. training manual outlining basic resident handling methods took more time and effort than expected. The ratio of preparation time to actual teaching time was 4:1. That is, 208 hours (28 FTE 7.5 hr. work days) were needed to produce 52 hours of classroom time. Also, it was considered critical that each teaching practitioner on the ECU be in agreement with each designated resident handling method to have consistent practice throughout the unit. Teaching was delayed until early summer.

ECU staff were introduced to the M.S.I.P. course with a letter attached to pay cheques, providing explanation and instructing them to sign up. Staff compliance was high (RN's 93%; LTCA' 100%). In June 1999 twenty-eight R.N.'s (out of a staff of 30 regular and part-time) were inserviced in three separate sessions. In September and October, 1999, all 68 Long Term Care Aides on the ECU attended one of eight sessions offered. In addition, the four activity aides, the hairdresser and two guest R.N.'s attended. In total 103 persons were trained during 11 four-hour sessions.

R.N.'s . training focused on their role as team leader with responsibility for implementation of the M.S.I.P. program. The reference manual was referred to frequently . Body mechanics and core resident handling methodology were taught and reviewed. The LTCA's course was more hands-on and concrete incorporating what had been identified as key attitude shifts needed to establish a safer workplace. The course outline with time allotted to each section follows. Note that " repositioning" residents, the task during which the majority of ECU injuries occur, was given priority.

COURSE OUTLINE

	Time (Min.)
INTRODUCTION	5
1. RIGHTS AND RESPONSIBILITIES	20
2. BODY MECHANICS	25
3. ASSESSMENT SKILLS TO DETERMINE CORRECT LIFT OR TRANSFER	15
4. MANAGING FALLS	25
5. MANUAL TRANSFERS	30
COFFEE	15
6. WARM-UP EXERCISES	5
7. REPOSITIONING	50
8. MECHANICAL LIFTS	30
9. CONCLUSION AND EVALUATION	20
Total	4 hrs.

KEY ELEMENTS OF SUCCESS

1. The hospital achieved WCB requirements by providing employees with a M.S.I.P. program which integrated the policies, procedures, education and equipment needed to work safely in a high risk environment. A classroom was provided in which equipment and materials were left set-up and ready for teaching.

2. Employees were paid and scheduled into four- hour sessions. Flexibility was provided as staff could choose different dates on a posted workshop calender. One comprehensive session of four hours was much easier to schedule and coordinate than multiple shorter sessions.

3. Education was specifically matched to employee education level, work needs and levels of responsibility RN.'s versus LTCA's. Teaching was done in small interactive groups, with maximum "hands on" practice provided. It was a 'customized" versus "generic" approach in that immediate practice needs were addressed throughout in regards to safety and resident handling.

4. There was a high ratio of teachers to students , 3:10. This enriched learning environment provided for better feedback to each student during time-limited practice sessions. Rapport between staff, nursing supervisors and the Occupational Therapist was enhanced by having the opportunity to teach and learn from each other, to share ideas and humour.

5. Employees felt acknowledged and valued having been provided with paid education that matched their needs. The classroom climate established focused on respectful exchange of information and valuing of each person's input. Staff morale at work has improved.

6. Employees now have a common knowledge base regarding M.S.I.P. and shared practice techniques. Each person can be a valued team member with a common vocabulary and baseline practice criteria to speak knowledgeably to issues and concerns.

FOLLOW-UP ISSUES ARISING FROM THE ECU M.S.I.P. SESSIONS

1. Revise bedside A.D.L. sheet to include logo for lift or transfer and toileting procedures.
2. Provide labels on storage racks on each wing to identify each type of sling.
3. Review residents with specific handling or mobility issues identified as problematic by staff.
4. Implement positioning slings more widely. Participate in sling design interest group.
5. Provide better equipment in good repair. Commodes are a major concern.
6. Continue to provide education identified as high priority by staff on safety and other topics, ie aggressive behaviors

OUTCOMES OF M.S.I.P. TRAINING

1. Increased safety awareness of workers day to day. For example, LTCA's say they have been monitoring safe work range and body mechanics with new awareness. Transfer belt use is more consistent.
2. Better communication about safety issues. For example, mobility issues at afternoon care conferences are now framed in terms of safety.
3. Easier to implement changes in procedures when each employee has a common knowledge base and language.
4. Better problem-solving and "climate of safety" for making safe moves on the job. For example, a group of LTCA's readily eased a slipping resident out of his chair and calmly got a floor lift . There was a coordinated, safety conscious plan.
5. Nursing supervisors have increased credibility and confidence in directing staff because of the shared workshop experiences and knowledge base.

