Getting to Zero in Washington State Nursing Homes: Final Report on Intervention Effectiveness

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ABSTRACT

BACKGROUND. The huge toll caused by back injuries among nursing home workers has been well documented at both the national and state level. These injuries have been primarily related to patient/resident handling. There is strong evidence that reduction in low back load would reduce the risk for injury. Zero-lift programs are designed to reduce these back loads and involve 5 basic components including 1) management commitment and employee involvement in implementation, 2) having enough of the right equipment for transfers and repositioning available and used, 3) appropriate training of staff, 4) relevant policies in place and complied with, 5) active case management to assist workers in a safe return to work if they are injured. Training materials and mechanical lifting devices continue to be developed and improved; yet back injuries are still occurring in nursing homes at unacceptable rates. The challenge for the nursing home industry is to effectively implement programs that reduce the loads on the nursing assistants (NACs) while maintaining a safe and caring environment for the residents of the nursing homes.

METHODS. We took advantage of a partnership between the Department of Labor and Industries and the nursing home associations (particularly Washington Health Care Association) in Washington State to assess the impact of implementing different interventions on a) implementation of zerolift and b) reduction in compensable (4 or more lost workdays) workers compensation claims rates for backs and shoulders related to resident handling. Out of six geographic regions in the state, two were assigned to a workers compensation (WC) premium discount (PD) offer intervention, one region was assigned an emphasis on implementing job modifications for injured workers as a way to get lifting equipment into these nursing homes, and the remaining three regions served as a comparison. In addition, WHCA (Washington Health Care Association) distributed training materials to their members and provided $1,000 rebates on lifting devices for their members who were part of their workers compensation group. These interventions crossed regions. We used four industrywide surveys (baseline and three yearly follow-ups) to assess the overall implementation in the industry. We conducted 30 baseline and 50 follow-up site visits to nursing homes in the three groups. PATH (postures, activities, tools and handling) analysis of NAC jobs was conducted during a subset of these site visits (8 PD and 8 comparison homes), to characterize exposures. A GEE (generalized estimating equations) approach to logistic regression was used to assess nursing home characteristics and zerolift implementation features' impact on WC claims rates in State Fund nursing homes.

RESULTS. The PD group (35/55 eligible participated) implemented components (particularly equipment) of zerolift more quickly than the comparison group. By the 4th survey, the comparison group had almost caught up with the PD group in terms of equipment. The job modification focus program was not effectively implemented so this region became part of the overall comparison group. There was limited awareness of the WHCA training materials or of the existence of the job modification program that was actually available to all injured workers if it would help return them to work successfully. The PATH analysis before and one year after the PD was distributed revealed significant decreases in awkward trunk postures during resident transfers but increases in shoulder load. The trunk loads increased in the comparison group. There was good correlation between site visit and survey equipment and training parameters. Other parameters had poor correlations. Canonical correlations between sets of parameters (barriers, commitment/involvement, policies) were good (>0.6). There was essentially no variance in policies and reported training practices between nursing

homes. In the WC analyses, important predictors of increased risk were resident/NAC ratio, NAC turnover, management turnover, for-profit/chain status, and hand-crank lifts/NAC ratios. In some of the analyses, predictors of reduced risk included having the same administrator in the previous three years, having a higher percentage of sit-to-stands lifts, management commitment/employee involvement and receiving a premium discount. However these variables were not statistically significant in all analyses. The significant predictors of increased risk in virtually all analyses were being a small nursing home and having high turnover.

Changes in health policy and financial viability of nursing homes throughout the study period were reflected in turnover and difficulty in sustaining zerolift environments.

SIGNIFICANT FINDINGS

Implementing zerolift programs can reduce trunk loads in nursing assistants while handling residents. One-time WC premium discounts appeared to help jumpstart the industry toward zerolift but were not able to sustain it through difficult financial times for the industry. Many of the barriers to sustained zerolift programs identified in this study are related to health policy and economic changes in the industry. Unless these underlying barriers are addressed, it will be difficult to bring about permanent change in the way NAC work is performed and risk reduced.

SCIENTIFIC REPORT

A. BACKGROUND

The huge toll caused by back injuries among nursing home workers has been well documented at the national and state level[1, 2, 3, 4]. These injuries have been primarily related to patient/resident handling activities. There is strong evidence that reduction in low back load would reduce the risk for injury[5]. Zero-lift ("no-lift", "low lift") programs are designed to reduce these back loads and involve several components: training; handling devices; enforcement of zero-lift policies; employee and management cooperation and participation; injury investigation and management (Garg 1999)[6]. There appear to be significant disconnects between the existence of technology to reduce the lifting hazards and the effective use of the technology in the industry. Training materials and mechanical handling devices continue to be developed and improved; yet back injuries are still occurring in nursing homes at an unacceptably high rate. The challenge for the nursing home industry is to effectively implement programs that reduce the physical load on nursing assistants, while maintaining a safe and caring environment for the residents of the nursing homes.

Between 1992-2000, Washington State's workers compensation system State Fund accepted large numbers of non-traumatic soft tissue disorders of the back, with an overall incidence rate of 171.7 per 10,000 FTEs, $1.5 billion were spent, with 35% resulting in four or more days of lost time and averaging 107 lost days per compensable claim. The cost of non-traumatic soft tissue upper extremity claims was $963 million, 36% were compensable with an average of 142 lost days per compensable claim.[7] The nursing profession has always been considered a physically laborious occupation. A high prevalence of low back pain and injury has been found among this occupation.[8, 9] The skilled nursing home in particular has high rates of musculoskeletal disorders. The Washington State Department of Labor and Industries (L&I) targeted nursing homes for a collaborative effort to reduce musculoskeletal injuries and illnesses. Nursing and personal care facilities in Washington State ranked first among industries for back injuries in terms of both frequency and claims incidence rate (619.9 per 10,000 FTEs). The WC compensable (4+ lost days) claims rate was 232.3, which was 3.9 times greater than overall industry. The compensable claims rate for the self-insured nursing homes was 155.5 with a relative risk of 2.0. Hignott[10] identified two studies[11,12] that reported geriatrics as a specialty of nursing that had one of the highest incidences of onset of back pain. Occupationally, nursing aides or assistants have higher prevalence, incidence and risk than other nursing personnel.[13, 14, 15, 16, 17] In 1988, for back pain attributed to activities at work, the risk was highest for nursing aides among largely female occupations with more than 290,000 workers, followed by licensed practical nurses. Registered nurses ranked eleventh.[18]

The occupation of nursing aide is considered to be physically demanding. Activities that have been identified to be responsible for poor postures include patient care, making beds, patient transfers, toileting and medical wound care[19]. Patient handling is regarded as the most frequent contributing factor or cause of low back pain, most notably lifting or transferring patients.[14, 20,16, 17] Traditionally, nursing assistants (NAC) tend to devote more time to lifting

and patient handling than other nursing personnel.[17] Garg et al[9] determined the frequency of patient handling tasks among nursing assistants in his cohort to be 49 per four-hour shift, including 12 requiring lifting and carrying, and 14 requiring lifting. Marras[20] estimated the risk of low back disorder from performing patient transfers between furniture during the lifting phase. The probability of being in the high-risk group for low back disorder was between 87.3 - 95.9% for one-person manual transfers and 76.9 - 87.1% for two-person manual transfers. Additionally, the corresponding compressive forces at the L5/S1 joint of the spine for these tasks ranged between 5964-6718N for one-person transfers and 4463-5178N for two-person transfers.[20] Marras compared these values to the 1981 NIOSH recommendations that a task, which generates compressive forces greater than 3400N, should be considered hazardous to some workers and that a task, which produces compressive forces greater than 6400N, is hazardous to most workers. [20] Other studies, where nursing assistants perceived transfer tasks the most stressful of patient handling tasks, have confirmed the high physical stress involved in patient transfers.[9,21,22]

Within the environment of nursing there are many factors that may reduce the presence of safe work practices. These can include intrinsic and extrinsic factors. Typically, the job of an NAC is low paying, with relatively no control of their environment and little opportunity for advancement. Psychological demands, job strain, the lack of authority over decisions, no skill utilization and the lack of support at work can have a significant effect on musculoskeletal symptoms.[23] This can lead to high stress, job dissatisfaction and ultimately, job turnover. The labor turnover rates are higher in nursing than in many other occupations.[16] The NAC turnover rate has been found to be higher in for-profit nursing homes, however, NAC involvement in patient care planning can significantly reduce the rate.[24] A high turnover rate may dilute the level of experience and training within a nursing home. Also, since managers anticipate the high turnover they are "rationally" choosing not to invest too much in training. In addition, using proper biomechanical techniques when handling patients is not always possible or adequate enough to reduce low back pain. Manual lifting of patients is generally more difficult than lifting inanimate objects of the same weight. Nursing assistants in skilled nursing homes are often confronted with patient or resident confusion in the middle of a lift, resulting in a shift of the weight being handled. The human body is not a box or compact mass with evenly distributed weight and convenient hand holds.[9, 25] It has been demonstrated that the strength requirements of patient lifting tasks exceed the strength capability of most female workers even when lifting lighter patients.[9]

Training has been the most common intervention aimed at reducing or preventing back problems for many years. Typically, the training involves educating employees in back care, proper body mechanics and lifting techniques and general ergonomic awareness, usually taught in a classroom setting. The benefit of this type of intervention in reducing low back problems, however, is questionable.[10, 26, 27] The lack of clearly defined outcome measures contributes to the uncertain effectiveness of educational back injury prevention programs. [8, 28] Often, it is the measure of cognitive knowledge by which educational sessions are evaluated and not the impact of teaching on work practices.[28] Different instruction techniques, classroom instruction and independent study, both failed to significantly change the on-the-job body mechanics of nurses.[28]

One approach that has been used for injury prevention is the formation of lift teams. The purpose of the lift teams is to stop untrained staff from performing resident lifts and eliminate

one-person lifts. Team members are medically examined, are considered to have a low risk of injury and specifically trained[29]. Often, resident lifting is the only duty performed. However, the formation of teams is dependent on the availability or size of the staff pool and the reallocation of staff. It has also been found that the narrow focus of the team's duties may create monotony and social isolation from other staff[30].

Another type of preventive measure taken to reduce low back problems associated with lifting and patient handling in nursing homes is the introduction of patient handling devices. These include lift sheets, hydraulic lifts or hoists, gait belts, and transfer boards. Although specific manual handling tasks have been associated with an increased risk of back pain; no such association has been found with mechanized patient transfers.[31] The traditional mechanical resident lift aid is the floor lift. Brophy et al[32] described a reduction in the number of low back injuries per year, in the incidence of back injuries per 100 full-time NACs, in the number of lost workdays and the yearly cost of back injuries following the introduction of lift equipment. Ceiling lifts are an alternative to the mechanical floor lift. In a comparison between floor lifts and ceiling lifts, nursing staff preferred the ceiling lifts for their stability, ease of use, safety and comfort of the patient, and the availability and quick use. Patients preferred the ceiling lifts for their comfort and feeling less like a physical burden for the nursing personnel[33]. The use of ceiling lifts has been related to a significant decrease in the injury rate in lifting and transferring but not for repositioning.[34]

However, the presence of patient handling devices does not guarantee their use. Common reasons given for not using the devices include the time involved to use the equipment, the lack of skill or experience, lack of staffing, the lack of availability of equipment at the time and place it is needed, the physical effort required and patient safety and preference.[9, 20] Additionally, patient-handling devices may not be considered as a feasible solution for reducing low back related problems. Introducing patient handling devices may be considered too expensive. However, the costs may not be that great when compared to the costs of ignoring the problem.[35] In cost-benefit analyses, it has been calculated that the costs of ceiling lifts can be paid for by savings in the reduction of direct costs of injuries in 4-5 years – less if indirect savings are considered.[33, 36]

One school of thought in the prevention of back injuries emphasizes a comprehensive program that involves more than training.[37, 25,18] Garg and Owen [35] recommend a comprehensive ergonomic approach to reduce back injuries among nursing personnel. Key elements of the approach include securing management commitment, enlisting worker participation, the determination of patient characteristics, the selection and ordering of equipment based on patient characteristics and staffing levels, and training nursing personnel. Silverstein [37] found evidence of a reduction in the severity and incidence of patient handling related injuries when a similar program was implemented in a California nursing home. The program consisted of a joint labor-management committee, back injury prevention training for the staff, the introduction of appropriate equipment and evaluation and feedback of the program.

Nursing homes have a number of constraints that have an impact on reducing the physical load on nursing assistants. Skilled nursing homes are under the jurisdiction of the Medicare & Medicaid Services (formerly Health Care Financing Administration or HCFA) and its state affiliates. In Washington State, the Department of Social and Health Services (DSHS) has the major regulatory authority over skilled nursing homes. The major focus of these

regulations is to provide quality skilled care for patients or residents. Interpretation of resident rights to confidentiality varies with respect to communication about their physical and mental status (information written on a board above the patient's bed, in the patient's chart, etc.), medication, use of restraints and equipment. Additionally, Medicaid and Medicare regulations affect treatment and equipment choices. For example, the purchase of a wheel chair with removable arms (which could facilitate some chair to bed transfers) may not be reimbursed when a fixed-arm chair would do. Certification of nursing assistants is also under the jurisdiction of DSHS. Most nursing homes have their own training programs to meet certification requirements although there are some technical/vocational programs as well. The focus of the training is on at protection of the resident with wide variance in emphasis on protection of the staff.

On a more global scale, the long-term care industry is changing. Skilled nursing homes are viewed as expensive and residents requiring less skilled care are being moved into assisted living, residential care or home health care environments. This increases the acuity of residents remaining in skilled nursing homes. Reimbursement is based on acuity. At the same time, with an aging population, there is an increase in the numbers of residents with various forms of end stage dementia, particularly Alzheimer's. These changes present tremendous challenges to the skilled nursing home industry: increased demand, less reimbursement, high staff turnover (due to low pay, in some cases minimal benefits, high demands) in a high employment economy. High nursing home management turnover has contributed to the instability of resident care and high nursing assistant turnover [38, 39] making management commitment to improving working conditions difficult to sustain.

In Washington State, there is a strong nursing home industry commitment to reducing resident handling related injuries and illnesses. The Washington Health Care Association (WHCA) has a group retrospective-rating program for workers' compensation. There are currently 150 skilled nursing facilities in this program. The retro program has identified resident handling as the area in which most injuries occur. In 1996, it initiated a rebate program for its members who bought resident transfer equipment ($500, increased to $1,000 in 1997). It developed training materials to assist members in developing zero-lift programs. The features of a zerolift program are summarized in Table 1.

This research took advantage of a unique opportunity for government and industry to work together to solve important health and safety problems. Both L&I and the WHCA are committed to reducing injuries related to resident handling activities. In 1998, L&I committed to developing and implementing a comprehensive strategy to reduce musculoskeletal disorders in the state. Washington is the only state where both an exclusive workers' compensation system and the state OSHA plan (WISHA) are in the same department. The recently legislatively mandated WISHA Advisory Committee (made up of labor and business representatives) has identified both musculoskeletal disorders and health care as two of the top health and safety priorities for the state.

B. SPECIFIC AIMS

The goals of this research have been two-fold. The first goal was to evaluate the implementation of zero-lift type programs in nursing homes in Washington State after distribution of zero-lift program training materials by the Washington Health Care Association (WHCA) to 75% of Washington State nursing homes. Two specific workers' compensation incentive programs were also evaluated to determine their effectiveness in the successful implementation of zero-lift programs in different geographic regions in Washington State. The second goal was to evaluate the effectiveness of these programs in the overall goal of reducing the incidence and severity of low back and shoulder injuries in nursing assistants in nursing homes that may be caused or aggravated by resident handling activities.

The specific aims of this research were:

- To conduct baseline and two annual follow-up surveys of Washington State nursing homes to determine the degree to which zero-lift programs have been implemented based on the presence or absence of five key program components. We actually conducted 3 follow-up surveys.
- To conduct preliminary and one year follow-up site visits to 36 nursing homes of different sizes and injury rates to validate the information gathered from the surveys in estimating the degree of zero-lift program implementation.
- To evaluate the effect that the distribution of Washington Health Care Association "Getting to Zero" training materials had on the implementation of zero lift programs in their member nursing homes.
- To evaluate the effect that two workers' compensation incentives had on the implementation of zero-lift programs in targeted nursing homes.
- Use workers' compensation data to track back and shoulder injury incidence, lost work time, and cost to assess the effectiveness of the implementation of zero-lift programs and the effect of the two workers' compensation incentive pilots.

The following groups were compared:

- Nursing homes that received the Washington Health Care Association (WHCA) training materials and those who did not.
- Nursing homes stratified by the degree of implementation of zero-lift programs based on the presence or absence of the five essential elements.
- Nursing homes that participated in the job modification pilot and those who did not, stratified by whether they also received the WHCA training materials.
- Nursing homes that participated in the premium discount pilot and those who did not, stratified by whether they also received the WHCA training materials.

C. RESEARCH DESIGN

This research investigated the following five hypotheses:

1. The distribution of a nursing home association developed training package to encourage zero-lift programs to 75% of Washington State nursing homes will result in an increase in the successful implementation of zero-lift programs in the state.

2. The introduction of training and mechanical handling devices into nursing homes will increase the implementation of zero-lift programs more than training alone.

3. The introduction of a workers' compensation premium discount pilot, which provides premium discounts in exchange for management-enforced zero-lift programs (including resident handling equipment, training, employee participation, enforcement of policy use, injury management and investigation,) will have the greatest impact in terms of successful zero-lift program implementation.

4. Implementation of zero-lift programs will reduce back and shoulder injuries related to resident handling.

5. The degree of successful implementation of zero-lift programs will affect the degree to which resident handling related injury rates will be reduced. In other words, those facilities fully implementing all five components of the zero-lift programs will have the lowest injury rates.

For purposes of this research, "Nursing home" was defined as a freestanding skilled nursing facility licensed by Washington State's Department of Social and Health Services (DSHS). This definition excluded hospital wings with transitional beds, homes for veterans, and intermediate care facilities for the mentally retarded. Information was obtained from DSHS about nursing home demographic characteristics, including financial status (for-profit versus nonprofit) and chain membership (defined here as three or more facilities with the same operator/licensee). At baseline, 245 facilities met the study definition. Over the four years of the study, this number decreased slightly, due to the closure of several facilities

There were three interventions evaluated in this study:

1. Distribution of "Getting to Zero" Training Materials.

WHCA produced a training package called "Getting to Zero" that teaches safe resident transfer techniques to reduce the physical load for caregivers. The "zero-lift" program concept involves training in body mechanics, the use of handling devices, and implementation of policies that support no actual lifting. The program described in the training materials has five major elements:

a. Eliminate awkward heavy lifting by providing modern, safe, easy to use, lifting/transfer equipment (total lift assists, sit/stand hoists, walking belts, shower chairs, ramp type weighing scales, repositioning in bed devices).

b. Provide training (demonstration, hands-on practice, follow-up and feedback) for staff using transfer devices.

c. Provide an environment in which use of equipment is expected, encouraged and enforced (policy implementation)

d. Employee participation in all aspects of the program to reduce resistance to change in resident handling methods (This includes providing input for decision-making such as information-sharing and team problem-solving. The development of a health and safety committee or special "getting to zero" committee that includes top management, nurses, NACs, and that establishes a coordinator with implementation responsibility is also necessary.).

e. Injury investigation and medical management (Health care providers should be aware of the program and treatment should be conservative, including modified work and close follow-up.

The WHCA training package consisted of videotape, a training facilitator's guide and handouts for nursing homes to use in staff training sessions. The WHCA distributed the training materials at their annual meeting in the fall of 1998 and at subsequent association chapter networking meetings for members who were unable to attend the annual meeting (there are 10 chapters in the state). The WHCA has had experience in producing these kinds of training materials, but has never done any formal evaluation of the effectiveness of this approach. There was a six-month lag between distribution at the annual meeting and distribution at chapter meetings.

2. Workers' Compensation Job Modification Incentive

L&I managers encouraged State Fund claims managers and risk management services to identify claimants within a select state region ("job modification test region") who had open back or shoulder injury claims and the potential of benefiting from the use of mechanical handling devices. In coordination with claims and risk management services, the health care provider, claimant, and employer were contacted to propose implementing a job modification that would involve the procurement of a mechanical lifting device. L&I used a variety of incentives to assist in the procurement of these devices if the employer is willing to implement a full zero-lift program and policy in the nursing home. L&I staff assisted in the necessary equipment selection and bidding process and insured that the vendor provided appropriate training in the use and maintenance of the equipment, not only to the injured worker but the nursing home training staff as well. Nursing homes in the test region (Region 2) with the highest back and shoulder injury rates completing the baseline survey were targeted for this coordinated effort. Their baseline site visits were conducted prior to their receiving mechanical lifting equipment. They were visited again, one year later, to determine if they had actually implemented a zero-lift program. The results from their surveys and site visits were compared to those nursing homes and regions where this incentive was not promoted ("comparison region") and also to the nursing homes and regions where the workers' compensation premium discounts were available.

3. Workers' Compensation Premium Discount Pilot

The State Fund sets premium rates every year in the fall. The State Fund uses the previous three years of workers' compensation experience to determine a company's premium rate for

the next year. A 15% one time upfront discount on the next year's workers compensation premiums was offered to nursing homes in six counties in western Washington who agreed to use the premium dollars saved to implement a zero-lift program (including the purchasing of training materials and patient handling devices). This premium discount offer was limited to State Fund nursing homes in Regions 3 and 4.

There were two major outcomes evaluated: the degree of implementation of the zero-lift programs (reduction in exposure) and perceived implementation of zerolift, and b) the reduction of the incidence and the severity of back and shoulder injuries.

The overall goal was to determine what factors are necessary for or predict both the successful implementation of zero-lift programs and the reduction of back and secondarily shoulder injuries in Washington State skilled nursing homes.