RECOMMENDATIONS

1. Provide 4 hour M.S.I.P. training on orientation and annually for all direct care staff.

2. Pay employees and expect them to attend.

3. Ensure planned resources for implementing the M.S.I.P. program. Provide relief staffing while planning and teaching is done. The ECU. M.S.I.P. is not repeatable or sustainable with out planned resources.

4. Provide a M.S.I.P. training room with a ceiling mounted lift.

5. Revise the ECU. M.S.I.P. training manual annually to reflect evolving practice and new safety strategies.

6. Provide a coffee break with tea, coffee and water in the teaching area to save time.

7. Keep M.S.I.P. teaching specifically geared to the unit being inserviced. Each supervisor needs to learn policy, procedure and practice for their area as it pertains to the M.S.I.P. program in order to provide instruction, support and follow-up.

A.3: OHSAH's risk factor/injury coding form for pre - versus post-test MSI rate comparisons

St. Joseph's Hospital (Comox) – Resident Lifting System Evaluation – Data Collection Form

OHSAH

1. Unique Identifier Code	

Demographics of injured worker and of injury:

2. Total Cost of Injury (to March 31/2000)	
3. Total Time Loss of Injury (to March 31/2000)	
4. Designation of injured worker	(1) RN – supervisor (2) RN (3) UA (4) Other ______
5. Employment status of injured worker	(1) FT (2) PT (3) Casual
6. Had the individual received training on the proper use of ceiling lifts at time of the injury?	(1) Yes (Date of last training session ______) (2) No (3) Don't know
7. Had the individual received MSIP program training at time of the injury?	(1) Yes (Date of last training session ______) (2) No (3) Don't know
8. Has the individual ever reported a previous incident of similar pain or discomfort?	(1) Yes (date of last report: ______) (2) No (3) Don't know
9. # of years employed at St. Joseph's	
10. Age of injured worker	

11. Date of Injury		12.Time of injury:		13.Date of Injury Report	

14. Body Area Injured	(1) Shoulder (2) Neck (3) Upper Back (4) Lower Back (5) Other ______
15. Type of Injury	(1) Strain/ Sprain (2) Other ______
16. Task involved at time of injury	**Repositioning Tasks:** (1) Sit up in bed (2) Moving to side of bed (3) Turn in bed (4) Sit up on side of bed (5) Bed boost (6) Inserting a bed pan (7) Chair Boost – high back chair (8) Chair boost – low back chair (9) Chair boost – recliner chair (10) Other repositioning task: ______ **Lifting / Transferring Tasks (indicate whether lifting or transferring):** (11) Bed to/from chair or commode (12) Bed to/from stretcher (13) Chair to/from chair (14) Up from floor (15) Toiletting (16) Car transfer (17) Other lifting/transferring tasks: ______ (21) Other – non-patient related : (22) Other-patient related: (23) No task identified at time of injury
17. # workers involved in task:	(1) 1 (2) 2 (3) 3 or more

17. Listed contributing factors in accident	**Equipment** (1) not functioning properly (2) not available – being used elsewhere (3) Incorrect attachments on equipment (4) equipment not adjustable as required (ie. non-adjusting beds, non-removable toilet rails, etc) (5) other equipment-related causes ______
	Other Environment (6) obstacles on path (7) floors slippery (8) floors uneven (9) lighting levels too low (10) excessive noise (11) cramped working area (12) not enough people available to assist **(13)** other environment-related causes ______
	Patient (Name of patient if available: ______) (14) patient accidentally slipped or fell (15) patient resisted move (16) patient became fatigued during transfer (17) patient misunderstood instructions **(18)** other patient-related causes ______
	Caregiver (19) Caregiver fatigued or distracted (20) Procedure selected was inappropriate for task / situation (21) Caregiver not adequately trained in proper patient handling skills **(22)** Other caregiver-related causes: ______

Use of Overhead Ceiling Lifts

18. Type of mechanical lift used during task	(1) Ceiling Mounted Lift (2) Other Mechanical Lift: ______ (3) No Mechanical Lift Used
19. Installation status of ceiling lift at time / location of accident	(1) Installed (2) Installed but not functioning (3) Not installed
20. If the ceiling lift **WAS INSTALLED AND FUNCTIONING**, why was it not used?	(1) Training – Caregiver not trained properly on the use of the equipment (2) Not indicated for patient (ie. patient weight bearing, mobile, and cooperative) (3) Not available (ie. in use) (4) Not appropriate – not a patient-related task (5) No reason provided or can't determine from the data sheets (6) Other reason why ceiling lift not used: ______
21. If ceiling lift **WAS USED**, was it being used properly?	(1) Yes (2) No (3) Don't know – can't determine from the data sheets
22. If ceiling lift **WAS NOT USED PROPERLY**, why not?	(1) Inadequate training on use of equipment (2) Problem with equipment (ie. incorrect attachments, faulty parts, etc) (3) No reason provided or can't determine from the data sheets (4) Other reason why ceiling lift not used properly: ______

A.4: St. Joseph's pre - versus post-intervention survey for assessing staff perceptions

CARE GIVER QUESTIONNAIRE

Please do not put your name on the Questionnaire. The purpose of the Questionnaire is to document current practices. Your contribution is important, Thank You.

DATE

POSITION

YEARS OF EXPERIENCE IN HEALTH CARE _______ years

YEARS WITH St. Joseph's ECU _____ years

AGE LESS THAN 30 ____ 30 TO 40 ____ 40 TO 50 ____ BETTER THAN 50 ____

		Please circle	
1.	Have you experienced soft tissue pain in the last 6 months which has interfered with your daily routine or life style?	YES	NO
2.	Have you worked at the Hospital while you were in pain?	YES	NO
3.	Is working in pain a common experience for you?	YES	NO
4.	Do you believe health workers are bound to work hurt sometimes?	YES	NO
5.	Have you ever had an injury caused by resident handling?	YES	NO
6.	Has an injury changed the was you approach your job? - If yes, how?	YES	NO
7.	Would you use a ceiling lift for repositioning Residents (in a bed or chair) if ceiling lifts were available?	YES	NO
8.	Do the ADL bedside sheets provide adequate instruction/direction for all resident handling procedures? - If not, how can we do it better?	YES	NO
9.	In your opinion is the way we determine and revise lift and transfer designations adequate? - If not, how might we do it better?	YES	NO
10.	In your opinion, is there adequate compliance with lift and transfer designation to maintain staff and resident safety and comfort?	YES	NO
11.	Have you recently knowingly taken some risk in failing to comply with designated lift and transfer designation because Staff to help was not available to you in a reasonable time frame?	YES	NO
12.	Do you receive adequate training in equipment use and procedure?	YES	NO

13. What is your opinion regarding the physical demands related to resident handling in your job now compared to:

2 years ago on a scale from 1 to 10? Please circle appropriate number.

1 2 3 4 5 6 7 8 9 10

5 years ago on a scale from 1 to 10? Please circle appropriate number.

1 2 3 4 5 6 7 8 9 10

Comments:

14. Check off ways you most often use to reposition Residents in bed:

- ☐ 1 Person Assist
- ☐ 2 Person Assist
- ☐ 2 Person with Draw Sheet
- ☐ Manual Floor Lift
- ☐ Electric Floor Lift
- ☐ Ceiling Lift

15. Which is your preferred resident handling strategy from bed to wheelchair?

- ☐ 1 Person standing pivot
- ☐ 2 Person standing pivot
- ☐ Mechanical Lift
- ☐ Other

16. What methods do you notice residents feel safest and most comfortable with?

- ☐ 1 Person standing pivot
- ☐ 2 person standing pivot
- ☐ Manual floor lift
- ☐ Electric floor lift
- ☐ Ceiling lift (mark N/A if ceiling lift is not available

17. If it was up to you to choose equipment for your wing what would you get in order to smooth out the fragmented work pace during busy direct care periods?

18. Have you ever had to refuse a family or resident's request to get the Resident in or out of bed because of lack of available equipment?