D. METHODS

A prospective design was used with some retrospective features. Statewide surveys were used to assess the degree to which nursing homes believed they implemented zero-lift programs. Site visits were used in a subset of nursing homes to validate survey findings, stratified by intervention group (premium discount, job modification, none). 1995-2001 workers compensation data were extracted and analyzed by intervention group and nursing home characteristics. Table 2 summarizes the data collection steps.

1. Nursing Home Surveys

The survey was used to assess the degree to which zero-lift programs have been implemented. Participants were provided with summaries of the annual surveys. The surveys were piloted with five nursing home administrators and revised to have fewer open-ended questions in order to increase response rate. They were then mailed to all nursing homes in Washington State in each of the three project years. The Washington Health Care Association distributed the survey with an endorsement cover letter to their 204 skilled nursing home members. A post card reminder was sent after 2 and 4 weeks. Subsequently, a survey company (Gilmore Research, Inc.) conducted the remaining surveys via telephone. A fourth survey was added to capture new challenges in the industry in 2001-2002. Survey instruments are included in Appendix 1.

Survey form and content changed over the four surveys although some questions remained constant through all four surveys. Table 3 summarizes the contents of each survey. Appendix 1 contains copies of each survey instrument. Summary results of each survey were mailed to all nursing homes in the state approximately one year after the data was collected.

2. Site Visits

Site visits were conducted in a subset of nursing homes to validate and elaborate upon the information collected in the surveys. The original study design called for conducting 12 site visits per intervention group and comparison group. However, fewer than 12 nursing homes in the job modifications region had job modifications related to resident handling activities. Site visits were conducted in Year 1 at the beginning of the project period to determine a baseline for nursing homes and then again in Year 2 to assess possible early changes in this baseline. The visits were also used to identify perceived barriers to program implementation. It was recognized that they might also serve as another type of intervention. Site visit data collection forms are included in Appendix 2. Specific areas of interest were:

- The availability of resident handling equipment, including when and how it was purchased.
- Current policies regarding resident handling, their implementation and enforcement.
- Incentives for following resident handling policies.
- The role of the joint management-labor health and safety committee in addressing resident handling issues.

- Mechanisms for the reporting and early treatment of back and shoulder injuries.
- Methods for follow-up investigations of back and shoulder injuries.
- Injury documentation: OSHA 200 logs for the previous two years will be requested.
- The impact zero-lift training has had on the organization (costs and benefits).

The baseline site visits were conducted before facilities received any premium discounts. A group of 2-4 individuals from Labor & Industries, (Physical Therapist, Ergonomist and Registered Nurse), visited each facility for approximately 4-6 hours. Interviews were conducted with a variety of individuals: the administrator or director of nursing services (sometimes both), staff development coordinator, representatives from the safety committee (both chair and member, if available), and several nursing assistants. The interviews were designed to obtain information about resident handling at that facility. In addition, observations were made of nursing assistants using equipment to handle residents.

A work sampling method (PATH: postures, activities, tools and handling) for characterizing job components of non-stereotypic jobs[40], was adapted for the nursing home environment [41] and used in a subset of facilities to improve our knowledge of overall exposure patterns in certified nursing assistant (NAC) work, and to assess potential differences in exposure between study periods. PATH analysis was used with one experienced NAC at each of 16 sites; eight in the premium discount group and eight at comparison facilities. Sampling was once per minute for approximately 4 hours and always included a meal. One analyst conducted all PATH observations. Primary job tasks included resident handling, other "resident-related", housekeeping/laundry/food delivery, administrative functions, and other.

Postures were categorized as:

Trunk

(1) Neutral;
(2) Forward flexion >= 20 and <45;
(3) Forward flexion >=45;
(4) Lateral bending and rotation in neutral
(5) Lateral bending and rotation in flexion

Shoulders, as reflected by the position of the upper arms relative to a reference line midway through the trunk as viewed in the sagittal plane

(1) Both elbows below 60°;
(2) One elbow at or above 60°; and
(3) Both elbows at or above 60°

Legs

(1) Neutral or standing with knees bent <35°;
(2) Lunge with one knee bent >=35°;
(3) Squatting;
(4) Walking;
(5) Kneeling; and
(6) Sitting

Resident/material handling categories were standard (lift, lower, carry, move/place, push/pull) with the addition of "precision work" (See Appendix 3 for PATH recording form). Weights of items commonly handled were estimated or measured and coded into three categories: 5

pounds or less, 5-50 pounds, more than 50 pounds. Tools included types of equipment used for handling residents, furniture, laundry, and food items. Personal breaks were not observed.

Nursing homes chose full-time NACs with no reported back or shoulder pain and that were willing to be observed for extended periods of time. At the time of the visit, the potential subject was introduced to the researcher, who explained the purpose of the study and what participation would entail. The nursing assistant was given the opportunity to ask questions, and if consent was granted, data collection proceeded. There were no refusals. NAC participants ranged from 23-55 years of age (mean of 32 years). NAC experience ranged from 3 months-20 years (mean of 3.6 years). There was only one male NAC participant.

3. Data Management and Analysis

The observations from each visit and facility were entered in an Access database, with a table for each facility. The respective tables were merged and imported into SPSS for analysis. Frequencies of observations were summarized for all categories.

Descriptive statistics of the frequencies of observations were calculated to characterize the work of nursing assistants by categories of tasks, activities, weight handled, and postures. Two post hoc categories of activities related to resident handling were created from the collected data in an attempt to discern activities done before and after transferring residents. Computation of frequencies using the Crosstabs procedure was done to investigate relationships between variables.

In an attempt to quantify simultaneous exposures to multiple risk factors, an "exposure score" was calculated as the sum of the code for shoulder posture (1 through 3) plus the code for trunk posture (1, 2, or 4, with 4 representing both marked flexion and side bending/rotation) plus the code for amount of weight handled (1, 2, and 4, with 4 representing the heaviest load of more than 50 pounds).

Follow-up visits were conducted at the same facilities approximately one year later with comparable observations and interviews with individuals in the same positions. Site Visit forms are included in Appendix 2.

In order to compare information obtained from surveys to that obtained from interviews, facilities that had both site visits and corresponding survey responses were identified and their responses used for analysis. For comparing Survey 1 and Visit 1, data were available for 30 facilities; for Survey 2 and Visit 2, information was available from 54 facilities.

All survey responses were entered into an Access database. Responses to the short-answer question on barriers were exported to the NUD*IST[42] program for inspection, coding, and analysis. For consistency, all NUD*IST analysis was done primarily by one individual, although the entire research team discussed and came to consensus regarding the criteria for coding qualitative themes. This type of iterative process is commonly used in qualitative research (Miles and Huberman, 1994)[43].

Responses from the interviews conducted during the visits were also entered into an Access database. Again, responses to the question on barriers were exported to the NUD*IST program. Results were merged and imported into SPSS (version 7.0) for statistical analysis.

Descriptive statistics were calculated. Dichotomous variables were evaluated for consistency by measures of percent agreement and the kappa statistic. Continuous variables were analyzed through the use of correlation coefficients[44, 45, 46]

A canonical correlation analysis was also performed[47, 48]. This procedure was used to investigate the relationship between two sets of variables. In this case, we used canonical correlation to assess the relationship between each component of the zero-lift program between data collected by survey and site visit.

Common elements in the data collected by site visit and survey were analyzed using kappa statistic for dichotomous variables, Spearman for continuous variables and inter class correlation coefficients for continuous variables; canonical correlations were used for assessing two sets of composite score. The canonical weights are determined so as to maximize the correlation between the resulting sets of composite scores.

4. Workers Compensation Data and Analysis

In Washington State, employers are required to obtain workers' compensation insurance through the L&I industrial insurance system unless they are able to self-insure (this excludes the self-employed who are not required to have coverage). Approximately two-thirds of the workers in the state are covered by the Department's State Fund (the rest work chiefly for the largest employers and are covered by their self-insured employers). Washington is the only state where workers contribute to the medical aid portion of the State Fund.

The L&I claims management database consists of two major data processing systems. The Medical Information and Payment System (MIPS) receives all billing information generated by provider medical bills. This system records such relevant items as dates of service, all associated procedure (CPT) codes, and physician diagnosis by International Classification of Disease, Version 9 (ICD-9) code for each provider visit. The L&I Insurance System (LINIIS) contains all data necessary for the administration of claims, including: industry, occupation, age, employment status, health care provider information, nature of injury, type of injury, source of injury, body part affected date and time of injury, days away from work and claim status (rejected, pending, accepted, medical only, compensable, permanent partial disability, pension, fatal, etc.). Injury information is coded using the American National Standards Institute (ANSI) z16.2 codes. Compensable or lost time claims data for the state's self-insured employers is also coded in the system.

Case definitions were derived from a combination of ANSI z16.2 codes from the claims database and ICD9 and procedure codes from the medical bill payment system (MIPS), Table 4. Analysis of workers' compensation injury data was used to assess trends in injury and severity rates from 1995-2001.

5. Statistical Methods for Analyzing Trends in Workers Compensation Compensable Lost Time Claims Rates

Poisson regression was used to compare the overall trends in compensable back and shoulder claims rates for the nursing home industry to overall industry excluding nursing homes over the study period to assess an industrywide effect.

For the nursing homes included in the study group, we assessed a number of potential predictors from the survey data and from administrative databases in univariate and then multivariate models (Table 5). For nursing home "quality indicators", inspection results, financial status, bed size, staffing, we extracted data from *http://www.medicare.gov/NHCompare/Search/NursingHomeResults.asp*.

Preliminary analysis indicated a large number of missing data points. In some cases, this was due to incomplete survey completion. In other cases, nursing homes may change ownership, financial status, or participation in a chain. In these cases, workers compensation data would be incomplete for some years. For nursing home chains, the chain may have both claims and hours (denominator in Washington State workers compensation system) reported at either the nursing home level or at the chain level. If the data were reported at the chain level, the chain would be excluded for multivariate analysis. When the missing data appeared non-random, imputation methods were used.

For the nursing homes included in our study, the statistical analysis of claim rates in relation to risk factors was carried out using linear and logistic regression, with generalized estimating equations (GEE) used to accommodate the statistical dependence of multiple observations per nursing home. Prior to the analysis, a number of data transformations and some exclusions were carried out to accommodate particular features of the data.

Out of a pool of 245 nursing homes with data available for at least one survey year, the data set was pared down to 188 nursing homes for analysis. The exclusions were as follows:

- Seven homes were excluded that did not have survey data available for all four survey years, 1998–2001.
- Nine homes were excluded that had less than 20 nursing assistants (NACs) for all survey years. These smaller homes were excluded because preliminary analysis showed a number of outlier claim rates among them, primarily due to the small rate denominator (number of NACs).
- One home was excluded that showed a dramatic change in the number of NACs between the first two survey years (25 NACs) and the last two survey years (8 NACs).
- After these initial exclusions, a balance of 228 nursing homes were available for analysis, but an additional 40 homes were excluded due to lack of any data on claim counts in the pre-survey years 1995–1997. It was important to be able to control for the pre-survey claim rate ("pre-rate") as an indication of high- versus low-risk homes.

After all exclusions, 188 nursing homes were available for multivariate analysis.
Another important feature of the data was the large number of missing values both for the outcome variables (claim rates) and for some independent variables. For example, among the 752 observations of the four survey years and 188 homes, 39% (N = 294) of the observations on claim counts were missing. Some of the independent variables were also missing substantial numbers of observations, such as NAC turnover (238 missing, or 32%) and hand lifts per NAC (93 missing, or 12%).

Due to the substantial number of missing values and the potential for bias associated with missing value patterns, an imputation method was used to create a complete data set. The multiple imputation method, developed by Rubin[49] and colleagues creates multiple data sets (typically five or more), each with the missing values imputed. The imputation is based on a series of stepwise-constructed regression models relating each variable with missing values to other variables. In

brief, missing observations are initially imputed with reasonable starting values, and then iteratively replaced using stepwise regression models, with predicted values updating the missing-value slots at each iteration until convergence is achieved. (In this study, a variable was allowed to enter an imputation prediction equation only if its contribution to R^2 was greater than 0.1.) Multiple data sets with imputed values are then created using the predicted values plus random error. The error models available include Poisson, normal, Bernouilli, and mixture distributions. After the multiple imputation process has yielded multiple imputed data sets, the user's analysis (regression, calculation of means, or any other analysis) is carried out producing a set of parameter estimates and their standard errors corresponding to each imputed data set. The final parameter estimates and their standard errors are calculated according to the following methods, which pool the results from the multiple imputed data sets.

The combined parameter estimate $\overline{\theta}_M$ from the M imputed files is calculated as

$$\overline{\theta}_M = \sum_{i=1}^{M} \frac{\theta_i}{M}$$

where θ_i is the parameter estimate from the i-th imputed file. The variability associated with this estimate $\overline{\theta}_M$ has two components: the average within-imputation variance,

$$\overline{W}_M = \sum_{i=1}^{M} \frac{W_i}{M}$$

(W_i is the variance for the parameter estimate from the i-th file) and the between-imputation component,

$$B_M = \frac{\sum_{i=1}^{M} (\theta_i - \overline{\theta}_M)^2}{M - 1}$$

The total variability associated with $\overline{\theta}_M$ is then

$$T_M = \overline{W}_M + \frac{M + 1}{M} B_M$$

The test of the null hypothesis for a parameter is carried out as a t-test with modified degrees of freedom as described in Little and Rubin (1987)[49]. The computation of standard errors and hypothesis tests were carried out in Intercooled STATA 7.0[50].

Transformations and recoding of a number of variables were carried out to accommodate the different steps of the analysis. In order to select from the menu of error distributions available

in the imputation process, most continuous variables were transformed to approximate normality with Box-Cox power transformations. Sometimes a constant (such as 1.0) was added to a variable prior to transformation. After the imputation, some variables were back-transformed to the original scale for use in the regression analysis of claim rates and risk factors.

The dependent variable of claim counts would usually be expected to have a Poisson distribution. However, analysis of frequency distributions and residuals from fitted models showed that claim counts differed quite substantially from the Poisson distribution. Thus, the dependent variable of claims was represented by the empirical logit of the claim rate, which is the logit of a modified rate; the rate is calculated as (claims + 0.5) divided by (NACS + 1). The logit transformation of claims rates was used for [Compensable non-traumatic back injury in NACs with source other person, C4BN] and [Compensable non-traumatic back or upper extremity injury in NACs with source other person, C4NN]. The outcome variable [Compensable non-traumatic shoulder injury in NACs with source other person, C4SN] was dichotomized to a variable indicating presence of any claims versus absence of claims. This dichotomy was used due to the very small number of homes with shoulder-based claims. The empirical logit transform was also used for the number of hand-lifts per NAC, the number of mechanical lifts per NAC (for each survey year), the number of sit-to-stand lifts per NAC, and the total number of lifts of any type per NAC. Two other equipment-related variables were created: (1) "PRNEW" indicates the percent of all lifts (hand lifts plus mechanical lifts plus sit-to-stand lifts) consisting of "newer" lifts: mechanical lifts plus sit-to-stand lifts; (2) "PRNEWEST" indicates the percentage of all lifts that were the newest type, sit-to-stand lifts.

The variables, recent number of administrative directors and recent number of directors of nursing services (measures of management turnover), were dichotomized into levels of one or two versus more than two. The variables related to involvement of a joint health and safety committee in injury investigation (SHCINVST), discussion of resident handling issues (SHCDISC), recommending equipment (SHCREC), and discussing prevention (SHCPREV) were also dichotomized into scores 1–2 versus 3–5. A new variable was created, SHC total, with a potential range of 0–4, as the sum of the SHC binary variables. The self-rating variables were also dichotomized, again using 1–2 versus 3–5, and a new variable, "sum zero", was created as the total of the dichotomized self-rating variables (potential range 0–6). The claim rates prior to the survey period (during 1995–1997) were used as control variables in a continuous form (logit transformed) as well as in a three-level categorical form. The trichotomy for the C4BN pre-rate variable used cut points of <3.0, 3.0–5.4, and >5.4. The C4NN pre-rate variable was trichotomized with cut points of <3.6, 3.6–6.7, and >6.7. The C4SN pre-rate variable was dichotomized into a claim rate of zero versus a positive claim rate.

Both univariate analyses and multivariate analyses were carried out to determine the association of independent variables with claim rate outcome variables. In the "univariate" analysis each independent variable was analyzed in relation to the outcome variables using four different models, which differed in the additional covariates included with the specific independent variable of interest. The four models consisted of combinations of (a) the "pre-rate" as a trichotomous categorical variable versus a pre-rate continuous variable, and (b) presence or absence of survey year as a categorical covariate.

Multivariate models of the logit claim-rate outcome variables incorporated independent variables selected according to the following process. A cluster analysis was carried out to identify several clusters of variables within which independent variables had moderate to strong correlations. Within each cluster a single variable was chosen — taking the variable that had the strongest Pearson correlation with the logit-transformed back injury rate (C4BN). Again, there were four sets of multivariate analyses. In addition to the particular correlation-selected independent variable, the four models differed in including pre-rate as a categorical versus continuous variable and including versus excluding the survey-year categorical variable. The "SHC" variables and the dichotomized number of administrators and directors of nursing homes were available for only two survey years (2000–2001) and a separate set of multivariate analyses was carried out incorporating these variables – again using the four combinations of time and pre-rate covariates.

E. RESULTS

1. WHCA Zerolift Interventions

a. Getting to Zero Video and Training Materials

In 1998-1999, the Washington Health Care Association (WHCA) distributed Getting to Zero videos to members in the their retrospective rating program (RETRO). RETRO conducted nursing home council meetings in different areas of the state to discuss the videos, training materials and the need to move toward "zerolift" environments. On surveys 1 (1998) and 2 (1999), nursing homes were queried about training on resident handling provided to NACs. All provided training but methods varied, as well as requirements for annual refresher or skills demonstration. Table 6 indicates that although there was a doubling between the two surveys in nursing homes that used some video for NAC manual handling training, very few identified the WHCA Getting to Zero video (from 4 to 11). However, of the Survey 1 respondents, 61 indicated that they used videos in their NACs resident handling training. Of those, most did not know the name of the video they used, and only 4 (6.6%) named the "Getting to Zero" video. In Survey 2, 130 used videos but only 8.5% of those identified the Getting to Zero video or the "WHCA video" whereas 37.7% identified another video. Of the 73 who were sent the video by WHCA, 15% reported using it specifically in the training. The uncertainty associated with which nursing homes were actually using the Getting to Zero video made it difficult to include this in the multivariate analysis of workers compensation claims rates. If no more than 6% of nursing homes were using this video, it does not represent a successful intervention strategy.

b. Rebates To Nursing Homes For Lifting Equipment

WHCA offered $1,000 to its retrospective rating group members for the purchase of a resident lifting device between 1996-2001. Of those participating in the surveys, Table 7 shows the number of rebates per study group. During the study period, 2 (28.6%), of those with JOBMODs, 35.1% of those in the comparison group, and 54.3% of those in the PD group received lifting equipment rebates.

2. Job Modification Intervention

Of 65 nursing homes in Region 2, 60 participated in the surveys, 7 of which received lifting equipment as part of the job modification (JOBMOD) program for injured workers from the workers compensation system. Compared to the other nursing homes in Region 2, those receiving JOBMODs were significantly larger (bed size of 141 ± 54.7 versus 107 ± 51.8, $p<0.001$), had lower occupancy (82.4% versus 88%, $p<0.02$), had similar residents/NAC ratios (2.6 versus 2.3), non-significantly higher NAC turnover (114% versus 86.4%), tended to be affiliated with chains (57.1% versus 38.8%), and tended to be for profit (71.4% versus 61.9%).

In the overall study population, there were significant differences in management turnover with the JOBMOD group higher (mean 5.0 ± 2.6 over the previous three years compared to 4.2 ± 1.8 for premium discount and 3.4 ± 2.4 for comparison homes, $p<0.05$). Based on equipment score (handlift + (mechanical total lift* 2 + sit-to-stand lift *2.5)), the jobmod group

had significantly less equipment by survey 4 than the other 2 groups (5.8±3.1 for JOBMOD, 9.9±7.3 for comparison, 13.3±7.3 for Premium Discount, $p<0.03$). Approximately 84% of the NACs in all three nursing home groups were female. There were significantly fewer NACs with English as a second language in the premium discount (PD) nursing homes (7%) than in the other two groups (approximately 26%), $p<0.01$. In addition to the 7 nursing homes in Region 2, 19 other nursing homes (including 2 in the premium discount group) had JOBMODS. Because of the small number of JOBMOD nursing homes in Region 2 and the dispersion of JOBMODS throughout the other regions, all Region 2 nursing homes were included with the Comparison group in the multivariate analyses of workers compensation rates.

3. Surveys

Over the survey years, the percentage of facilities preferring telephone interviews increased from 44% to 55%. Surveys (both written and phone interview) were completed primarily by administrators (53%), directors or assistant directors of nursing services (18%), or staff development coordinators (7%).

The nursing homes in the premium discount (PD) group were comparable to the comparison nursing homes in Washington State as well as all skilled nursing homes in the United States with the exception of for profit and chain status, both of which were greater in the PD group compared to both those who were eligible for PD but chose not to participate, and for all non-PD participating nursing homes (Table 8). Survey participation ranged between 95% (survey 2) and 82% (survey 4), Table 9. The premium discount group tended to have a higher percent participation, particularly in the last two surveys. There were no differences between the PD group and comparison group over the surveys for median number of beds, residents, resident to NAC ratios or turnover. In survey 3, occupancy rate was slightly greater for the comparison group. In survey 4, administrator turnover in the PD group was higher (Table 10). Premium Discount nursing homes obtained significantly more electric lifts (especially sit-to-stand) per 100 beds than the Comparison group (Table 11) immediately after receiving the premium discount (Survey 2) and the following year (Survey 3). The differences between the two groups narrowed by the 4th survey. Self-ratings for the last two surveys indicated the PD group had significantly higher ratings for overall implementation, equipment and training in both years and for management commitment/employee involvement for the 3rd survey year. Several indicators of patient care quality were available for the last year via the HCFA survey data. The PD group had fewer deficiencies (7.1±6.0 vs. 9.8±6.7, $p<0.05$) but more pressure sores noted (11.5±4.7 vs. 9.6±4.8, $p<0.05$). There were no significant differences in residents with behavioral symptoms (26.9±18.8 vs. 29.2±17.4) between the two groups.