☐ Never ☐ Occasionally ☐ Often

19. What resident handling related training would you like to see improved or expanded?

20. If new resident handling information was to be presented how would you prefer that to be done? (Check beside your choices)

- ☐ Videos
- ☐ Printed handouts
- ☐ Peer instruction on the job
- ☐ Peer instruction during in-services held during time off floor
- ☐ Instruction by experts from outside our hospital
- ☐ Instruction from our Physical Medicine Department
- ☐ Hands on practice sessions on a demonstration unit
- ☐ Others (please outline briefly)

RESIDENT HANDLING - PERCEIVED RISK

Listed below are common resident handling strategies

Please consider each strategy and indicate by circling a body part if you believe it to be at risk for strain or injury during that task.

If you believe a body part to be at risk please estimate on a scale of 1 to 10 the degree of risk you feel during that task.

On the scale 1 indicates very little risk up to 10 which indicates your highest degree of risk.

RESIDENT MOVED BED TO COMMODE USING TWO PERSON STANDING PIVOT

(Least risk)	1	2	3	4	5	6	7	8	9	10	(Most Risk)
Back	1	2	3	4	5	6	7	8	9	10	
Shoulder	1	2	3	4	5	6	7	8	9	10	
Neck	1	2	3	4	5	6	7	8	9	10	
Arms/Hands	1	2	3	4	5	6	7	8	9	10	
Legs	1	2	3	4	5	6	7	8	9	10	

RESIDENT LIFT BED TO COMMODE WITH ELECTRIC FLOOR LIFT

	(Least risk)	1	2	3	4	5	6	7	8	9	10	(Most Risk)
Back		1	2	3	4	5	6	7	8	9	10	
Shoulder		1	2	3	4	5	6	7	8	9	10	
Neck		1	2	3	4	5	6	7	8	9	10	
Arms/Hands		1	2	3	4	5	6	7	8	9	10	
Legs		1	2	3	4	5	6	7	8	9	10	

TURNING A RESIDENT SIDE TO SIDE IN BED (one person)

	(Least risk)	1	2	3	4	5	6	7	8	9	10	(Most Risk)
Back		1	2	3	4	5	6	7	8	9	10	
Shoulder		1	2	3	4	5	6	7	8	9	10	
Neck		1	2	3	4	5	6	7	8	9	10	
Arms/Hands		1	2	3	4	5	6	7	8	9	10	
Legs		1	2	3	4	5	6	7	8	9	10	

LIFTING A RESIDENT UP IN BED FOR MEAL USING TURNING SHEET

	(Least risk)	1	2	3	4	5	6	7	8	9	10	(Most Risk)
Back		1	2	3	4	5	6	7	8	9	10	
Shoulder		1	2	3	4	5	6	7	8	9	10	
Neck		1	2	3	4	5	6	7	8	9	10	
Arms/Hands		1	2	3	4	5	6	7	8	9	10	
Legs		1	2	3	4	5	6	7	8	9	10	

MOVING RESIDENT FROM BED TO STRETCHER (three person assist)

	(Least risk)	1	2	3	4	5	6	7	8	9	10	(Most Risk)
Back		1	2	3	4	5	6	7	8	9	10	
Shoulder		1	2	3	4	5	6	7	8	9	10	
Neck		1	2	3	4	5	6	7	8	9	10	
Arms/Hands		1	2	3	4	5	6	7	8	9	10	
Legs		1	2	3	4	5	6	7	8	9	10	

A.5: St. Joseph's pre - versus post-intervention survey for assessing resident perceptions

RESIDENT QUESTIONNAIRE ABOUT MECHANICAL LIFTS

Your time and effort filling out the questionnaire is most appreciated.
Our goal is to improve Safety, Comfort and Convenience for the Residents.

		please circle	
1. Do the staff assist you to move in and out of bed using a mechanical lift?	usually	sometimes	never
2. Are you satisfied with the way you are assisted to move?	usually	sometimes	never
3. Would you like more involvement in the decision about how staff would assist you to move?	usually	sometimes	never
4. Do you feel safe when moved using the lift?	usually	sometimes	never
5. Are you comfortable while being moved in the lift?	usually	sometimes	never
6. Do you feel your privacy is adequately protected when you are assisted to move?	usually	sometimes	never
7. Do you believe help is available when you need assistance to get in or out of bed?	usually	sometimes	never
8. Has the need for assistance with mobility limited your choices in clothing to an unacceptable degree?	usually	sometimes	never
9. Are you out of bed as often as you would like to be?		Yes No	
-If you answered "no," was it because Staff was busy somewhere else.		Yes No	

A.6: Comparison of the resident lifting system (ceiling mounted lift) with portable floor model mechanical lifts (St. Joseph's staff perceptions)

RESIDENT LIFTING SYSTEM
FINAL EVALUATION REPORT

COMPARISON OF THE RESIDENT LIFTING SYSTEM (CEILING MOUNTED LIFT) WITH PORTABLE FLOOR MODEL MECHANICAL LIFTS

Although a formal quantitative survey was not done comparing the resident lifting system to conventional mechanical and/or manual lifts, staff provided a qualitative list of its comparative advantages and disadvantages:

ISSUE	RESIDENT LIFTING SYSTEM (CEILING MOUNTED)	MECHANICAL LIFT (PORTABLE FLOOR MODEL)
Bed Height	The residents bed can be raised to waist level to create a safe and comfortable working height. The RLS can then be safely used to transfer Residents safely to his or her chair.	The bed cannot be raised to a safe and comfortable working height, without having to then lower it to accommodate the ML.
Resident Security	Residents feel safe and secure while the RLS is in operation because of the stability and the smooth ride to their wheelchair. Also the spreader bar is above their head giving the resident free movement and clear vision.	Residents do not feel as safe in the ML due to the awkward movements while staff manually transfer the resident to the chair. Also, because the spreader bar is directly in front of the resident's head causing pain and pressure to the resident.
Finding Equipment	No need to look for equipment. The RLS is conveniently mounted on an overhead track above each resident's bed increasing staff time at the resident's bedside and with other activities.	Staff must look for a ML only to find it is being used by other staff elsewhere. This causes a time delay frustrating residents and staff who have to wait.
Access to bed	The RLS has no obstacles to avoid. No moving furniture to gain access to the resident.	The ML has a base which is difficult to get under beds. The new electrical beds have wires that hang down entangling the wheels of the ML. Older beds have to have their bed rails down to transfer residents which gets in the way of the ML. The staff have difficulty maneuvering the base of the ML past the legs of the bed at times hitting the bed causing the resident to swing back and forth creating uneasiness with the residents.

Staff to operate	The RLS generally needs only one care giver to safely operate the system. This allows more time with each individuals care.	The ML needs two staff to safely transfer residents. This takes time to find other staff to assist with the transfer leaving less time for care.
Lift Height	Withe RLS located above each bed on an overhead track, this allows enough height for the residents to clear the bed as he or she is being transferred to the wheelchair.	The ML does not always transfer high enough for the resident to fully clear the bed or chair. The staff then have to manually lift the resident causing a risk factor for the resident's skin integrity and an increase of injury to staff.
Independence	Competent residents can manage themselves in their own transfers. This allows them to get up and down when they choose giving them their dignity and a better quality of life.	With the ML competent residents must remain dependent on staff to transfer them. Staff have less time because of limited equipment.
Bathing/Privacy	Having a RLS in the main bathroom is a great advantage. It allows residents to receive a bath with ease. Residents can go in the bathroom with their wheelchairs and the RLS and can transfer themselves safely to the shower chair, bathing chair or toilet. This will eliminate the use of commodes. Then the staff are able to dress themselves in the same room warm giving them warmth and dignity.	With the ML the resident has to be undressed then transferred to the shower chair. The resident is then wheeled to the main bathroom and bathed. After the resident is bathed they are wrapped in a flannel and wheeled back to their room, wet and cold, to be dressed.
Injury to knees and shins	The RLS does not have any structure around the resident preventing injury to the knees while trying to position the resident.	The ML has a metal framework directly in front of the resident which can cause injury to the knees and shins while trying to maneuver them.
Lowering of resident	With the RLS residents can be gently lowered into the Gerry chair from the front reducing back strain to the nursing staff.	With the ML the nursing staff has to reach around the framework of the chair while pulling and lowering the resident at the same time. This is an awkward position for the staff, increasing injury.