There was considerable overlap between groups in terms of who received $1,000 lifting equipment rebates from the nursing home association (WHCA), Table 10. When those who received rebates (irrespective of PD status) were compared, those with rebates rated their overall implementation higher (4.0±0.9 vs. 3.2±1.1, $p<0.0000$). The difference was stronger in survey 4 ($p<0.001$) than in survey 3 ($p<0.05$), with year a significant factor ($P<0.000$). However, there were no significant differences by rebate status alone for the number of newer lifts per 100 beds over the four surveys or by year. Within the rebate group, those receiving the premium discount rated their zerolift implementation much higher than the comparison group (4.6±0.5 vs. 3.7±0.9, $p<0.01$). For those not receiving the rebate, the PD

group rated their zerolift implementation higher than the comparison group (3.8±0.9 vs. 3.1±1.0, p<0.000). Similarly, for the comparison group, those who did receive the rebate rated their zerolift implementation higher than those who did not (3.7±0.9 vs. 3.1±1, p<0.01). The differences between rebate groups with and without premium discount held when comparing the number of newer lifting equipment per 100 beds. In the PD group, those that received the rebate reported 5.2±2.5 new lifts per 100 beds vs. 3.8±2.0, (p<.05). In the comparison group, those with rebates reported slightly more lifts per 100 beds (3.3±2.6 vs. 2.8±2.8) but the difference was not statistically significant.
These results suggest the combination of premium discounts and rebates result in the greatest zerolift implementation.

4. Site Visits

All PD nursing homes (n=34) and 23 Comparison nursing homes participated in site visits prior to receiving the premium discount and approximately one year later. Characteristics of the participating nursing homes are described in Tables 12 (financial status, size, staffing) and 13 (equipment). The PD sites tended to be more for-profit chain members and have slightly more NAC turnover than the comparison group.

Comparison Of Survey To Site Visits

Survey questions were not identical to the site visit interviews, although the basic issues of equipment, training, policies, management commitment/employee involvement and case management were included in both. Tables 14-15 show the correlations between these instruments for the two-visit/survey periods. In general the correlations between the categorical variables on both occasions were quite poor with the exception of management turnover (Table 14). Correlations for the continuous variables faired a little better (Table 15), particularly with respect to numbers of lifting devices, and in round 2, turnover of NACs and management. Figure 1 indicates greater similarity between site visits and surveys at round 2 for components of NAC training than at round 1. Figure 2 suggests the greatest similarity at round 2 was for policies on 1-2 person transfers in manual handling (using transfer/gait belts) than on specific lifting equipment. The change in equipment between baseline and follow-up visits illustrated in Figure 3 shows a decrease in the number of hand crank lifting devices and an increase in electric devices, especially sit-to-stands in the PD group. Table 11 shows a steady increase in the newer lifts for both groups. Table 16 shows the canonical correlations for different dimensions or domains of zerolift between and within site visits and surveys. The strongest correlations were for equipment, training, and overall summary scores.

During the site visits, NACs, managers and administrators were queried about the challenges to implementing zerolift including industry-wide changes. Common themes were identified at all sites:

Nursing assistants were asked: **What makes handling the residents more difficult?**

- The vast majority of responses (29/45) involved the residents themselves: unpredictability, combativeness, confusion, dementia, and weight.
- A distant second (8/45) were categories related to staffing, time, and fatigue.
- Remaining comments related to:
    - Not knowing the residents
    - Families of residents

- Small rooms and low beds
- Lack of communication between shifts

Management personnel were asked about **recent changes in the industry**.

- Since PPS (Prospective Payment System), physical therapists more concerned with billable hours and less involved with nursing assistants.
- Increased competition for employees, especially nurses (all levels). Perception that fewer people going into nursing.
- Increased acuity of residents – "from the ER to the nursing home" as one administrator put it.
- Perception that residents are getting heavier.

Administrator was asked about **regulations that affect resident handling**.

- Majority of responses related to resident's rights and concern that residents could refuse to be moved with lifts.
- Privacy issues mentioned; e.g., no information over beds about lifting requirements.
- Low beds, no side rails, leading to more difficult lifting almost from the floor
- Punitive of state to pull NAC licenses, making it more difficult to recruit NACs when they can get paid the same at fast food chains with much less responsibility and concern about authorities accusing them of violating resident rights and care

Identification of barriers to implementation of zerolift was much more frequent during site visits than on the surveys (Figure 4), most likely due to establishment of rapport between researcher and nursing home management and NACs during the site visits.

5. PATH Analysis

PATH analysis was used to describe the postures, activities and tasks of nursing assistants in the study. We compared PATH before and after premium discounts were distributed to assess potential changes in back and shoulder exposures. A total of 5,360 observations were collected during the site visits, with the average of 167.5 $\pm$ 26.5 observations per facility. The number of observations per facility is presented in Table 17.

a. Frequencies of Major Task Categories and Activities related to Resident Handling

The primary target of the intervention was reducing back and shoulder loads associated with repositioning residents and changing residents' clothing.(Table 18). At Baseline, resident handling accounted for 22.5% of the observations, while the activities of transferring residents, repositioning residents, and changing residents' clothing accounted for 4.6%, 3.9%, and 3.3% of nursing assistants' time, respectively. Overall, tasks related to the direct care of individual residents accounted for 67.9% of the observations (resident handling, 22.8%; other resident related, 45.1%).

Baseline frequencies of observations for the categories of shoulder, trunk, and leg postures (Table19) indicated non-neutral postures of the shoulders and trunk were fairly common occurrences, as each accounted for almost 40% of the observations (see also Figures 6a-b). With respect to leg postures, standing (65.1%) and walking (19.9%) were the most frequently

observed categories, while sitting occurred only about 10% of the time. The frequencies of shoulder and trunk postures exhibited while performing the five major tasks are illustrated in Figure 5d. The highest percentage of non-neutral postures for both the shoulder and the trunk occurred during resident handling tasks, accounting for 58.7% of shoulder postures and 67.8% of trunk postures observed. The actual transferring of residents was less likely to involve non-neutral shoulder postures, but such postures were still relatively high at 51.2% of the observations (Figure 5b). Using a transfer belt resulted in much more awkward trunk and shoulder postures than using any of the lifting equipment (Figure 5a). Marked flexion of the trunk occurred most in repositioning and providing incontinence care (Figure 5c). Adjusting and operating equipment had the most neutral trunk postures, at 43.5%. The combination of heavy weight (>50 pounds) with both shoulders in non neutral postures occurred in 42% of the observations of 50+ pound weights (Figure 5e), and for the back, non-neutral trunk postures were involved 72% of the time while handling more than 50 pounds (Figure 5f) When the amount of weight handled was considered for tasks and resident handling activities, handling loads greater than 50 pounds was associated with resident handling in almost 82% of the observations (Figure 7a and 7b). The activities of repositioning and transferring were commonly associated with handling more than 50 pounds, with 83% and 77.2 % of the observations, respectively.

Resident handling task percent observations differed between the PD and Comparison homes, as well as within study groups between baseline and follow-up (Table 20). This is most likely due to differences in time of day when the observation period took place. When specific postures/ tasks/loads are considered, the PD group had significantly lower trunk scores in resident handling, incontinence care, resident handling > 50 pounds at follow-up than at baseline (Figure 8a). However there were significant increases for shoulder posture scores for resident handling, transferring, repositioning and repositioning with more than 50 pounds (Figure 8c). This suggests a tradeoff between the back and shoulder while handling residents. For the comparison group, there was no significant difference in trunk posture scores (Figure 8b) but there were significant increases in shoulder scores for resident handling, repositioning and incontinence care (Figure 8b).

The calculated combined back-shoulder exposure score had a range from 2 to 25. Figure 9 presents the combined exposure scores for the major NAC resident handling tasks for premium discount and comparison groups at baseline and follow-up. There were significant decreases for the PD group in all but repositioning and adjusting belts. There was a significant increase in resident handling score for the comparison group. Repositioning residents had the highest score, followed by transferring residents and providing incontinence care. Changing resident's clothing had the smallest value.

6. Workers Compensation Crude Claims Rates for Nursing Homes

When compared to other industries, the crude accepted claims incidence rate for all WMSDs (NTNUMB) decreased significantly faster ($p<0.01$) although it still remained much higher than other industries combined. The same was true for crude accepted back claims (Figure 10a). There was a sharp decrease in compensable WMSDs and specifically back claims rates between 1998 and 1999, however, the rates then began to edge up again in 2000-2001 (Figure 10b), compared to the rest of industry. Figure 10c presents the severity rate (lost workdays per 10,000 hours) for the State Fund nursing homes from 1996-2001 (1995 data are not available), showing a large spike in 1998 and then a slow decline. Figure 10d

presents the crude rates of State Fund accepted claims with source other person by PD group status. The PD group had much higher rates of all WMSDs in the early years then sharply decreased whereas the non-PD group had a slow steady decline. The compensable back claims rate for the PD group started higher than the non-PD group but by 2001 was virtually identical (Figure 10e).

7. Workers Compensation Claims Rates for Surveyed Nursing Homes, Univariate and Multivariate Analyses.

Due to missing data from surveys or workers compensation data from different years per study site, we used non-imputed data that included missing variables, as well as imputed data based on 9 imputed datasets (see methods section). Table 21 presents descriptive statistics for the two types of analyses. In general, they are not hugely different for mean values. We were able to include more nursing homes in the imputed analyses but we lost some precision in estimates. Therefore, we present results first for the non-imputed analyses (Tables 22-29), and then for the imputed data (Tables 30-35).

Non-imputed data

In the univariate analyses, important continuous predictors (Table 22) of compensable back claims rates among NACs were the number of hand-crank lifts per NAC (with an approximate relative risk [ARR] of 1.14 per lift, $p<0.01$ with preclaims rate, bedgroup and year in the model) as were being a for-profit home in a chain (ARR=1.19, $p<0.01$), and with increasing resident/NAC ratio ($p<0.001$), increasing NAC turnover (ARR=1.38 per increase in resident, $p<0.01$), having more than two administrators in the past three years (ARR=1.11, $p<0.01$) as well as other management turnover. The total number of lifts per NAC also appeared to increase risk although this may be due to the inclusion of the handcrank lifts (ARR=1.17,$p=0.5$). There was a slight increase in risk (ARR=1.03, $p=0.5$) with the number of resident care deficiencies identified by nursing home inspectors when controlling for bedgroup. This information was only available for the last year of the study. Protective predictors included receiving a premium discount after 1998 (ARR=0.80, $p<0.05$), having more beds (larger facility, $p<0.05$), having the same administrator ($p<0.05$), safety committee discussion of prevention activities (ARR=0.79, $p<0.05$). With Trichotomous variables and having prerate, year and bedgroup in the model, the predictors were quite similar (Table 23).

The patterns are quite similar with non-imputed WMSDs (back, neck, upper extremity) (Tables 24), indicating that the greatest predictor for higher claims rate was resident to NAC ratio (ARR=1.42 per resident, $p<0.001$) and the greatest protective effect was with having the same administrator for the past three years (ARR=0.86, $p=0.01$), followed by having a premium discount (ARR=0.79, $p<0.05$). Higher self-rating of management commitment/employee involvement (asked in the two final surveys) had a protective effect, controlling for bedgroup (-0.83, $p<0.05$). Turnover of NACs and management were important predictors of risk ($p<0.01$) as was the amount of lifting equipment per NAC (ARR=1.17, $p<0.01$). This latter result is not intuitively obvious, requiring further investigation. The association with number of resident care deficiencies was slightly stronger than with back claims alone (ARR=1.03, $p<0.001$). With the trichotomous non-imputed data (Table 25), the negative effect of for-profit and chain status is stronger (ARR=1.18, $p<0.01$). Risk continues to be elevated with amount of lifting equipment per NACs but the staffing and turnover

variables continue to predominate in the analysis. However, as the percent of equipment that is newer increases, the lower was the risk, although not statistically significantly.

With Shoulder claims rates, the continuous non-imputed analysis (Table 26) shows a significant decrease in risk with a larger percentage of sit-to –stand lifts present (RR=0.10, $p<0.01$). There was also a decrease in risk with a decrease in occupancy (RR=0.03, $p<0.01$). Risk was highest for resident to NACs ratio (RR=1.54, $p<0.001$) and NAC turnover (RR=1.9, $p<0.01$). The non-imputed trichotomous analysis (Table 27), showed even stronger protective effects for higher percentage of sit-to-stand devices (RR=0.09,$p<0.01$), low occupancy, and showed slightly higher risk effects for turnover and staffing ratios (resident/NAC ratio. Premium discount status was not a significant predictor.

Table 28a presents the multivariate analysis of the non-imputed data for 2000-2001 (n=103 nursing homes), with pre-claims rate (1995-1997) treated as logit. In this analysis, significant predictors of Back claim rates were small bedgroup and NAC turnover. For all WMSDs, the predictors were small bedgroup, a high preclaims rate, resident/NAC ratio (ARR=1.33, $p<0.01$. For Shoulder claims rates, predictors of risk were high preclaims rate, handcrank lifts per NAC (ARR=2.8, p=0.004) and premium discount status (ARR=4.2, p=0.05). This later finding is of some concern, however it did not hold up in the 4-year analysis (Table 28b).

Table 28b covers 1998-2001. In this analysis, for Backs, prerate was marginally significant (p=0.07). Being in the small bedgroup (relative to medium), demonstrated increased risk (ARR=1.57, $p<0.001$). The higher the resident/NAC ratio, the greater the back claims risk (ARR=1.26 ($p<0.001$). Increasing NAC turnover had increasing back claims risk (ARR=1.14, $p<0.05$) and the number of handcrank lifts per NAC increased risk (ARR=1.11, $p<0.05$). Having the same administrator was protective (ARR=0.83, $p<0.05$). The results were similar for all WMSDs except that NAC turnover and handcrank lifts were no longer significant. For the shoulder, the only significant predictor of increased risk was increasing NAC turnover (RR=1.61, $p<0.04$).

Table 29 transforms the logit of rates into estimated average claims rates per 100 NACs for the imputed and non-imputed analyses for the premium discount and comparison groups for 1998-2001. The changes with imputation appear to be greatest for compensable shoulder disorders. Additionally, this table presents the number of nursing homes that were available for the four years when imputed versus non-imputed methods are used. Clearly, there was a huge loss in nursing homes when the non-imputed data was used. However as can be seen in Tables 30-36, there was a great loss in power with the imputed data.

Imputed Data Results

In the univariate analysis, controlling for prerate, year and bedgroup, the number of handcrank lifts per NAC significantly increased risk for Back claims rate, as did total number of lifts. In the imputed analysis, while percent new lifts decreased risk, this was no longer significant. NAC turnover increased risk and larger facilities were at lower risk even while controlling for bedgroup. Premium discounts decreased risk but not significantly. High resident /NAC ratios and turnover increased risk, but no longer significantly. Increased self-ratings on zerolift implementation decreased risk but not significantly (Table 30). In the trichotomous analysis for Back claims, the significant predictors of increased risk were the number of handcrank lifts per NAC (ARR=1.10, p=0.01) and the only significant predictor of

decreased risk was number of beds increasing, p=0.02), Table 31. Findings were virtually identical for all WMSDs (Table 32-33). However for the Trichotomous analysis of all WMSD claims rates, there was significant increased risk with number of handcrank lifts/NAC, sit-to-stand lifts/NAC, total lifts/NAC, higher equipment scores, being in a nursing home chain. Risk decreased with increasing bed size. For univariate analyses of imputed data for shoulder claims (Table 34), NAC turnover continued to be the largest predictor of risk (RR=1.53, p=0.02). The number of mechanical lifts per NAC was significant only when not adjusting for year and bedgroup. The trichotomous analysis did not differ from the continuous analysis (Table 35).

In the Multivariate analysis of imputed data (Table 36a) from 2000-2001, the only significant predictor of back and all WMSD claims was bedgroup (smaller homes had higher risk). And for shoulder claims, there were no significant predictors.

In the Multivariate 4-year analysis (Table 36b), back claims risk was elevated for small bedgroup and high preclaims rate (with large bedgroup being protective). When year was not included in the model, number of handcrank lifts per NAC increased risk significantly (p=0.03). For all WMSDS, small bedgroup and high preclaims rate were the significant predictors. For shoulder disorders, the only significant predictor of increased risk was NAC turnover (RR=1.40, p=0.3), when year was not included in the model.

F. DISCUSSION

Implementation of the zerolift environment in a nursing home requires more than just having lifting equipment. It requires having enough of the right equipment in the right place at the right time, with staff that knows how and when to use the equipment and actually use it. It requires having appropriate policies in place with expectations of enforcement, employee involvement and management commitment to create a cultural shift in the way work is organized. This may be extremely difficult to sustain in environments with high turnover of management and NACs, along with a volatile market with nursing homes entering bankruptcy and closure across the country. The competition with home health care agencies and hospitals for skilled NACs, when the financial rewards are low and personal liability high in nursing homes, paints a bleak picture for sustainability of the industry. At the same time, injury rates among nursing assistants are among the highest. Something clearly needs to be done to improve the industry for residents and nursing assistants alike.

To our knowledge, this is the first occupational health study to evaluate the effectiveness of intervention to reduce musculoskeletal disorders in an entire industry. There were multiple interventions (planned and unplanned), most of which were outside the control of the researchers:

- Distribution of industry training materials on zerolift (irrespective of study group)
- Provision of $1,000 rebates for lifting equipment by WHCA to members of the nursing home retrospective rating program (irrespective of "study group")
- Workers compensation claims managers being encouraged to actively seek opportunities for job modifications for injured workers in nursing homes
- Provision of one time upfront workers compensation premium discount (15%) to nursing group in the PD group regions for getting started with implementing zerolift environments.
- Researchers conducting four industrywide surveys and reporting the results on a yearly basis to the nursing homes
- Site visits to a sample of nursing homes in the PD group and comparison group to assess implementation
- Change in the Prospective Payment System (PPS), which adversely affected the incomes of some nursing homes and increased the administrative overhead for all.

This intervention study demonstrated an overall industry willingness to implement components of zerolift environments, even under extremely chaotic conditions of high management and NAC turnover. This would not have happened without strong encouragement from the industry association. Those in the premium discount intervention group obtained electric lifting equipment, particularly sit-to-stand devices, earlier than the comparison group but by the last year of follow-up, the comparison group largely caught up with the premium discount (PD group) (Table 11). This suggests that the one time PD may have served as a jumpstart for that group but was not a major factor in the sustainability of

the zerolift program per se. The overlap in groups that received $1,000 rebates from the association (Table 7) may have helped to obscure differences. It should be noted that no nursing homes in Washington State have installed ceiling lifts.

Site visits to PD and comparison nursing homes before and one year after the premium discount was received indicated significant reductions in exposure to hazardous resident handling activities, especially for the trunk (Table 20, Figures 8-9). There is some suggestion that there may be tradeoffs between trunk and shoulder postural hazards with the use of mechanical lifting devices. The PATH analyses also shows that while less time than one might expect is spent in resident handling, this task presented the highest hazard, followed by repositioning in bed. It is interesting to note that while there was an increase in use of lifting devices for resident transfers, there was minimal purchase of "slip sheets" or other products to assist with repositioning in bed. According to the laboratory work by Marras et al (1999)[51] this is potentially the most stressful task for the low back. To our knowledge, this is the first study that characterized the distribution of NAC tasks, activities, postures and weights handled. This should assist others in focusing on areas of greatest concern. At the same time, the PATH data collection was extremely labor intensive, and may not easily lend itself for exposure assessment outside the research environment.

The intervention related to training claims managers and healthcare providers about the job modification program (up to $5,000) in Region 2 was largely ineffective. In fact, a greater proportion of nursing homes in the comparison group obtained job modifications. During the site visits and in the final survey, administrators were queried about their knowledge of the job modification program. While they claimed knowledge, the majority had never used it. Those who had used it reported finding it effective. Several responded that it took too long to actually go through the process. There was little evidence that the claims managers actively sought out injured workers and their employers to discuss this option. Likewise, the industry retrospective rating program third party administrator (TPA) was not enthusiastic about the use of the job modification program. It will be a challenge to the Department of Labor and Industries to identify ways to more effectively advocate job modifications to healthcare providers and employers (or their third party administrators).

There was little indication that the industry association distribution of "Getting to Zero" video and training materials was well recognized and utilized by study participants. In the surveys, respondents indicated using videos but didn't know their names. This might have been a function of administrators completing the surveys rather than the staff development coordinators who would be more likely to know the names of the videos they used. During the site visits, Staff Development Coordinators indicated that videos might be useful for orientation or for a safety meeting; they preferred hands on demonstration-return demonstration approaches. The high turnover in staff development coordinators may have resulted in the WHCA training materials being lost during the multiple transitions.

There was initial indication of a decrease in workers compensation rates for back injuries related to another person in nursing assistants (NACs) but this decline did not persist (Figure 10, Tables 23-36). There are likely a myriad of possible explanations. From the univariate analyses, and to a lesser extent the multivariate analyses, the chaos in the industry as reflected in NAC and management turnover and high resident to NAC staffing ratios increased the risk of WMSD claims rates by more than a program could combat. This study took place in a time of nursing home bankruptcies and retrenchment in reimbursement and

increasing regulation. It also took place during the economic boom where other industries, such as fast food, could offer better wages without the liabilities associated with taking care of nursing home residents. An additional consideration may be that the PD group was comprised of more for-profit and chain nursing homes than the comparison group. Since these nursing homes were the most squeezed financially, and had the most NAC turnover particularly in the 4th year (100% versus 75% turnover, $p<0.08$) and more management turnover in the previous 3 years reported (3.8 vs. 3.2, $p<0.05$), it might have negatively impacted their ability to sustain zerolift environments. On the survey (Table 11), those in the PD group self-rated their management commitment/employee involvement higher than the comparison group. However, those nursing homes with higher management commitment/employee involvement ratings (>3 on 5 point scale) also had significantly less management turnover (3.1 ± 2.4 versus 4.4 ± 1.9, $p<0.0001$), (not shown in table).