Maneuvering ability	With the RLS there is a free and clear floor space for the nursing staff to maneuver around.	The ML has a wide base with legs protruding which reduces floor space around the working area causing a tripping hazard.
Stretcher height	The RLS is compatible to any stretcher height.	The ML is incapable of adjusting to the stretcher height.
Storage	With the RLS there is no need to store any equipment leaving hallways clear of clutter.	The ML causes a storage problem most notably cluttering the hallways.
Privacy Curtains	The only disadvantage to the RLS is the privacy curtains. They will have to be modified in order to close properly.	

OTHER ISSUES

PRIVACY:

In the four bed rooms a gantry system was mounted on the ceiling with one lift shared by the occupants of the room. This initially posed some problems with using the privacy curtains. These difficulties were eventually resolved by fabrication of a gate hinged cantilevered arm privacy curtain track (see Appendix III).

MAINTENANCE:

The system is under warranty for three years parts; one year labour; one year batteries and three years for slings.

For the 8 month period May 1 - December 31, 1998 there were a total of 42 equipment failures with 53 equipment days lost. For the following 10 month period January 1 - November 1, 1999, there were 37 equipment failures with only 21 equipment days lost. On all but one occasion, residents were safely lowered using the secondary system. On one occasion, a resident had to be lifted to release the sling from the carry bar.

Supplier response to equipment failures has been considered quite satisfactory and timely and improvement in the operation of the equipment has been evident.

TRAINING:

Training commenced on the basis that one nursing wing already had an over-bed lifting device in place and therefore many of the staff were already trained in the use of the equipment. The installation process saw the four bed rooms with a gantry system as the first rooms completed. Upon completion of the installation in each resident room, the equipment was deemed available to use. Accordingly, training was completed on an ad hoc basis as equipment became available. An initial decision was made to teach staff how to use the lifting system for lifts and transfers and at a later date it was intended to teach how to use the equipment for repositioning residents in bed. This was based on the need to develop an appropriate sling for use in repositioning residents in their beds. At this time, a suitable sling has not yet been developed to adequately meet the needs of repositioning residents in an extended care setting. However, a repositioning sling is being used with satisfaction in our Intensive Care Unit which also has the WISPA system installed. This repositioning sling development project is being jointly worked on with the manufacturer, Trillium Lodge and St. Joseph's.

At this time, 93 % of our Registered Nursing staff and 100% of our Long Term Care Aide staff have been trained by way of a four hour in-service. The training project was initiated in January 1999, with a goal of teaching in the spring. However, revision of policy and procedures, and production of an ECU MSIP training manual outlining basic resident handling methods took more time and effort than expected. It was also considered critical that each teaching practitioner of the program be in agreement with each designated resident handling method to have consistent practice throughout the unit. This caused training to be delayed until early summer.

TRACK CONFIGURATION:

At this time only one design concern has been identified. In four two-bed rooms, the U shaped track did not extend far enough beyond the end of the bed resulting in insufficient working space to conduct lifts. The installation of additional ceiling track will resolve this design error.

SLINGS:

Prior to the installation of the RLS system, the Extended Care Unit was using mainly universal slings and a few hammock slings. The unit now has four choices of slings: universal, hammock, positioning and hygiene. Repositioning residents in bed using the RLS remains a challenge. Problems include slings not staying in place under residents and discomfort in the sling. However, a positioning sling is being used with satisfaction in our Intensive Care Unit which also has the WISPA system installed. A positioning sling project has been initiated by the RLS contractor, the manufacturer and the ECU staff. To date, a prototype has been designed and is currently being made by the manufacturer.

A.7: Checklist for Economic Evaluations (Drummond et al.)

A.8: Present value costs and benefits for different intervention scenarios

ABOUT THIS DOCUMENT

The Occupational Health and Safety Agency for Healthcare (OHSAH), which operated from 1998-2010, was a precursor to SWITCH BC. Conceived through the Public Sector Accord on Occupational Health and Safety as a response to high rates of workplace injury, illness, and time loss in the health sector, OHSAH was built on the values of bipartite collaboration, evidence-based decision making, and integrated approaches.

This archival research material was created by OHSAH, shared here as archival reference materials, to support ongoing research and development of best practices, and as a thanks to the organization's members who completed the work.

If you have any questions about the materials, please email hello@switchbc.ca or visit www.switchbc.ca