With such high economic pressures, and financial survival tied to resident care and occupancy (via PPS), we tried to examine the relationship between worker injuries and resident care indicators. We were able to obtain the number of deficiencies identified on the state survey (administered by the Department of Social and Health Services who do annual inspections of every nursing home in the state). In the non-imputed univariate models (with bedgroup and year in the models) the number of deficiencies was related to increased risk ($p<0.05$), Tables 22-25, however this variable did not retain statistical significance in the imputed analyses or in either of the multivariate analyses.

Workers Compensation Claims Analysis

A number of significant predictors identified in the non-imputed analyses were not carried over to the imputed analyses. This is likely the consequence of having non-random missing data. While the imputation methodology may appear "like getting something for nothing," there is, in fact, a price for the gain in completeness. Imputation involves uncertainty, and that uncertainty influences the final parameter estimates and their standard errors. Thus, while the imputation method allows the analyst to avoid dropping observations, and may correct for bias due to missing value patterns, the penalty is less power in hypothesis tests, due to the incorporation of the random component of imputation.

The data were also analyzed in non-imputed form. The primary advantage and disadvantage of each form (imputed, non-imputed) is as follows. The imputed form is likely to have fewer false positives but also has less power to detect true associations. The non-imputed form may have more power to detect true associations, but may be biased by missing value patterns. The standard errors of parameter estimate were generally smaller in the imputed data analysis, presumably due to the larger sample size available; however, the parameter estimates tended to be closer to zero than in the non-imputed analysis. Typically, standard errors from the imputed method were 20–30% smaller than those from the non-imputed method; however, parameter estimates from the imputed method, though they varied widely, could commonly be one-half or two-thirds of the magnitude of the estimates from the non-imputed method.

We should have had enough power to detect significant long-term change. A previous study of the impact of a lift program intervention on injuries and cost found very large changes from pre to post: 60 - 90% reduction, depending on the endpoint.[32] These studies did not involve long-term follow-up (4 years). Additionally, in the literature, most of these studies involved

the active participation of the researchers in implementation and sustaining efforts. This was not done in our industrywide study except through the yearly summary reports of survey data to the industry.

Barriers to Implementing ZeroLift

The most common barriers mentioned in surveys and site visits were staffing, time, training, organization, and residents acuity. Beneath these relatively obvious labels are some deeply troubling themes that must be addressed by the industry, government and society, particularly in the face of a larger aging population needing assistance.

Health Care and Social Policy Issues

The site visits provided the most illuminating information about administrator and NAC perceived barriers to implementing zerolift environments. In virtually every nursing home visited, the first barrier identified was "We are the second most regulated industry in the US, the first is the nuclear industry." The negative publicity about resident care in certain nursing homes reflected badly on the whole industry, and resulted in increased enforcement activities. Every skin tear, bruise or pressure sore was required to be reported immediately to the authorities. Administrators believed that investigators held NACs guilty until proven innocent, resulting in NACs being less willing to work in nursing homes when they could make the same pay for less liability in the fast food industry. The policy decision to shift from nursing homes to home health care for the less disabled residents squeezed the nursing homes in terms of removing residents that were a "lighter load" for nursing assistants. This also made working in home health care rather than nursing homes more attractive to NACs. At the same time, to reduce hospital costs, higher acuity patients were sent to nursing homes earlier. This "double squeeze" considerably increased the physical and mental load for NACs. With the implementation of PPS, more nursing homes were focusing in-house physical therapists toward "billable hours" only, with much less involvement in training and mentoring NACs in resident handling. As physical therapists increasingly went from permanent employees to contract employees, the ability to work effectively with NACs was further reduced. A fourth component of the "perfect storm" that took place during the 4 years of the study was the introduction of welfare reform with "welfare to work" programs. According to most administrators interviewed, many nursing homes took these new workers, many of whom had never worked before, and trained them to be NACs, only to have many wash out of the training or "not have a work ethic." Turnover increased dramatically. The role of turnover in back injuries among nursing assistants was identified previously by Myer, Silverstein and Nelson (2002)[52].

NACs were interviewed during the course of the site visits. Most did not know if they had a joint health and safety committee in the facility (required under Washington State OSHA-plan). For the most part, nursing assistants indicated knowledge of how to use the mechanical lifts and demonstrated this in their work. However, if the devise was not in the immediate vicinity, or the NAC was pressed for time; a manual transfer was often used where policy would have indicated using a mechanical assist. For the NACs, the major issues were 1) perceived comfort of the resident, 2) family member objection, 3) availability of equipment, and 4) time pressure when understaffed. Rarely was there enforcement of lifting policy unless a patient or staff member was hurt in a transfer. These issues theoretically could be addressed with improvements in work organization, resident education and more or better

lifting devices. NACs believed that they would be less likely to be injured if they used the devices, but this was overridden by the other perceived barriers.

Long-term Investment

Many nursing home administrators were unsure of their own future or the nursing homes' future so long term investment in structural improvements seemed prohibitive. For example, there is good evidence that ceiling lifts eliminate many of the objections to using floor lifts: finding them, storing them, having to rearrange furniture in the resident room to use them, patient anxiety with uneven accelerations in moving the lifts, fitting the lift under beds, through bathrooms, etc. However, most US nursing homes are largely unable or unwilling to expend such capital outlays as would be required to install these devices, particularly if they do not have the ceiling structures to support them. This is in stark contrast to the efforts to install ceiling lifts in acute care and long-term care facilities in British Columbia, an effort supported by the Ministry of Health (which pays for health care in British Columbia), the Health Care Employers Association and the healthcare workers unions. Unless similar joint efforts and the resources to support them are implemented in Washington and other states, it is unlikely that we will see real change in injury rates for residents or staff due to manual handling.

G. CONCLUSIONS

This study demonstrated that it is possible for nursing homes to implement zerolift environments in nursing homes in the midst of industrywide change and challenges. However, while we could demonstrate a short-term reduction in claims rates (2 years), we were not able to demonstrate a sustained reduction in workers compensation back injury rates over the four-year period. This suggests two-year studies may overestimate improvements under similar circumstances. Unless the underlying issues related to high management and NAC turnover and staffing are addressed, and long term structural changes in policy implemented, it is unlikely that implementing zerolift environments alone can solve the major problems facing nursing homes, residents and workers.

H. ACKNOWLEDGEMENTS

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Figure 1. Components of NAC Training, Site Visit vs. Survey

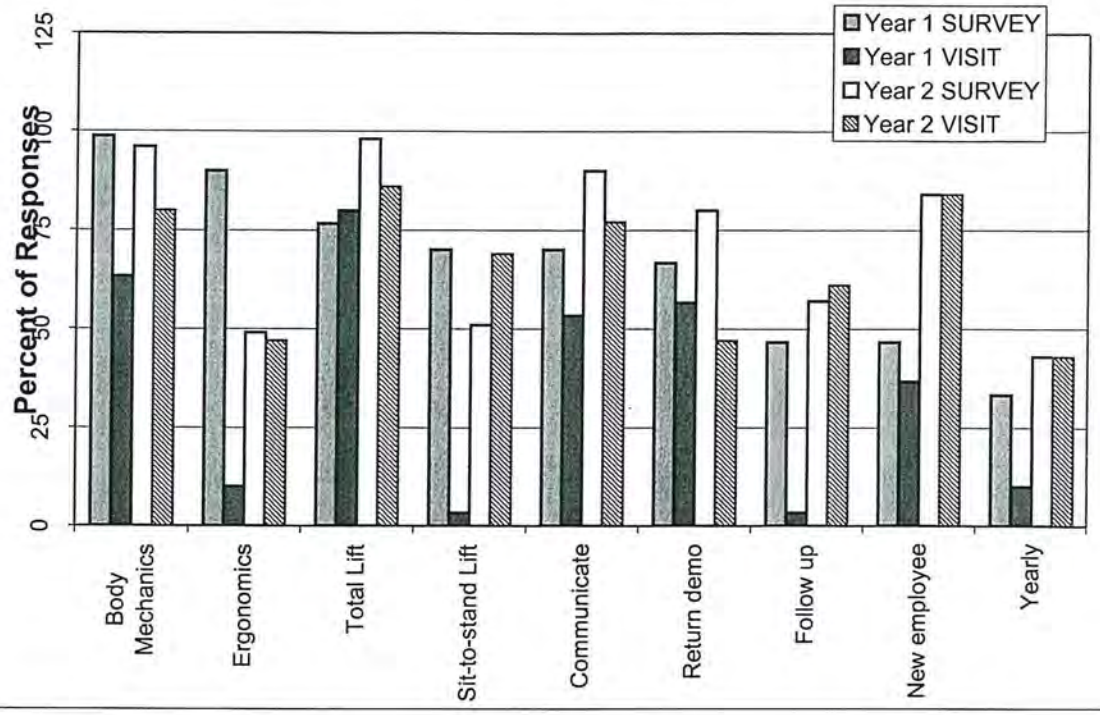


Figure 2. Percent Reporting Policies by Type at Round 2

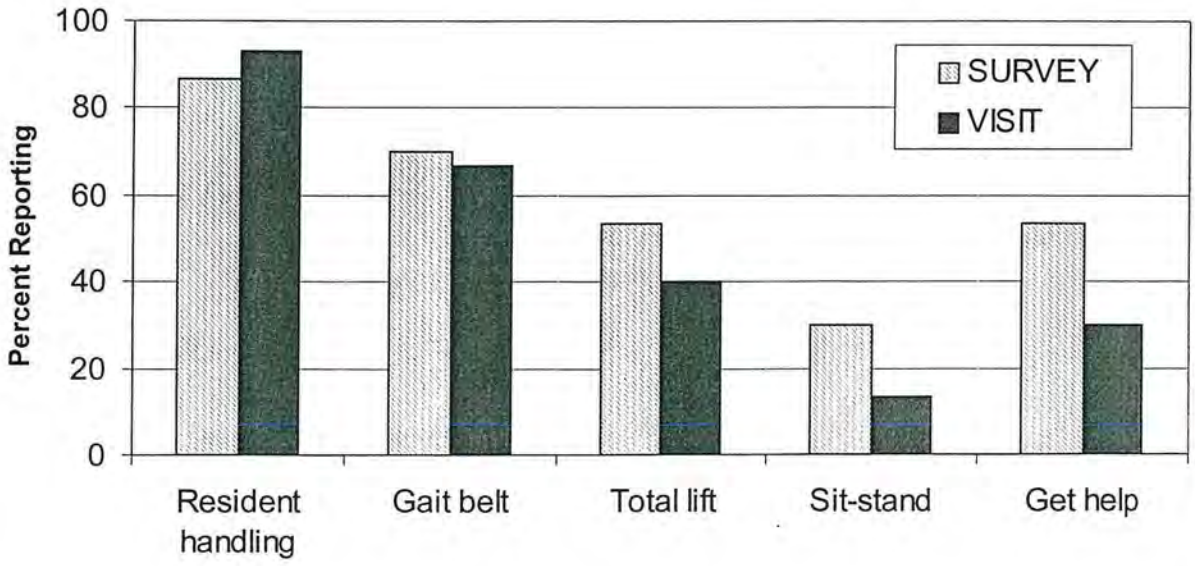


Figure 3a. Number of Hand-operated Total Lifts Between Nursing Home Groups

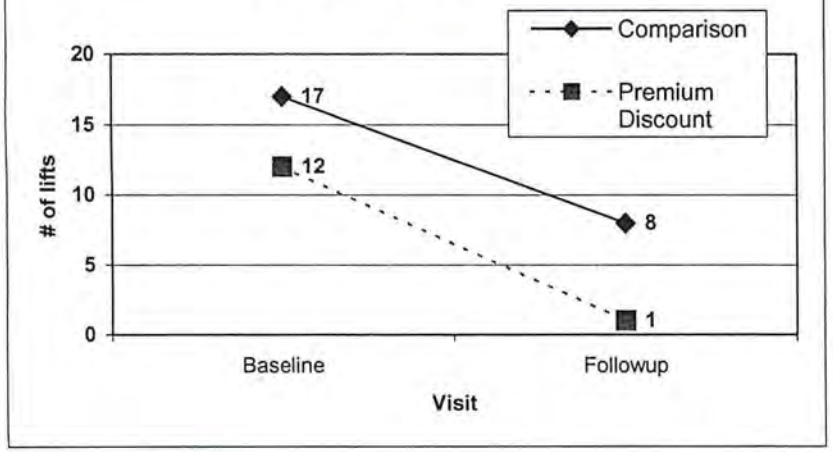


Figure 3b. Number of Battery-operated Total Lifts Among Nursing Home Groups

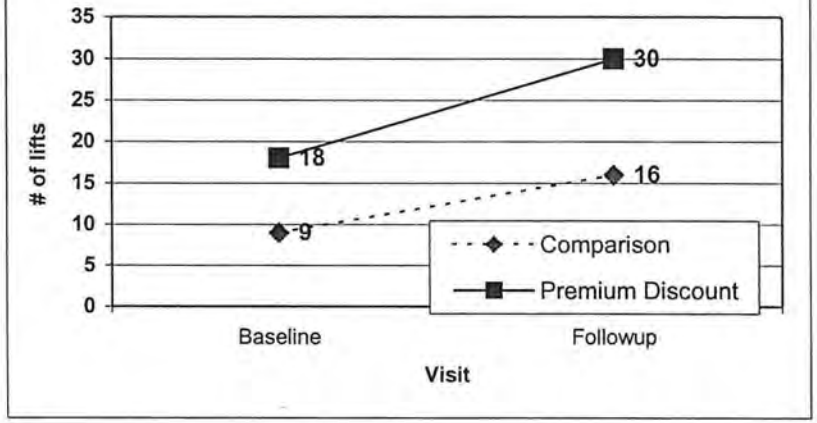


Figure 3c. Number of Mechanical Sit-to-Stand Lifts Among Nursing Home Groups

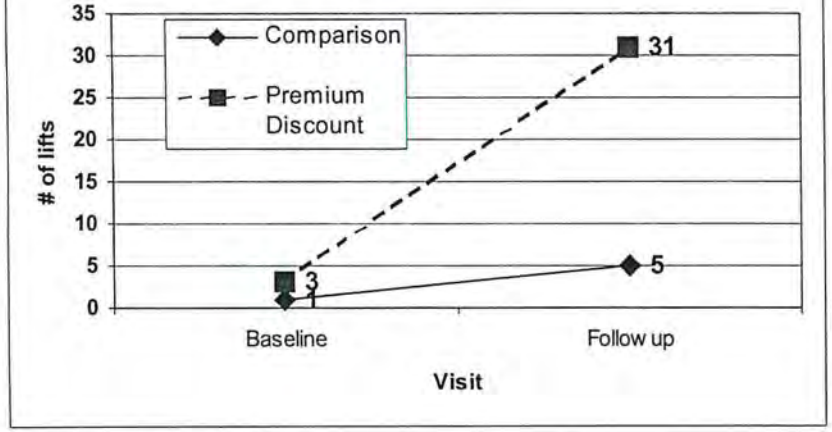


Figure 3d. Change in Equipment From Baseline to Follow-Up

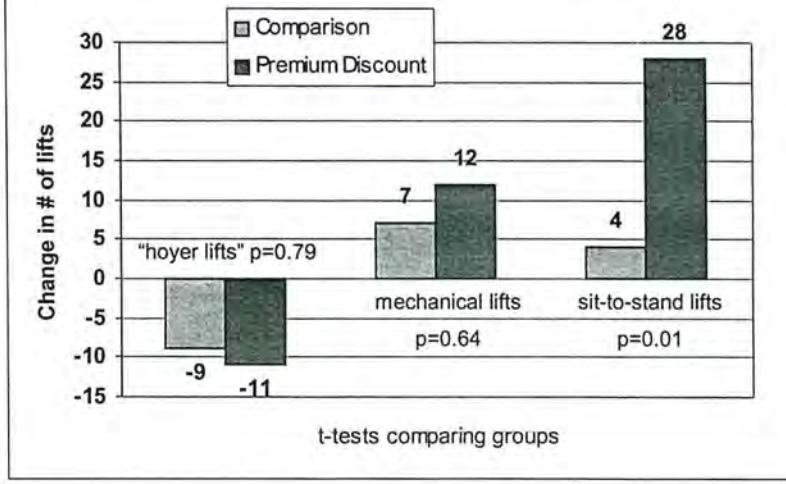


Figure 4. Reporting Barriers to Decreasing Injuries Related to Resident Handling at Round 2.

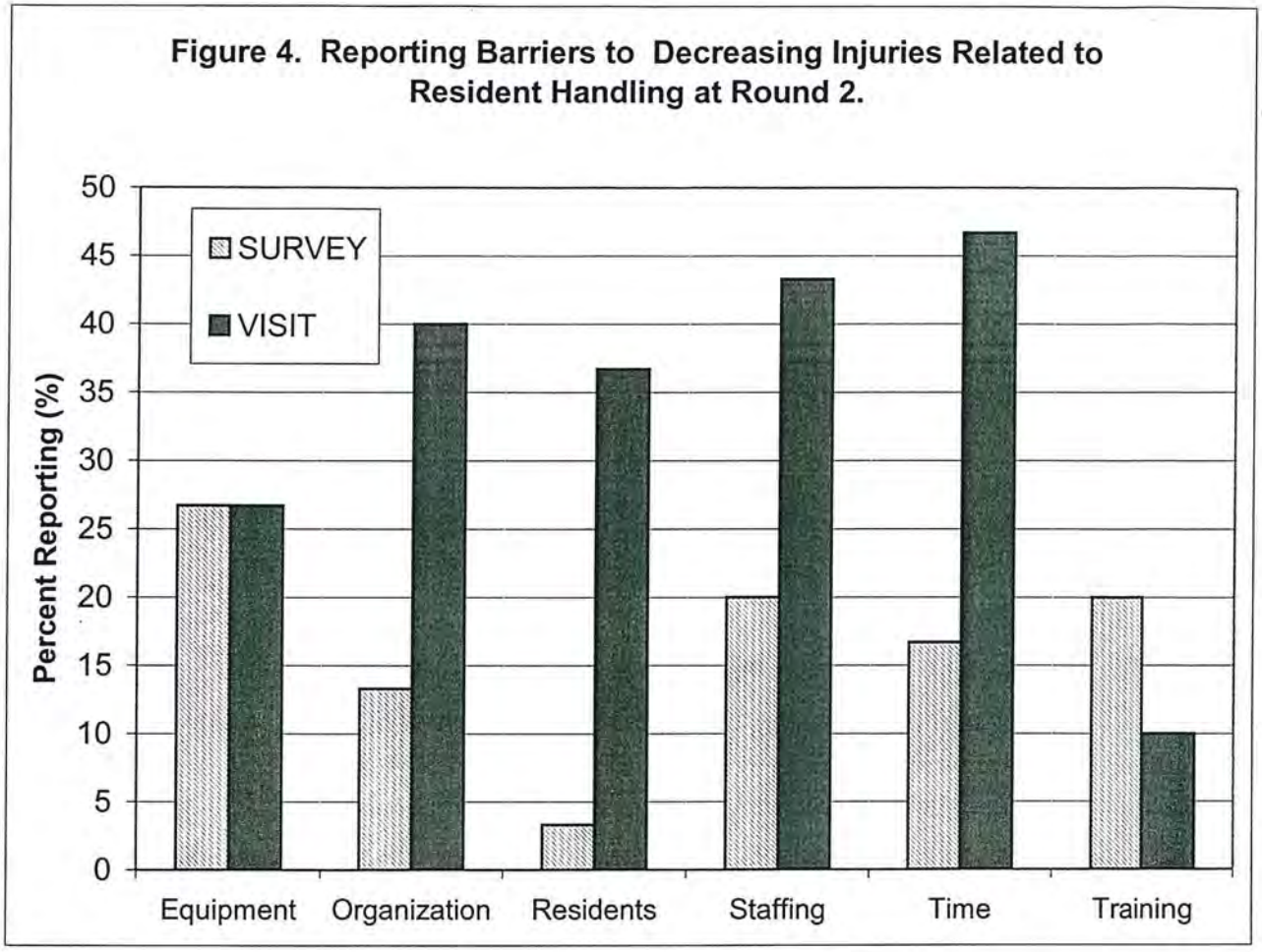


Figure 5a. PATH Analysis, Observations of Neutral Postures by Resident Transfer Type

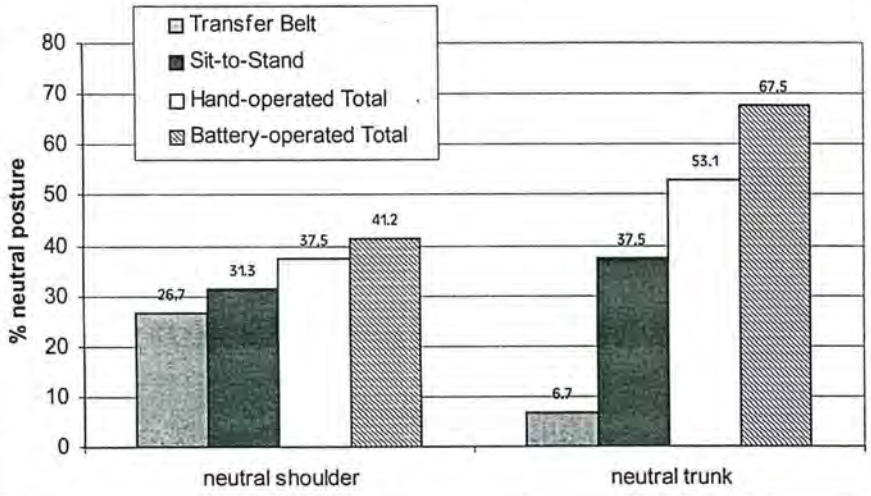


Figure 5b. Basline PATH Analysis, Observations of Shoulder Postures During Resident Handling Activities

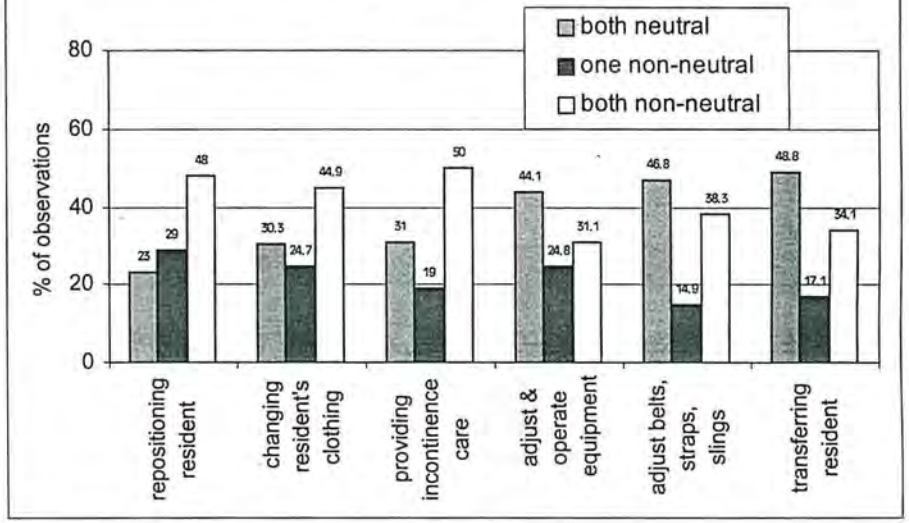


Figure 5c. Baseline PATH Analysis, Trunk Postures During Resident Handling Activities

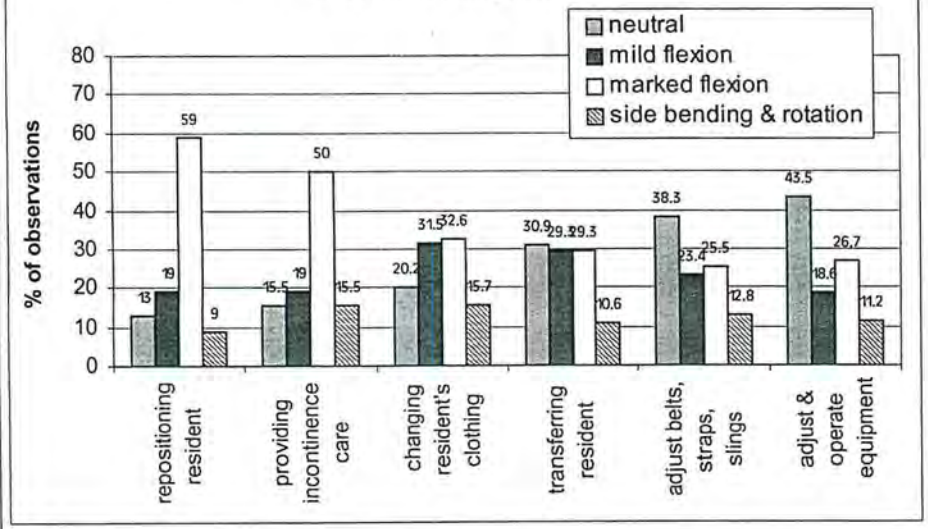


Figure 5d. Baseline PATH Analysis, Postures and Heavy Weights by Task

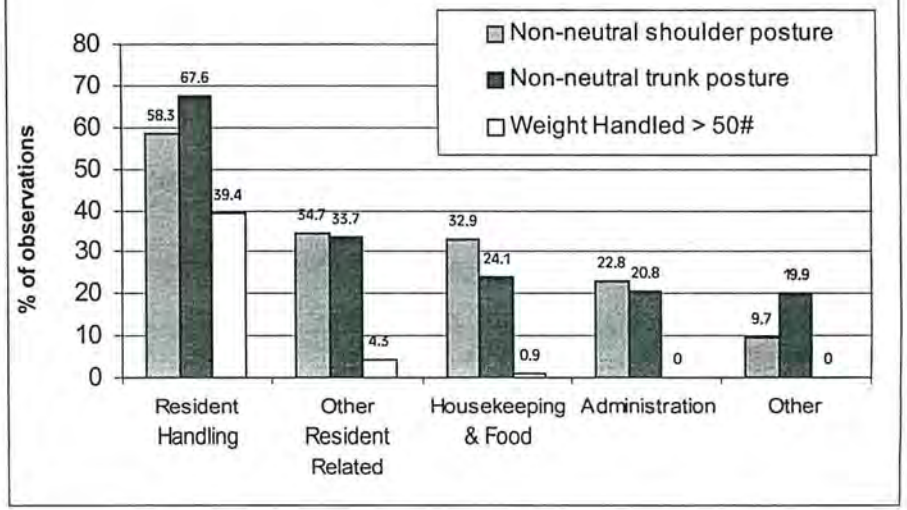


Figure 5e. Baseline PATH Analysis, Shoulder Posture and Weight Handled for All Facilities

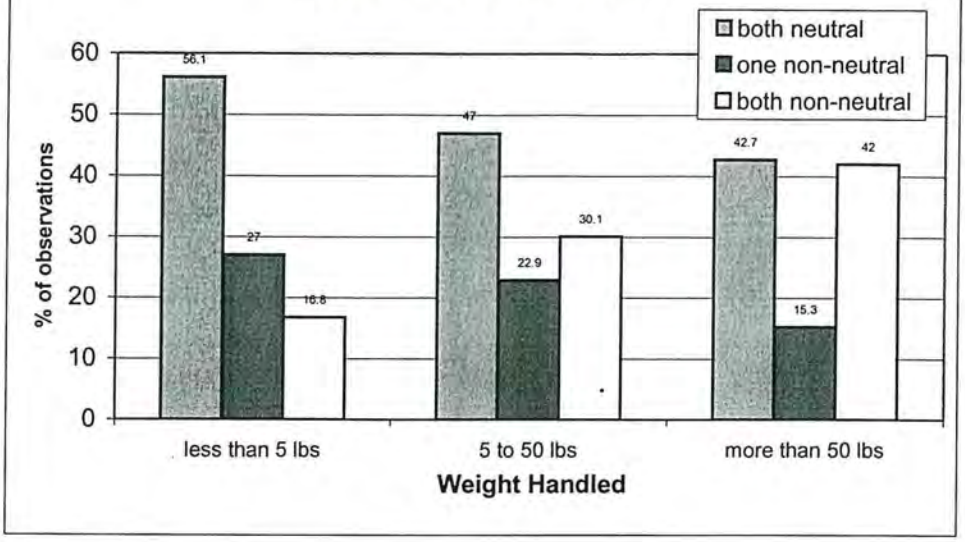


Figure 5f. Baseline PATH Analysis, Trunk Posture and Weight Handled for all Facilities

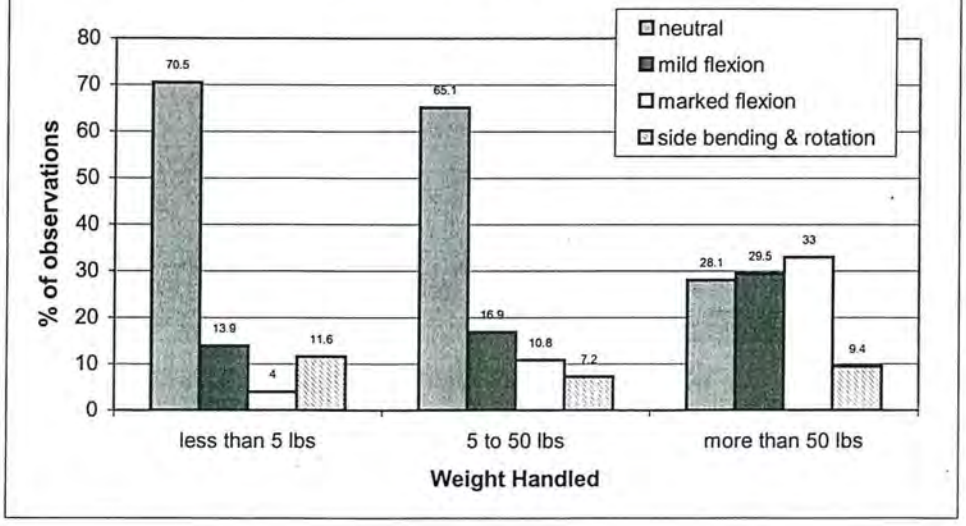


Figure 6a. Baseline PATH Analysis, Shoulder Postures in Resident Handling

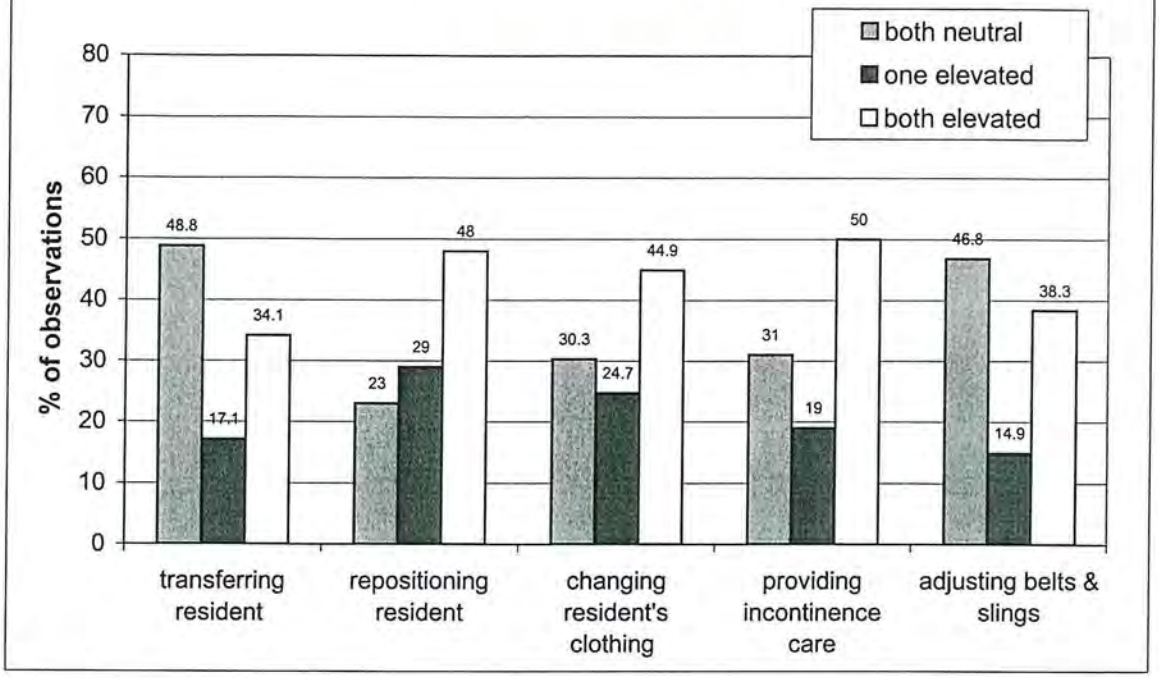


Figure 6b. Baseline PATH Analysis, Trunk Postures in Resident Handling

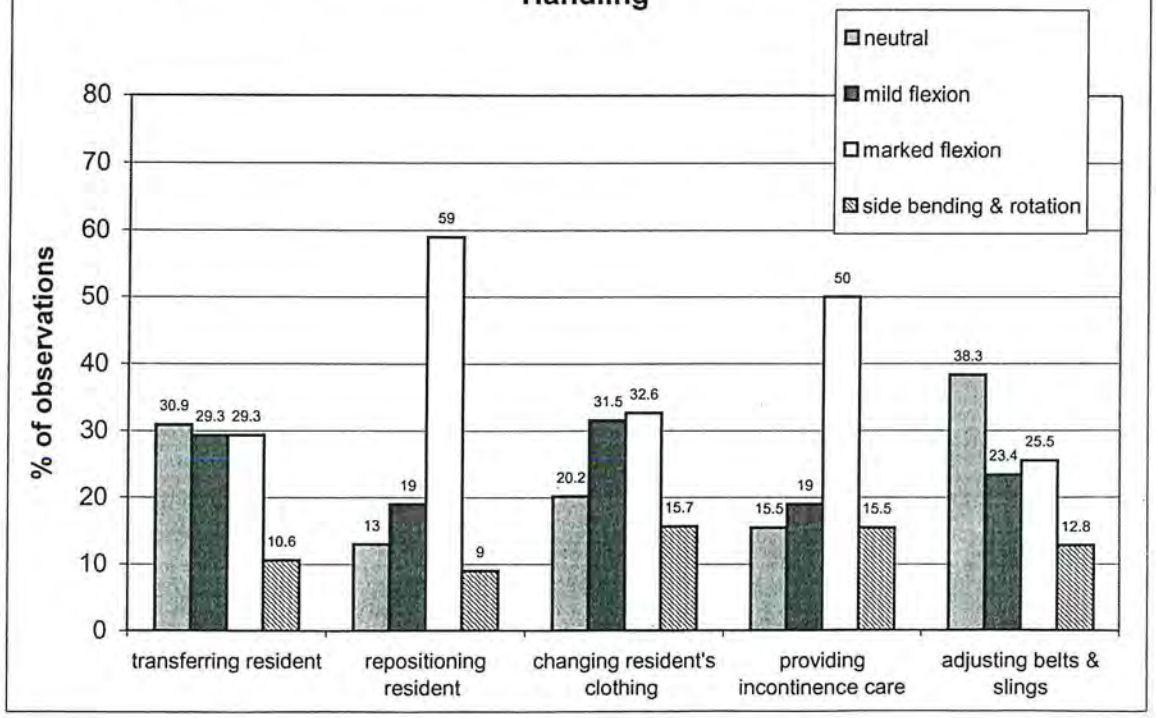


Figure 7a. PATH Analysis, Lifting in Primary Job Tasks

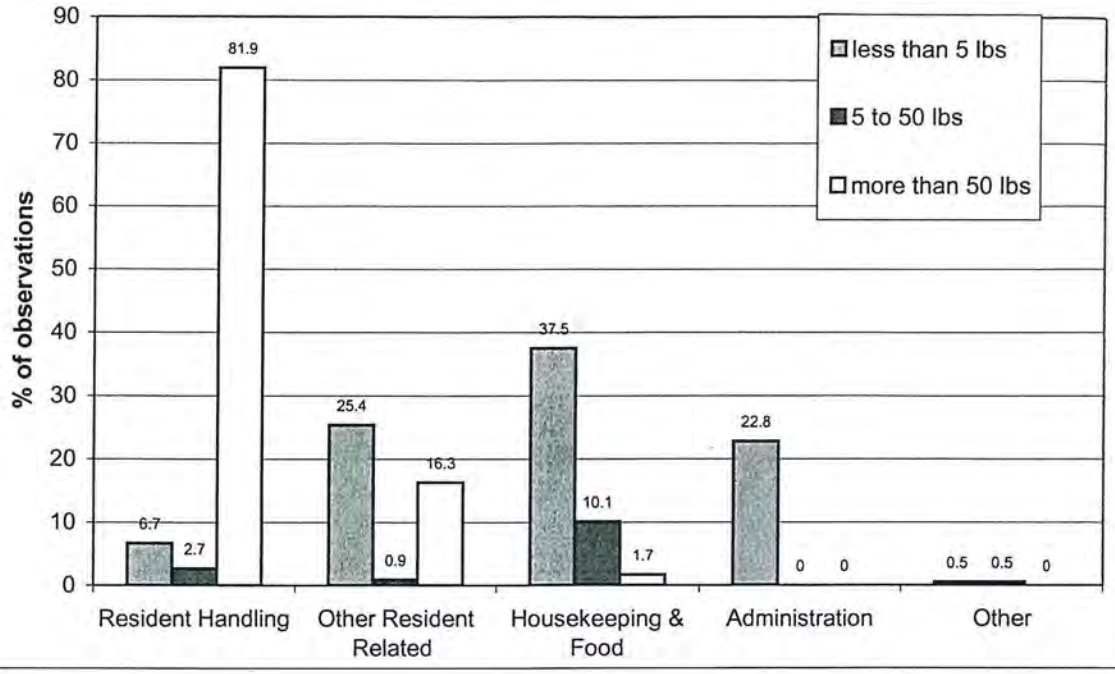
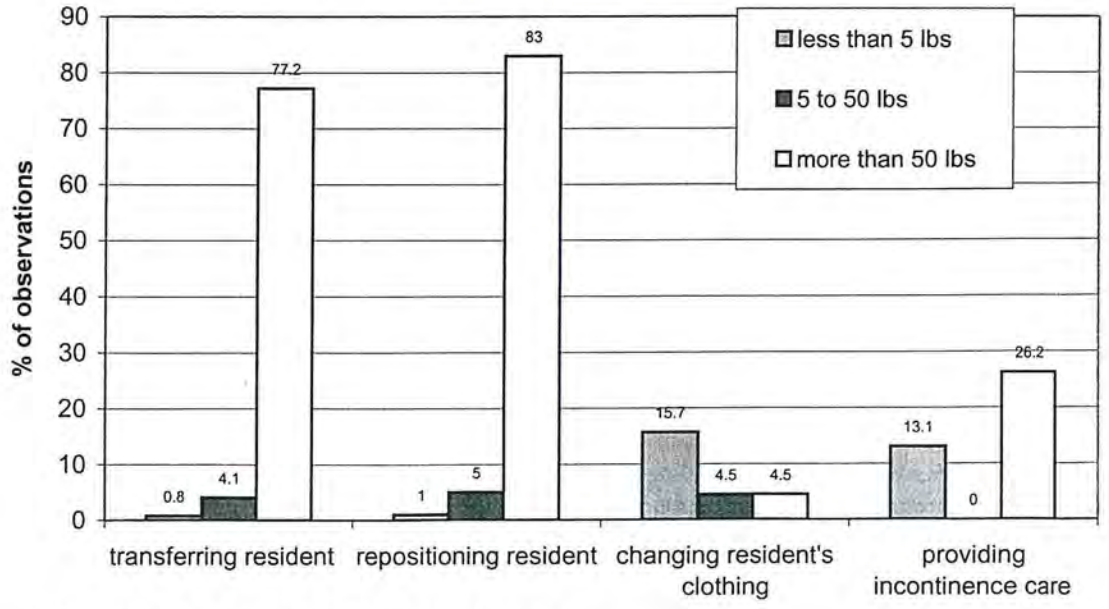
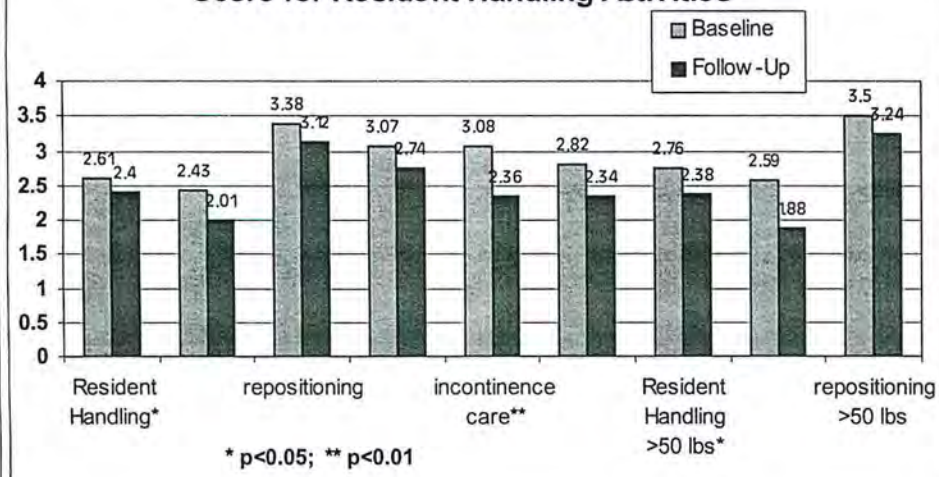


Figure 7b. PATH Analysis, Lifting During Resident Handling



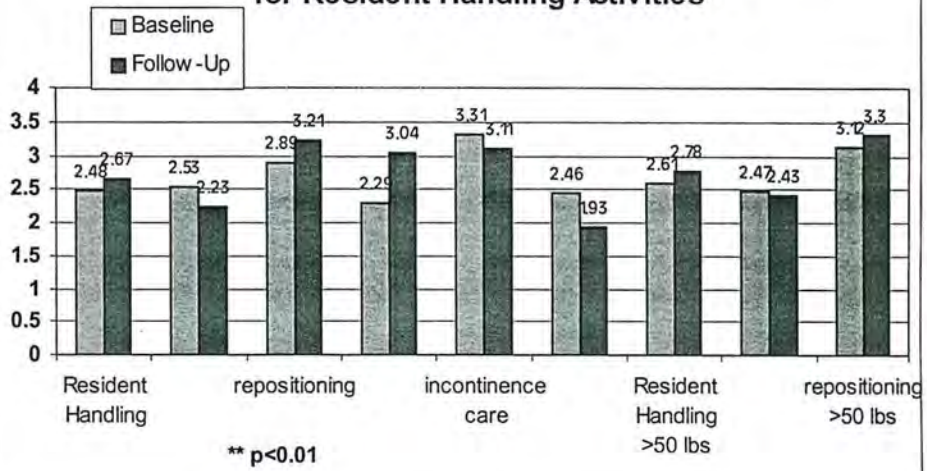
NOTE: data not availabe for adjusting belts & slings

Figure 8a. Premium Discount Group, Trunk Posture Score for Resident Handling Activities



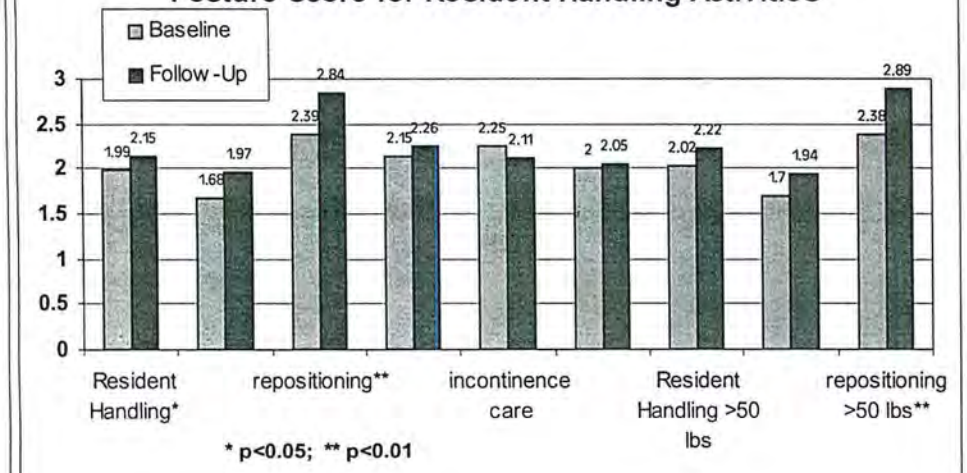
* p<0.05; ** p<0.01

Figure 8b. Comparison Group, Trunk Posture Score for Resident Handling Activities



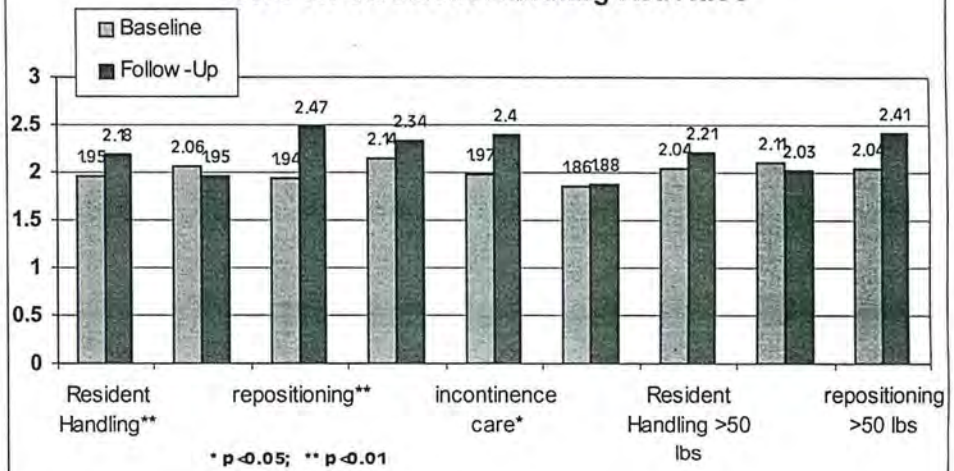
** p<0.01

Figure 8c. Premium Discount Group, Shoulder Posture Score for Resident Handling Activities



* p<0.05; ** p<0.01

Figure 8d. Comparison Group, Shoulder Posture Score for Resident Handling Activities



* p<0.05; ** p<0.01

Figure 9a. Premium Discount Group, Combined Exposure Score for Resident Handling Activities

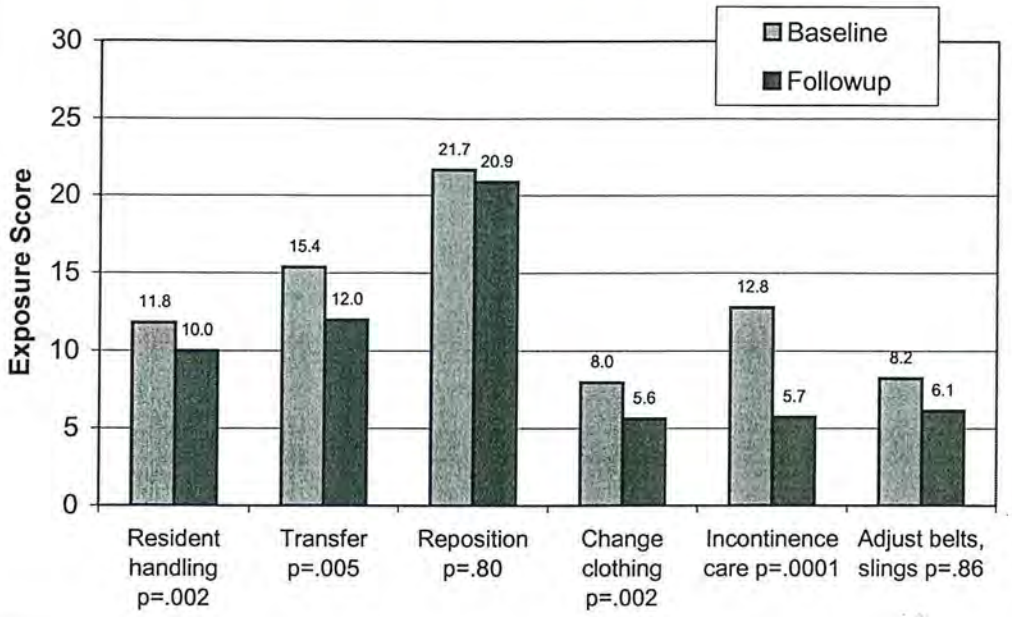


Figure 9b. Comparison Group, Combined Exposure Score for Resident Handling Activities

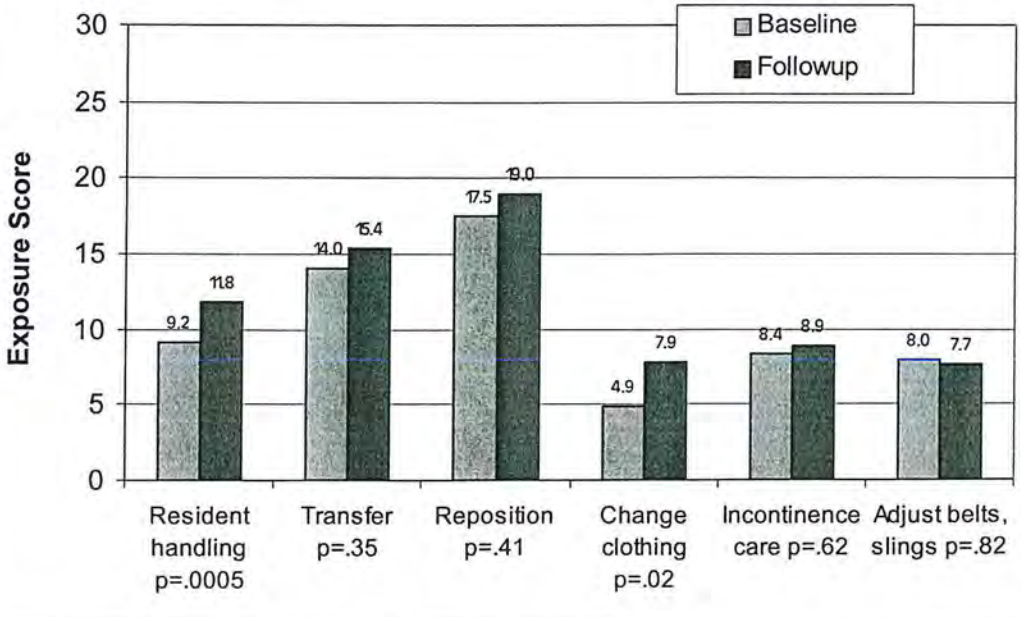
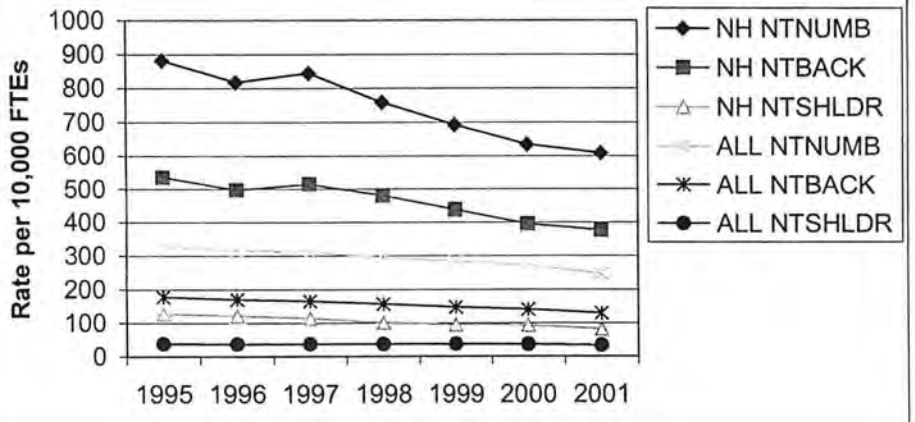


Figure 10a. Washington State Fund Nursing Homes & All Industries. Incidence Rates for Accepted WMSD Claims



10b. Washington State Fund Compensable Claims Rates: WMSDs 1995-2001

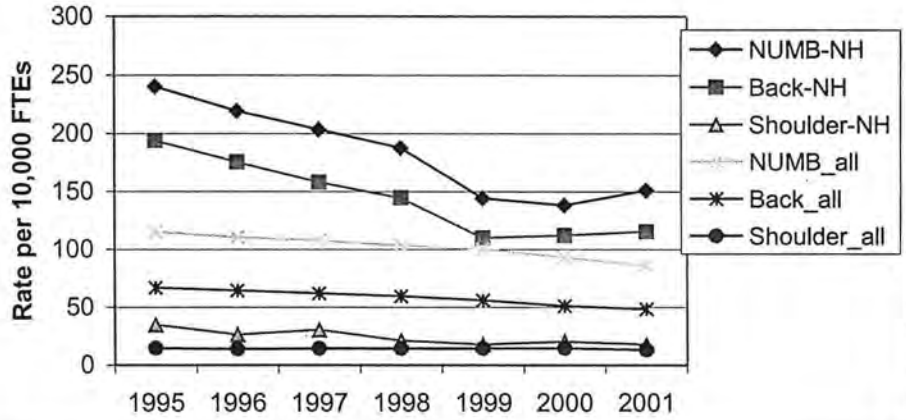


Figure 10c. Washington State Fund WMSD Severity Rates for Nursing Homes

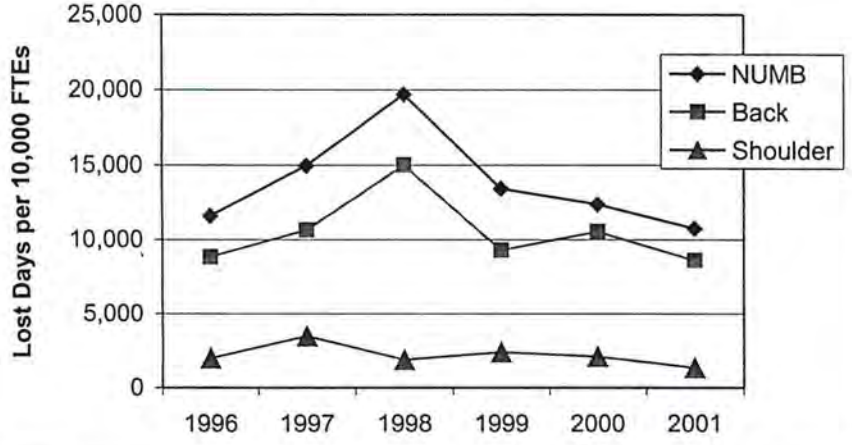


Figure 10d. Washington State Fund Nursing Home Accepted Claims Source =Other Person

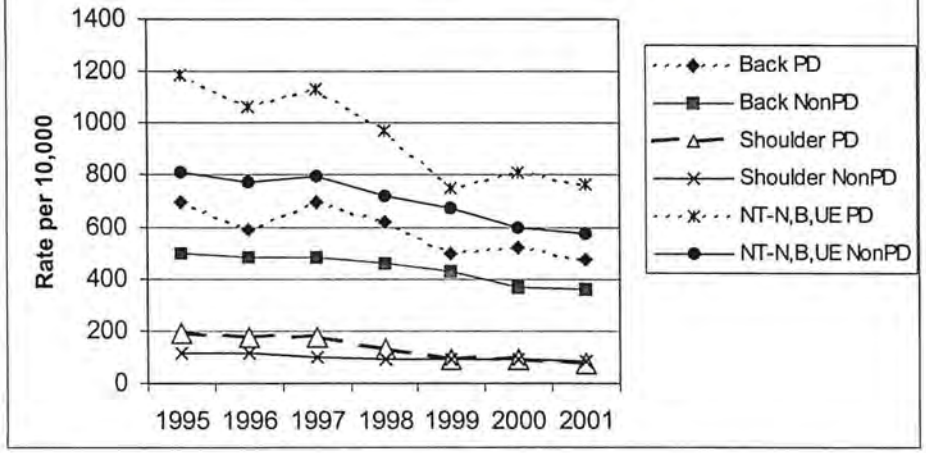


Figure 10e. Washington State Fund Nursing Homes Compensable Claims Rates, Source=Other Person

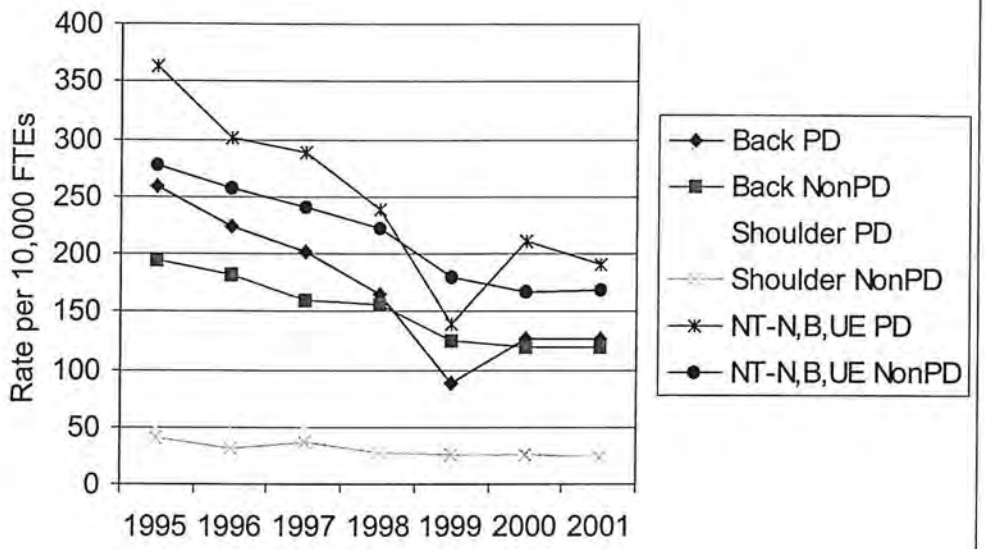


Table 1. Implementing Zero Lift: Key Components with Examples of Important Elements

EQUIPMENT	*COMMITMENT & INVOLVEMENT*
Adequate amount of handling devices appropriate for needs of residents and staff	Funds allocated for resources
Equipment easily accessible to staff	Members of management team understand & support philosophy of zero lift
Processes in place for:	Someone is accountable for program
Battery charging & replacement	Employees are involved with zero lift program:
Inspecting & laundering slings	Design, implementation
Maintenance & repair	Selection of equipment
	On-going feedback & improvement

POLICIES & ENFORCEMENT	*TRAINING*
Written policies & procedures on resident handling, including use of equipment	Training on resident handling, including equipment use, integrated into overall training & staff development program
Expected behaviors clearly communicated to all staff	Part of orientation
Noncompliance is investigated without assuming blame	Regular refresher training
Procedures for progressive discipline followed where appropriate	"Hands on" practice included
Resident assessment takes functional mobility and available equipment into account	Regular "skills checks" conducted
Up-to-date information on resident status communicated to all staff	ALL nursing staff know how to use equipment (not just NACs)
	Training on managing "difficult residents" is offered

MEDICAL CASE MANAGEMENT
Accidents are investigated to better understand root cause
Active case management with workers who are injured
Key personnel know about availability of equipment for handling:
Case managers, third party administrators
Medical care providers (physicians, therapists, etc.)
Alternative "light duty" work is available & promoted

Table 2. Project Overview: study components and population (nursing home is the unit of analysis), the intervention and comparison groups, and the data collection methods.

		Intervention Groups			No Intervention
	Industry wide	WHCA member	Job Modification Region	Premium Discount Region	Comparison Region
Year 1					
Calculate WC incidence & severity rates, 1995-1998	Yes	Yes	Yes	Yes	Yes
Baseline survey	Yes	Yes	Yes	Yes	Yes
Distribution of WHCA training materials	Most	Yes	Most	Most	Most
SHARP baseline site visit	No	30*	10+2	10+2	10+2
Report baseline results to participants	Yes	Yes	Yes	Yes	Yes
Year 2					
SHARP follow-up survey	Yes	Yes	Yes	Yes	Yes
SHARP follow-up site visits	No	30*	10+2	10+2	10+2
Report Year 2 survey results to participants	Yes	Yes	Yes	Yes	Yes
Year 3					
SHARP Follow-up survey	Yes	Yes	Yes	Yes	Yes
Report Year 3 survey results to participants	Yes	Yes	Yes	Yes	Yes
Report study results to participants	Yes	Yes	Yes	Yes	Yes
Year 4					
SHARP Follow-up survey 4	Yes	Yes	Yes	Yes	Yes
Report Year 4 survey results to participants	Yes	Yes	Yes	Yes	Yes
WC incidence & severity rates, 1995-2001	Yes	Yes	Yes	Yes	Yes
Report study results to participants	Yes	Yes	Yes	Yes	Yes

Table 3. Changes in Survey Instruments over Study Period

	SURVEY 1	*SURVEY 2*	*SURVEY 3*	*SURVEY 4*
Characteristics	# beds # residents # nursing personnel # NACs hired/year respondent tenure	# beds # residents # nursing personnel # NACs hired/year respondent tenure # administrators past 3 yrs # DNS past 3 yrs	# beds # residents # nursing personnel # NACs hired/year respondent tenure # administrators past 3 yrs # DNS past 3 yrs # SDC past 3 yrs	# beds # residents # nursing personnel # NACs hired/year respondent tenure # administrators past 3 yrs # DNS past 3 yrs # SDC past 3 yrs
Equipment	# hand-operated total lifts # mechanical total lifts # sit-to-stand lifts	# hand-operated total lifts # mechanical total lifts # sit-to-stand lifts	# hand-operated total lifts # mechanical total lifts # sit-to-stand lifts Self-rating scale	# hand-operated total lifts # mechanical total lifts # sit-to-stand lifts Self-rating scale
Policies & Enforcement	checklist provided	checklist provided	Self-rating scale	Self-rating
Training	checklist for content, methods, & frequency	checklist for content, methods, & frequency	Self-rating scale on Training	Self-rating scale on Training
Commitment & Envolvement	Is HSC involved in: investigating employee injuries? recommending equipment?	Is HSC involved in: investigating employee injuries? recommending equipment?	Self-rating scale on Commitment & Involvement Self-rating frequency HSC activities	Self-rating scale on Commitment & Involvement Self-rating frequency HSC activities
Case Management	missing	missing	Self-rating scale on Medical Case Management Self-rating on overall zero lift implementation	Self-rating scale on Medical Case Management Self-rating on overall zero lift implementation
Barriers	Barriers to decreasing injuries related to resident handling	Barriers to decreasing injuries related to resident handling	Barriers to decreasing injuries related to resident handling	Barriers to decreasing injuries related to resident handling

DNS = Director of Nursing Services, SDC = Staff Development Coordinator, HSC = Health & Safety Committee

Table 4. Case definitions for Workers compensation data

Body Part	Back	Shoulder
Nature	190, 260, 310,, 580, 995,999	
ICD-9 or CPT (SF only)	ICD9: 722.10, 722.73, 724, 724.2, 724.3, 724.5	ICD9: 726.1, 726.10, 727.61, 840.4, CPT: 23410, 23412, 23415, 23420
Type	100, 120,121,122,123,124,129,899-999	
Source	5900 (other person)	5900 (other person)

Table 5. Variables considered in logistic regression analysis

Variables	Variable name	Source	Years available
Year	YEAR	WC	1995-2001
Survey	SURVEY	Survey	1998-2001
Site visit by research staff	VISIT	Site visit database	1998-1999
Geographic region (n=6)	REGION	Admin	1995-2001
Elgible for premium discount (PD)	ELGIBLE	Admin	1998
NH accepted PD	ACCEPTPD	Admin	1998-1999
Profit vs nonprofit	FINSTATE	HCFA	1995-2001
Part of chain 3 or more	CHAIN	Admin	1995-2001
Financial * chain	FINXCHN	HCFA, Admin	1995-2001
Premium discount status	PDVSCOMP	Admin	1995-2001
Equipment rebate from WHCA	WHCAREB	WHCA	1996-2001
Number of resident beds	FACBEDS	Survey	1998-2001
Number of nursing staff	RNS,LPNS,NACS	Survey	1998-2001
Residents per NAC	NACRATIO	Survey	1998-2001
% female NACs	NACFEM	Survey	1998-2001
%NACs with english second language	NACESL	Survey	1998-2001
NAC turnover (NACs/# hired in last year)	NACTURN	Survey	1998-2001
NAC turnover score	NACTURN	Survey	1998-2001
# Administrators in previous 3 years	NUMADMIN	Survey	1999-2001
# Dir of Nursing last 3 yrs	NUMDNS	Survey	1999-2001
# staff devp coordinators	NUMSDC	Survey	2000-2001
Management turnover	TURMLMGT	Survey	2000-2001
# Hand crank lifts	HANDLIFT	Survey	1998-2001
# mechanical total lifts	MECHLIFT	Survey	1998-2001
# sit-to-stand lifts	SSLIFT	Survey	1998-2001
Mechanical Lifts per bed	LIFTBED	Survey	1998-2001
Total # lifts	SUMLIFT	Survey	1998-2001
Equipment score (sslift=2.5, crank=1)	EQUIPSCR	Survey	1998-2001
Self rated Policy score	RATEPOLI	Survey	2000-2001
Self-rated Training score	RATETRNG	Survey	2000-2001
Manage difficult residents	COMRES	Survey	1998-1999

Table 5 continued

Variables	Variable name	Source	Years available
Training sum frequency, kind, followup	SUMTRNG	Survey	1998-1999
Self-rated Equipment score 1-5	RATEEQUP	Survey	2000-2001
Self-rated management commitment /employee involvement score	RATE MCEI	Survey	2000-2001
Self-rated medical case management	RATECASE	Survey	2000-2001
Self-rated zero lift score	RATEZERO	Survey	2000-2001
Low mobility	BEDFAST	HCFA	2002
Pressure sores	PRESORES	HCFA	2002
Behavioral symptoms	BEHSX	HCFA	2002
# of deficiencies on state survey	NUMDEF	HCFA	2001-2002
Premium discount 1998 +	PDA	Admin	1998-2001
Premium discount 1999 +	PDEFF	Admin	1999-2001
H&S committee investigates injury	SHCINV	Survey	2000-2001
H&S committee discusses handling	SHCDISS	Survey	2000
H&S comm rec equip	SHCREC	Survey	2000
H&S comm discuss prevention	SHCPREV	Survey	2000
Small vs large homes	Bedgp	Survey	1998-2001
Claims rate 1995-1997	Pre-rate	Admin	
Self-insured/state fund	liab	Admin	1995-2001
Lifts per NAC	Handliftnacs Ssliftnacs Mechssliftnacs sumliftnacs	Survey	1998-2001
Lifts per bed	Handliftbed Ssliftbed Mechssliftbed sumliftbed	Survey	1998-2001

Table 6. Use of Videos in Resident Handling Training for NACs, Surveys 1-2.

	WHCA member	RETRO member		WHCA Record of Getting to Zero Video		Use any video in resident handling training		Name "Getting to Zero" video	
		#	(%)	#	(%)	#	(%)	#	(%)
Survey 1	196	146	(74.5)	74	(37.6)	61	(31.1)	4	(2.0)
Survey 2	195	145	(74.4)	73	(37.4)	130	(66.7)	11	(5.6)

Table 7. Number of Lifting Equipment Rebates Provided by WHCA over Study Period

	1996	1997	1998	1999	2000	2001	Total
JOBMOD	0	0	0	0	1	1	2
PD	0	0	2	6	5	6	19
Comparison	1	0	11	20	11	25	68
Total	1	0	13	26	17	32	89

Table 8. Study Facilities at Baseline Compared to All Facilities in Washington State and the United States

	United States*	Washington State* (n=278)	Facilities Meeting Study Definition (n=245)	Eligible for Premium Discount but Refused (n=19)	Accepted Premium Discount (n=34)	Comparison Group (n=210)
% For-Profit	65.2%	68.7%	80.8%	73.7% (a++)	94.1%	79.0%
% Nonprofit	28.3%	23.0%	19.2%	26.3%	5.9%	21.0%
% Multifacility Owned	55.3%	67.6%	55.5%	***57.9%(a+)***	***82.4%***	***51.0% (b**)***
% For-Profit AND Multifacilty	N/A	N/A	51.8%	***52.6%(a++)***	***82.4%***	***47.1%(b***)***
% Government	6.6%	8.3%	N/A	N/A	N/A	N/A
Mean # Beds	107	94	100	102	102	100
Mean # Residents	88	76	83	97	83	83
Median Occupancy	87.2%	83.9%	87.5%	85.9%	82.2%	87.6%
Mean # RNs	7	8	13	9	12	13
Mean # LPNs	12	10	11	14	12	11
Mean # NACs	35	36	42	47	42	42

Chi-Square Analysis
(a) + PD vs Eligible but non PD p<0.10, ++ <0.05
*(b) Premium Discount vs Comparison ** p<0.01, ***p<0.001*

* Source: HCFA's Online Survey, Certification and Reporting Data (March 1997) reported by the American Health Care Association

Table 9. Populations Surveyed and Response Rates

	SURVEY 1 (1998)			SURVEY 2 (1999)			SURVEY 3 (2000)			SURVEY 4 (2002)		
L&I Geographic Region (Exclusive Categories)	***# responses***	***# facilities***	***rate***	***# responses***	***# facilities***	***rate***	***# responses***	***# facilities***	***rate***	***# responses***	***# facilities***	***rate***
Region 1 (comparison)	37	39	94.9%	36	39	92.3%	33	39	84.6%	31	38	81.6%
Region 2 (comparison)	62	69	89.9%	64	69	92.8%	60	68	88.2%	48	64	75.0%
Region 3 (premium discount)	35	37	94.6%	36	37	97.3%	34	35	97.1%	33	35	94.3%
Region 4 (3 counties in premium discount)	32	35	91.4%	33	35	94.3%	31	35	88.6%	29	35	82.9%
Region 5 (comparison)	37	39	94.9%	38	38	100.0%	35	38	92.1%	32	36	88.9%
Region 6 (comparison)	19	26	73.1%	25	26	96.2%	24	26	92.3%	19	25	76.0%
TOTAL FOR SURVEY	**222**	**245**	**90.6%**	**232**	**244**	**95.1%**	**217**	**241**	**90.0%**	**192**	**233**	**82.4%**

Study Group (Exclusive Categories)	***# responses***	***# facilities***	***rate***	***# responses***	***# facilities***	***rate***	***# responses***	***# facilities***	***rate***	***# responses***	***# facilities***	***rate***
Premium Discount	31	35	88.6%	33	34	97.1%	33	34	97.1%	34	34	100%
All Others	191	210	91.0%	199	210	94.8%	184	207	88.9%	158	199	79.4%
TOTAL FOR SURVEY	**222**	**245**	**90.6%**	**232**	**244**	**95.1%**	**217**	**241**	**90.0%**			**82.4%**

Financial Status	***# responses***	***# facilities***	***rate***	***# responses***	***# facilities***	***rate***	***# responses***	***# facilities***	***rate***	***# responses***	***# facilities***	***rate***
Not for Profit	42	47	89.4%	45	47	95.7%	42	46	91.3%	36	47	76.6%
For Profit	180	198	90.9%	187	197	94.9%	175	195	89.7%	156	186	83.9%
Chain Membership	120	136	88.2%	134	143	93.7%	129	143	90.2%	117	141	83.0%

	Discount				Discount				Discount				Discount			
Beds & Residents	***Mean***	***(sd)***	***Mean***	***(sd)***	***Mean***	***(sd)***	***Mean***	***(sd)***	***Mean***	***(sd)***	***Mean***	***(sd)***	***Mean***	***(sd)***	***Mean***	***(sd)***
# Beds	102	41.4	100	44.0	101	35.4	99	42.3	98	36.5	96	40.4	98.1	36.8	96.1	40.6
(median beds)	***89.0***		***96.0***		***96.0***		***95.0***		***96.0***		***95.0***		***96.0***		***95.0***	
# Residents	83	36.4	83	38.7	85	34.9	85	37.4	83	35.2	84	37.0	83.9	35.5	82.0	36.3
% Occupancy	0.82	0.13	0.84	0.14	0.83	0.13	0.87	0.12	***0.83****	0.12	***0.88****	0.11	*84.1*	9.9	85.6	12.8
Nursing Personnel	***Mean***	***(sd)***	***Mean***	***(sd)***	***Mean***	***(sd)***	***Mean***	***(sd)***	***Mean***	***(sd)***	***Mean***	***(sd)***	***Mean***	***(sd)***	***Mean***	***(sd)***
# RNs	12	6.8	14	11.9	12	6.4	12	7.2	11	6.0	11	6.3	10.2	6.6	9.3	6.4
# LPNs	12	8.2	11	6.5	11	6.4	11	7.0	11	7.4	11	7.1	12.4	8.4	10.6	6.0
# NACs	42	23.4	42	23.0	43	23.0	42	22.8	43	19.7	41	20.5	45.4	24.2	42.2	22.7
Nursing Assistants & Turnover	***Mean***	***(sd)***	***Mean***	***(sd)***	***Mean***	***(sd)***	***Mean***	***(sd)***	***Mean***	***(sd)***	***Mean***	***(sd)***	***Mean***	***(sd)***	***Mean***	***(sd)***
NAC/res ratio	2.2	1.0	2.4	2.8	2.1	0.6	2.2	1.4	2.0	0.4	2.2	0.6	2.0	0.7	2.1	0.9
NAC turnover	1.09	0.56	0.99	1.4	1.14	0.7	0.98	0.6	1.2	0.9	1.2	1.1	1.0	0.7	0.8	0.6
# administrators past 3 yrs	question not asked on this survey				2.4	1.2	2.0	1.3	2.2	1.2	2.1	1.4	**2.5**+	1.8	**2.0**+	1.4
# DNS past 3 yrs	question not asked on this survey				2.1	1.2	2.1	1.2	2.0	1.1	2.0	1.3	1.9	1.3	1.8	1.1
% WHCA equipment rebate	5.7%		5.2%		17.7%		9.5%		14.7%		5.8%		17.7%		12.8%	

+ $p<0.10$, * $p < 0.05$ on t-test comparing groups

Table 11. Survey Nursing Home ZeroLift Ratings Premium Discount Status

	Survey 1		Survey 2		Survey 3		Survey 4		ANOVA sig
	PD	Comparison	PD	Comparison	PD	Comparison	PD	Comparison	
Sit-stands/100 beds	0.34	0.4	1.9	0.7****	2.7	1.1****	2.0	1.4*	PD, year
Elec total lift/100 beds	0.8	1.2	1.9	1.8	2.5	2.1	3.8	3.3	year
Electric combo/100 beds	1.1	1.5	3.9	2.5**	5.1	3.2****	5.9	4.7*	PD year
Self Rating of ZeroLift Implementation (1 none-5 very much)									
Overall ZeroLift					4.0	2.9****	3.9	3.4**	PD,year
Equipment					3.9	3.1***	3.8	3.4*	PD,year
Training					3.8	3.4*	3.8	3.5*	
Management Commit/ Employee Involvement					3.7	2.7****	3.8	3.5	PD, year
Safety committee involvement (1-20)					15.0	15.0	16.9	16.4	
Policies					3.6	3.4	4.0	3.6*	PD
Case Management					4.2	3.8@	4.3	4.0@	PD

@p<0.1, *p<0.05, **p<0.01, ***p<0.001 ****p<0.0001

Table 12. Comparability of Premium Discount and Comparison Nursing Homes Participating in Site Visits

	Premium Discount (n=34)	Comparison (n=16)
% Chain	82.4%*	57.1%
% For Profit	90.2%	81.0%
% For Profit Chain	79.4% @	57.1%
Mean # of beds	99	103
Mean # Residents	83	84
Median Occupancy	83.3%	81.8%
Mean # RNs	11	13
Mean # LPNs	10	11
Mean # NACs	43	42
NAC Turnover	114%@	82.5%
Resident/NAC ratio	2.1±0.59	2.1 ±0.52
# Administrators in past 3 years	2.4±1.2	2.0±1.1

*p<0.05, @ p<0.10

Table 13. Nursing Home Characteristics: Site visits Compared to Surveys

A. Round 1 (n=30)

	SURVEY 1		*VISIT 1*	
Variable	**Mean**	**Std Dev**	***Mean***	***Std Dev***
Nursing assistant turnover	0.9	0.5	*0.8*	*0.4*
Total # barriers	1.0	0.9	*2.0*	*1.2*
Total # manual total lifts	1.5	1.6	*1.5*	*1.6*
Total # electric total lifts	1.2	1.6	*1.3*	*1.5*
Total # sit-to-stand lifts	0.3	0.8	*0.2*	*0.6*
Total # policies	2.4	1.4	*2.1*	*1.1*
Total # enforcement strategies	3.3	2.2	*2.9*	*1.1*
Total # components & frequency of training	6.0	2.1	*3.2*	*1.4*

B. Round 2 (n=50)

	SURVEY 2		*VISIT 2*	
Variable	**Mean**	**Std Dev**	***Mean***	***Std Dev***
Nursing assistant turnover	1.2	1.29	*1.3*	*1.17*
# Administrators past 3 years	2.3	1.17	*2.7*	*1.58*
# DNS past 3 years	2.1	1.31	*2.4*	*1.44*
Total # barriers	1.1	1.24	*0.5*	*0.58*
Total # manual total lifts	1.3	1.65	*1.1*	*1.53*
Total # electric total lifts	1.6	1.35	*2.0*	*1.44*
Total # sit-to-stand lifts	1.3	1.82	*2.7*	*2.08*
Total # policies	3.1	0.96	*2.6*	*1.18*
Total # enforcement strategies	4.3	1.93	*4.3*	*1.26*
Total # components & frequency of training	6.5	1.65	*5.9*	*2.65*

Table 14A. Components of ZeroLift: Comparison of Survey to Visits, Round 1, Categorical Variables (n=30)

Variable	*SURVEY %*	*VISIT %*	% agree	Kappa	p
Committee investigates injuries	77	80	77	0.31	0.08
Committee involved with equipment	57	20	50	0.07	0.58
Have policies on resident handling	87	93	82	0.27	0.11
Have policy on transfer belts	70	67	57	0.00	1.00
Have policy on total assist lifts	53	40	47	-0.05	0.77
Have policy on sit-stand lifts	30	13	63	-0.04	0.82
Hold supervisor responsible	40	10	57	-0.03	0.80
Physical therapy followup	50	17	53	0.07	0.62
Retraining	77	60	50	-0.12	0.48
Individual counseling	70	57	60	0.16	0.38
Verbal warning	50	77	53	0.07	0.67
Written reprimand	57	67	43	-0.09	0.60
Training on body mechanics	97	63	67	0.11	0.18
Training on ergonomics	47	3	50	-0.07	0.34
Training on total lifts	67	57	50	-0.05	0.79
Training on sit-stand lifts	33	10	70	0.18	0.20
Training on communication with residents	90	10	20	0.02	0.54
Training includes demonstration	77	80	70	0.12	0.52
Follow-up on training	70	3	27	-0.07	0.12
New employee traning	70	53	57	0.11	0.52
Refresher traning at least annually	47	37	57	0.12	0.51
Training includes hands-on practice	87	93	87	0.27	0.11
Offer training on difficult residents	93	87	87	0.27	0.11
Equipment as barrier	27	27	67	0.15	0.42
Staffing as barrier	20	43	57	0.06	0.71
Training as barrier	20	10	77	0.10	0.54
Time as barrier	17	47	50	-0.05	0.74
Residents as barrier	3	37	67	0.11	0.18
Management tenure < 3 years	***43***	***39***	***87***	***0.63***	***0.001***

Table 14B. Components of ZeroLift: Comparison of Survey to Visits, Round 2 Categorical Variables (n=50)

Variable	SURVEY %	VISIT %	% agree	Kappa	p
Committee investigates injuries	86.3				
Committee involved with equipment	68.6				
Have policies on resident handling	94	98	92	-0.03	0.80
Have policies on transfer belts	88	41	41	-0.04	0.64
Have policy on total assist lifts	90	71	69	0.06	0.58
Have policy on sit-stand lifts	***41***	***51***	***67***	***0.34***	***0.02***
Hold supervisor responsible	65	51	49	-0.03	0.85
Physical therapy followup	63	46	44	-0.10	0.46
Retraining	88	98	88	N/A	N/A
Individual counseling	84	86	74	-0.02	0.89
Verbal warning	69	82	54	-0.20	0.14
Written reprimand	61	76	58	0.04	0.76
Training on body mechanics	96	80	80	0.11	0.27
Training on ergonomics	49	47	51	0.02	0.90
Training on total lifts	98	86	84	-0.04	0.69
Training on sit-stand lifts	***51***	***69***	***67***	***0.33***	***0.01***
Training on communication with resident	90	77	67	-0.16	0.19
Training includes demonstration	80	47	39	-0.17	0.11
Follow-up on training	57	61	57	0.11	0.43
New employee training	84	84	73	-0.04	0.79
Refresher training at least annually	43	43	45	-0.12	0.40
Training includes hands-on practice	78	51	49	-0.03	0.79
Offer training on difficult residents	***98***	***88***	***90***	***0.26***	***0.01***
Equipment as barrier	18	8	75	-0.12	0.34
Training as barrier	14	6	80	-0.09	0.48
Staffing as barrier	14	22	73	0.07	0.63
Time as barrier	22	2	76	-0.04	0.60
Residents as barrier	14	0	86	N/A	N/A
Administrator tenure <3 years	***74.5***	***78.4***	***80***	***0.46***	***0.001***

Table 15. Comparison of Surveys to Visits, Continuous Variables

A: Round 1 (n=30)

Variable	Pearson	p	Spearman	p
Nursing assistant turnover	0.07	0.78	0.03	0.90
Total # barriers	0.03	0.86	0.06	0.77
Total # manual total lifts	0.33	0.07	0.28	0.13
Total # electric total lifts	***0.77***	***<0.001***	***0.73***	***<0.001***
Total # sit-to-stand lifts	***0.70***	***<0.001***	***0.77***	***<0.001***
Total # policies	-0.17	0.38	-0.16	0.40
Total # enforcement strategies	-0.21	0.28	-0.21	0.27
Total policy "score"	-0.19	0.33	-0.21	0.26
Total components & frequency of training	0.10	0.61	0.06	0.75

B: Round 2 (n=50)

Variable	Pearson	p	Spearman	p
Nursing assistant turnover	0.06	0.70	***0.32***	***0.03***
# Administrators past 3 years	***0.62***	***0.00***	***0.66***	***0.00***
# DNS past 3 years	***0.71***	***0.00***	***0.66***	***0.00***
Total # barriers	0.13	0.36	0.12	0.42
Total # manual total lifts	***0.68***	***<0.001***	***0.58***	***<0.001***
Total # electric total lifts	***0.63***	***<0.001***	***0.68***	***<0.001***
Total # sit-to-stand lifts	***0.46***	***0.01***	***0.47***	***0.00***
Total # policies	0.10	0.48	0.25	0.07
Total # enforcement strategies	0.02	0.91	0.04	0.79
Total # components & frequency training	-0.07	0.64	-0.08	0.56

Table 16. Domain Canonical Correlations between Site Visits and Surveys

Domain	P value (first)	Canonical Correlation	Adjusted Canonical Correlation	Variable	Survey Standardized Canonical Coefficient	Site Visit Standardized Canonical Coefficient
Commitment/ Involvement (9)	0.6	0.91	0.86	Committee investigates injuries	-0.07	0.15
				Committee involved in selecting equipment	0.40	0.41
				Management tenure	0.76	0.74
				Training identified as barrier	-0.10	-0.37
				Equipment identified as barrier	0.25	0.62
				Organization inferred as barrier	0.21	0.39
				Staffing identified as barrier	-0.37	0.16
				Time identified as barrier	0.25	0.35
				Residents identified as barrier	-0.2	-0.17
Equipment Subscore (3)	<0.0001	0.91	0.90	Manual lifts	0.11	0.16
				Electric total lifts	0.84	0.90
				Electric sit-to-stand lifts	0.69	0.54
Policy Subscore (4)	0.6	0.50	0.22	Have policy on resident handling	0.02	-0.46
				Have policy on transfer belt	-0.98	0.24
				Have policy on electric total assist	-0.25	-0.49
				Have policy on sit-to-stand	0.59	1.00

Table 16 continued

Domain	P value (first)	Canonical Correlation	Adjusted Canonical Correlation	Variable	Survey Standardized Canonical Coefficient	Site Visit Standardized Canonical Coefficient
Policy Enforcement (6)	0.3	0.73	0.58	Hold supervisor responsible	0.35	0.74
				Physical therapy follow-up	-0.07	0.39
				Retraining	0.96	-0.07
				Individual counseling	-1.24	0.06
				Warning	-0.54	0.10
				Reprimand	0.82	-0.52
Training Subscores (3)	0.06	0.66	0.60	Total components & frequency	-0.51	-0.43
				Includes hands-on practice	0.96	0.01
				Train on manage difficult residents	0.56	0.89
All 5 Summary Scores	<0.005	0.86	0.81	Commitment/involvement score	-0.20	-0.16
				Policy score	-0.08	0.18
				Enforcement score	-0.06	-0.26
				Equipment score	0.92	0.96
				Training score	0.02	0.06

Table 17. PATH Analysis. Number of Observations Per Site

	Premium Discount		Comparison		
Facility visits	Baseline	Followup	Baseline	Follow-up	Total
1	183	177	165	184	709
2	251	152	128	178	709
3	125	161	141	182	609
4	188	182	174	151	695
5	171	151	169	193	684
6	143	137	183	195	658
7	164	172	160	122	618
8	201	146	140	191	678
Total	1426	1278	1260	1396	5360
Mean	178.25	159.75	157.5	174.5	167.5
St. Dev	38.29	15.98	19.15	25.36	26.47

Table 18. Study Groups Compared at Baseline on Percentages of PATH Observations of Tasks, Resident Handling Activities, and Load

	STUDY GROUP						
% observations in category	***Comparison***			***Premium Discount***			***M-W test***
Tasks	***mean***	***std dev***	***std err***	***mean***	***std dev***	***std err***	***p value***
Resident Handling	20.8	9.7	3.4	24.0	5.9	2.1	0.65
Other Resident Related	***38.1***	***13.1***	***4.6***	***53.1***	***9.3***	***3.3***	***0.04***
Housekeeping & Food	***30.1***	***17.3***	***6.1***	***12.1***	***7.0***	***2.5***	***0.01***
Administration	3.2	2.8	1.0	4.3	3.1	1.1	0.57
Other Task or Activity	16.1	22.2	7.9	6.6	1.2	0.4	0.28

	STUDY GROUP						
% observations in category	***Comparison***			***Premium Discount***			***M-W test***
Activities	***mean***	***std dev***	***std err***	***mean***	***std dev***	***std err***	***p value***
transferring resident	4.2	2.2	0.8	5.1	2.1	0.7	0.38
repositioning resident	2.8	2.0	0.7	4.6	2.7	0.9	0.23
changing resident's clothing	2.8	2.1	0.8	3.7	1.9	0.7	0.20
providing incontinence care	2.3	2.0	0.7	4.0	3.4	1.2	0.33
(created post hoc)							
adjusting transfer belts/slings	2.8	2.0	0.7	1.5	1.6	0.6	0.20

	STUDY GROUP						
% observations in category	***Comparison***			***Premium Discount***			***M-W test***
Load	***mean***	***std dev***	***std err***	***mean***	***std dev***	***std err***	***p value***
less than 5#	23.8	9.7	3.4	19.0	8.3	2.9	0.44
five to 5 to 50#	4.1	3.1	1.1	2.4	1.7	0.6	0.33
greater than 50#	8.8	4.9	1.7	12.9	6.0	2.1	0.13

Table 19. Study Groups Compared at Baseline on Percentages of PATH Posture Observations

	STUDY GROUP						
% observations	*Comparison*			*Premium Discount*			*M-W test*
Shoulder Posture	*mean*	*std dev*	*std err*	*mean*	*std dev*	*std err*	*p value*
both neutral	62.0	11.4	4.0	63.8	7.6	2.7	0.65
one elevated	17.3	5.3	1.9	18.2	3.1	1.1	0.65
both elevated	20.8	9.5	3.4	18.0	7.5	2.7	0.65

	STUDY GROUP						
% observations	*Comparison*			*Premium Discount*			*M-W test*
Trunk Posture	*mean*	*std dev*	*std err*	*mean*	*std dev*	*std err*	*p value*
neutral	63.0	8.4	3.0	61.4	14.3	5.1	0.80
mild flexion	15.2	6.3	2.2	16.3	4.1	1.4	0.44
marked flexion	11.1	5.7	2.0	13.2	8.5	3.0	0.88
side bend & rotation	10.7	7.1	2.5	9.2	5.2	1.8	0.80

	STUDY GROUP						
% observations	*Comparison*			*Premium Discount*			*M-W test*
Leg Posture	*mean*	*std dev*	*std err*	*mean*	*std dev*	*std err*	*p value*
stand	61.3	7.6	2.7	67.7	6.7	2.4	0.06
lunge	1.1	1.0	0.4	1.4	1.2	0.4	0.96
squat	2.3	1.7	0.6	3.8	2.5	0.9	0.23
walk	22.0	5.8	2.1	18.5	3.4	1.2	0.20
kneel	0.6	0.8	0.3	1.0	0.8	0.3	0.28
sit	12.8	7.7	2.3	7.6	6.7	2.4	0.18

Table 20. Percent of Observations in Different Tasks, PATH Analysis. Premium Discount & Comparison Group Baseline & Follow-up

COMPARE GROUPS BY VISIT

	Premium Discount (n=8)			Comparison (n=8)	
Task/Activity	***Baseline***	***Followup***	***Task/Activity***	***Baseline***	***Followup***
Resident handling	**11.8	10.0	**Resident handling**	***9.2	11.8
Transfer	**15.4	12.0	Transfer	14.0	15.4
Reposition p=.80	21.7	20.9	Reposition	17.5	19.0
Change clothing	**8.0	5.6	**Change clothing**	*4.9	7.9
Incontinence care	***12.8	5.7	Incontinence care	8.4	8.9
Adjust belts, slings	8.2	6.1	Adjust belts, slings	8.0	7.7

COMPARE VISITS BY GROUPS

	Baseline			Follow-up	
Task/Activity	***PD***	***Comp***	***Task/Activity***	***Premium Discount***	***Comparison***
Resident handling	***11.8	9.2	**Resident handling**	*10.0	11.8
Transfer	15.4	14.0	**Transfer**	*12.0	15.4
Reposition	**21.7	17.5	Reposition	20.9	19.0
Change clothing	***8.0	4.9	**Change clothing**	*5.6	7.9
Incontinence care	*10.2	6.4	**Incontinence care**	***5.7	8.9
Adjust belts, slings	8.2	8.0	Adjust belts, slings	6.1	7.7

* p<0.05, ** p<0.01, ***p<0.001

Table 21. Descriptive statistics for the non-imputed and imputed data

	Non-imputed data					Imputed data (all 9 files combined)			
variable	**mean**	**sd**	**min**	**max**	**N**	**mean**	**sd**	**min**	**max**
finstate	80.80%		0	1	912	80.80%		0	1
chain	58.80%		0	1	912	58.80%		0	1
pdvscomp	14.50%		0	1	912	14.50%		0	1
facbeds	100.8	39.9	20	265	912	100.8	39.9	20	265
numres	85.9	35.9	11	225	840	94.0	76.6	2.06	1258.40
sameadmn	40.35%		0	1	912	40.35%		0	1
c4sn.d	9.65%		0	1	508	9.78%		0	1
liab	41.67%		0	2	912	41.67%		0	2
(More than 2 DNS) numdns.d	30.49%		0	1	587	30.23%		0	1
(More than 2 Admin) numadmn.d	27.75%		0	1	609	27.73%		0	1
shcinvst.d	88.57%		0	1	385	88.67%		0	1
shcdisc.d	89.03%		0	1	383	89.55%		0	1
shcrec.d	66.67%		0	1	372	67.57%		0	1
shcprev.d	93.95%		0	1	380	94.37%		0	1
dicotomous rate > 2 rateequp.d	79.22%		0	1	385	79.43%		0	1
dicotomous rate > 2 ratetrng.d	87.24%		0	1	384	87.72%		0	1
dicotomous rate > 2 ratepoli.d	87.82%		0	1	386	88.23%		0	1
dicotomous rate > 2 ratemcei.d	70.50%		0	1	383	71.17%		0	1
dicotomous rate > 2 ratecase.d	93.26%		0	1	386	93.40%		0	1
dicotomous rate > 2 ratezero.d	78.39%		0	1	384	78.39%		0	1
c4bnlogit	-3.29	0.74	-5.49	-1.42	505	-3.20	0.77	-5.49	-1.42
c4nnlogit	-3.05	0.67	-5.40	-1.42	505	-2.98	0.69	-5.40	-1.42
logrtc4bt	6.91	4.83	0	13.92	507	6.46	5.03	0	13.92
logrtc4nt	7.93	4.44	0	14.07	507	7.00	4.94	0	14.07
handnacs	-3.48	0.91	-5.66	-1.10	798	-3.49	0.94	-5.66	-1.10

.d = dichotomous variable

Table 21 continued

	Non-imputed data					Imputed data (all 9 files combined)			
variable	mean	sd	min	max	N	mean	sd	min	max
mechnacs	-3.03	0.91	-5.53	0.14	808	-3.00	0.91	-5.53	0.14
ssnacs	-3.67	0.93	-5.71	-1.24	794	-3.64	0.92	-5.71	-1.24
totalpt1ln	1.42	0.60	0	3.33	546	1.41	0.60	0	3.33
numsdc	1.99	1.19	0	6.00	377	1.99	1.18	0	6.00
bedfast	7.17	6.67	0	33.00	214	7.25	6.66	0	33.00
presores	9.98	4.81	0	27.00	214	10.01	4.86	0	27.00
behsx	28.50	17.60	0	77.00	197	27.52	17.42	0	77.00
numdef	9.44	6.67	0	34.00	219	9.44	6.65	0	34.00
hirenac	40.40	29.06	0	200.00	621	39.49	27.76	0	200.00
nacs	43.55	21.75	12	150.00	908	43.52	21.75	12	150.00
totalpt	3.99	3.50	0	27.00	546	3.92	3.38	0	27.00
occu	85.83%	12.25%	13.10%	100.00%	840	93.23%	57.00%	1.86%	723.70%
nacturn	97.12%	66.94%	0.00%	616.67%	618	99.19%	70.44%	0.00%	646.20%
logturn	-0.23	0.67	-2.56	1.82	614	-0.24	0.73	-4.40	1.87
turnscrr	0.57	2.59	-3	4	912	-1.03	1.33	-3	4
numadmdns	0.58	0.74	0	2	584	0.58	0.74	0	2
numsdc.d	0.69	0.46	0	1	912	0.65	0.48	0	1
turmlmgt	1.13	0.97	0	3	584	1.11	0.96	0	3
handlift	1.14	1.42	0	10.00	798	1.15	1.48	0	17.77
mechlift	1.97	1.95	0	14.00	808	2.03	2.04	0	19.41
sslift	0.96	1.46	0	8.00	794	0.97	1.43	0	10.32
mechssl	2.91	2.88	0	22.00	792	2.99	2.92	0	23.73
sumlift	4.01	2.89	0	23.00	781	4.14	2.98	0	23.73
equipscr	7.35	6.16	0	49.00	781	7.62	6.27	0	49.61
mechsslnacs	-2.74	0.99	-5.48	0.44	792	-2.69	0.98	-5.48	0.44
sumliftnacs	-2.24	0.67	-4.26	0.44	781	-2.20	0.68	-4.41	0.44
equipscrnacs	-1.67	0.95	-4.26	3.27	780	-1.61	0.95	-4.26	3.27
shctotal	3.37	1.00	0	4	367	3.40	0.96	0	4

Table 21 continued

		Non-imputed data				Imputed data (all 9 files combined)			
variable	mean	sd	min	max	N	mean	sd	min	max
sumzero	4.97	1.56	0	6	378	4.98	1.52	0	6
finxchn	55.26%		0	1	912	55.26%		0	1
pda	14.47%		0	1	912	14.47%		0	1
pdeff	10.86%		0	1	912	10.86%		0	1
bedgr.sm	30.37%		0	1	912	30.37%		0	1
bedgr.lg	20.18%		0	1	912	20.18%		0	1
prnew	64.75%		0	1	777	66.24%		0	1
prnewest	17.32%		0	1	777	17.82%		0	1
prec4bn.l	0.11	0.07	0.01	0.55	752	0.11	0.07	0.01	0.55
prec4nn.l	0.13	0.08	0.02	0.55	752	0.13	0.08	0.02	0.55
prec4sn.l	0.02	0.02	0.00	0.12	752	0.02	0.02	0.00	0.12
prec4sn.d	0.23	0.42	0	1	752	0.23	0.42	0	1
prec4bn.t1	0.32	0.47	0	1	753	0.32	0.47	0	1
prec4bn.t2	0.34	0.47	0	1	752	0.34	0.47	0	1
prec4nn.t2	0.36	0.48	0	1	752	0.36	0.48	0	1
prec4nn.t1	0.31	0.46	0	1	752	0.31	0.46	0	1
nacratio	2.11	0.63	0.17	6.5	836	2.27	1.35	0.17	10.40

Table 22. Compensable Back Claims Among NACs with Source=Other Person, 1995-2001 Univariate Models with Non-imputed Data

With prerate	as continuous			With year			With bedgroup			With year and bedgroup		
Variable name	*Description*	*Coef.*	*p-val.*	*Coef.*	*p-val.*		*Coef.*	*p-val.*		*Coef.*	*p-val.*	
handnacs	logit((handlift+1/2)/(nacs+1))	0.1641	**<0.001**	0.1663	**<0.001**	***	0.1297	**0.002**	**	0.1314	**0.004**	**
mechnacs	logit((mechlift+1/2)/(nacs+1))	0.0327	0.4	0.0632	0.2		0.0120	0.8		0.0349	0.4	
ssnacs	logit((sslift+1/2)/(nacs+1))	0.0803	**0.05**	0.1075	**0.02**	*	0.0432	0.3		0.0621	0.1	
mechsslnacs	logit((mechsslift+1/2)/(nacs+1))	0.0207	0.6	0.0538	0.2		0.0052	0.9		0.0296	0.5	
sumliftnacs	logit((sumlift+1/2)/(nacs+1))	0.1318	0.05	0.1901	**0.007**	**	0.1028	0.1		0.1532	**0.03**	*
equipscrnacs	logit((equipscore+1/2)/(nacs+1))	0.0416	0.4	0.0793	**0.1**		0.0259	0.5		0.0573	0.2	
prnew	mechssl/sumlift	-0.1782	0.07	-0.1725	0.1		-0.1778	0.06		-0.1724	0.1	
prnewest	sslift/sumlift	-0.1634	0.3	-0.1462	0.4		-0.1837	0.2		-0.1715	0.3	
pdvscomp	PD	-0.1117	0.2	-0.1175	0.2		-0.1037	0.2		-0.1087	0.2	
pda	PD after 1997	-0.1117	0.2	-0.1175	0.2		-0.1037	0.2		-0.1087	0.2	
pdeff	PD after 1998	-0.2579	**0.007**	-0.2386	**0.02**	*	-0.2470	**0.009**	**	-0.2288	**0.02**	*
finstate	Financial status	0.1147	0.2	0.1147	0.2		0.1268	0.1		0.1235	0.2	
chain	Chain	0.1887	**0.02**	0.1888	**0.02**	*	0.1978	**0.006**	**	0.1957	**0.006**	**
finxchn	finstate * chain	0.1707	**0.03**	0.1717	**0.03**	*	0.1780	**0.01**	*	0.1761	**0.01**	*
facbeds	Number of beds	-0.0053	**<0.001**	-0.0054	**<0.001**	***	-0.0037	**0.04**	*	-0.0039	**0.04**	*
occu	numres/facbeds	-0.5119	0.1	-0.4707	0.2		-0.6324	**0.03**	*	-0.5984	0.05	
nacratio	numres/nacs	0.27405	**<0.001**	0.27479	**<0.001**	***	0.32306	**<0.001**	***	0.32315	**<0.001**	***
sameadmn	Same administrator	-0.1336	0.08	-0.1266	0.10		-0.1558	**0.02**	*	-0.1490	**0.03**	*
nacturn	hirenac/nacs	0.1890	**0.001**	0.1811	**0.001**	***	0.1844	**0.001**	***	0.1754	**0.002**	**
logturn	ln of nacturn	0.1832	**0.003**	0.1748	**0.004**	**	0.1888	**0.001**	***	0.1792	**0.001**	***
turnscrr	nacturn categorized	0.0005	1.0	0.0063	0.6		0.0040	0.8		0.0098	0.5	
numdns_d	numdns > 2 or 1,2	0.0137	0.9	0.0176	0.8		0.0149	0.9		0.0186	0.8	
numadmn_d	numadmn > 2 or 1,2	0.1953	**0.03**	0.1877	**0.04**	*	0.2224	**0.01**	*	0.2158	**0.01**	*

Table 22 continued

With prerate	**as continuous**			**With Year**		**With bedgroup**		**With year and bedgroup**	
Variable name	*Description*	*Coef.*	*p-val.*	*Coef.*	*p-val.*	*Coef.*	*p-val.*	*Coef.*	*p-val.*
numadmdns	sum(numadmn_d+numdns_d)	0.0717	0.2	0.0709	0.2	0.0817	0.2	0.0813	0.2
numsdc	Number of SDCs	0.0643	0.1	0.0536	0.2	0.1174	**0.003** **	0.1071	**0.008** **
numsdc_d	numsdc > 2 or 1,2	0.1224	0.05	0.2060	**0.04** *	0.1338	**0.03** *	0.2213	**0.02** *
turmlmgt	sum(numadmn_d+numdns_d+numsdc_d)	0.0799	0.07	0.1140	**0.02** *	0.0920	**0.03** *	0.1269	**0.009** **
shcinvst_d		-0.0290	0.9	0.0019	1.0	-0.0988	0.5	-0.0703	0.7
shcdisc_d	All binary 1,2 vs. 3-5	-0.1681	0.3	-0.1274	0.4	-0.1850	0.2	-0.1488	0.3
shcrec_d		-0.2045	0.08	-0.2167	0.06	-0.2205	**0.04** *	-0.2314	**0.03** *
shcprev_d		-0.1134	0.6	-0.0711	0.7	-0.0711	0.7	-0.0312	0.9
shctotal	Total of the shc binaries	-0.0598	0.2	-0.0519	0.3	-0.0712	0.2	-0.0635	0.2
rateequp_d		0.1057	0.4	0.1563	0.2	0.0793	0.5	0.1250	0.3
ratetrng_d		-0.1162	0.5	-0.0474	0.8	-0.0802	0.6	-0.0186	0.9
ratepoli_d	All binary 1,2 vs. 3-5	-0.2952	0.09	-0.2486	0.2	-0.3086	**0.04** *	-0.2695	0.09
ratemcei_d		-0.0791	0.5	-0.0043	1.0	-0.0372	0.7	0.0338	0.8
ratecase_d		-0.0978	0.6	-0.0486	0.8	-0.1900	0.3	-0.1445	0.4
ratezero_d		0.0747	0.6	0.1318	0.3	0.0536	0.7	0.1047	0.4
sumzero	Total of the rate binaries	-0.0150	0.6	0.0061	0.9	-0.0156	0.6	0.0035	0.9
totalpt	Physical therapists	-0.0057	0.6	-0.0050	0.6	0.0020	0.8	0.0026	0.8
bedfast	Low mobility	-0.0128	0.3			-0.0101	0.4		
presores	Pressure sores	0.0014	0.9			0.0037	0.8		
behsx	Behavioural symptoms	-0.0025	0.6			-0.0041	0.3		
numdef	# of deficiences	0.0224	**0.03**			0.0191	**0.05**		

Table 23. Compensable Back Claims Among NACs with Source=Other Person, 1995-2001 Univariate Models with Non-imputed Data, Tricotomous

With prerate	as trichotonomous			With year			With bedgroup			With year and bedgroup		
Variable name	*Description*	*Coef.*	*p-val.*	*Coef.*	*p-val.*		*Coef.*	*p-val.*		*Coef.*	*p-val.*	
handnacs	logit((handlift+1/2)/(nacs+1))	0.1632	**<0.001**	0.1661	**<0.001**	***	0.1308	**0.002**	**	0.1330	**0.004**	**
mechnacs	logit((mechlift+1/2)/(nacs+1))	0.0428	0.3	0.0732	0.1		0.0177	0.7		0.0403	0.4	
ssnacs	logit((sslift+1/2)/(nacs+1))	0.0855	**0.04**	0.1114	**0.01**	*	0.0461	0.2		0.0640	0.1	
mechsslnacs	logit((mechsslift+1/2)/(nacs+1))	0.0282	0.5	0.0604	0.2		0.0095	0.8		0.0332	0.4	
sumliftnacs	logit((sumlift+1/2)/(nacs+1))	0.1355	**0.04**	0.1922	**0.006**	**	0.1051	0.1		0.1551	**0.02**	*
equipscrnacs	logit((equipscore+1/2)/(nacs+1))	0.0476	0.3	0.0834	**0.09**		0.0295	0.5		0.0596	0.2	
prnew	mechssl/sumlift	-0.1630	0.1	-0.1621	0.2		-0.1724	0.08		-0.1707	0.1	
prnewest	sslift/sumlift	-0.1558	0.3	-0.1482	0.4		-0.1841	0.2		-0.1793	0.3	
pdvscomp	PD	-0.1467	0.1	-0.1524	0.1		-0.1422	0.1		-0.1473	0.1	
pda	PD after 1997	-0.1467	0.1	-0.1524	0.1		-0.1422	0.1		-0.1473	0.1	
pdeff	PD after 1998	-0.2833	**0.004**	-0.2687	**0.01**	**	-0.2784	**0.005**	**	-0.2645	**0.01**	*
finstate	Financial status	0.1221	0.2	0.1224	0.2		0.1385	0.1		0.1358	0.1	
chain	Chain	0.1999	**0.01**	0.2002	**0.01**	*	0.2046	**0.005**	**	0.2031	**0.005**	**
finxchn	finstate * chain	0.1691	**0.03**	0.1703	**0.03**	*	0.1769	**0.01**	*	0.1755	**0.01**	*
facbeds	Number of beds	-0.0054	**<0.001**	-0.0054	**<0.001**	***	-0.0036	**0.04**	*	-0.0038	**0.04**	*
occu	numres/fabeds	-0.6125	0.06	-0.5814	0.09		-0.6807	**0.02**	*	-0.6545	**0.03**	*
nacratio	numres/nacs	0.28158	**<0.001**	0.2829	**<0.001**	***	0.32131	**<0.001**	***	0.32226	**<0.001**	***
sameadmn	Same administrator	-0.1425	0.06	-0.1362	0.07		-0.1601	**0.02**	*	-0.1540	**0.02**	*
nacturn	hirenac/nacs	0.1751	**0.001**	0.1647	**0.003**	**	0.1713	**0.001**	***	0.1601	**0.003**	**
logturn	ln of nacturn	0.1726	**0.004**	0.1618	**0.007**	**	0.1792	**0.001**	***	0.1674	**0.002**	**
turnscrr	nacturn categorized	0.0033	0.8	0.0093	0.5		0.0062	0.6		0.0121	0.3	
numdns_d	numdns > 2 or 1,2	0.0350	0.7	0.0389	0.7		0.0280	0.8		0.0318	0.7	
numadmn_d	numadmn > 2 or 1,2	0.2336	**0.01**	0.2271	**0.01**	*	0.2443	**0.005**	**	0.2387	**0.006**	**
numadmdns	sum(numadmn_d+numdns_d)	0.0896	0.1	0.0888	0.1		0.0917	0.1		0.0914	0.1	

Table 23 continued

With prerate	as trichotonomous			With year		With bedgroup		With year and bedgroup	
Variable name	*Description*	*Coef.*	*p-val.*	*Coef.*	*p-val.*	*Coef.*	*p-val.*	*Coef.*	*p-val.*
numsdc	Number of SDCs	0.0771	0.07	0.0672	0.1	0.1315	**0.001** ***	0.1223	**0.002** **
numsdc_d	numsdc > 2 or 1,2	0.1324	**0.04** *	0.2311	**0.02** *	0.1464	**0.02** *	0.2497	**0.008** **
turmlmgt	sum(numadmn_d+numdns_d+numsdc_d)	0.0933	**0.03** *	0.1286	**0.01** **	0.0996	**0.02** *	0.1350	**0.005** **
shcinvst_d		-0.0249	0.9	0.0070	1.0	-0.1087	0.5	-0.0798	0.6
shcdisc_d	All binary 1,2 vs. 3-5	-0.1378	0.4	-0.0969	0.5	-0.1659	0.3	-0.1296	0.4
shcrec_d		-0.2094	0.08	-0.2212	0.05	-0.2304	**0.03** *	-0.2411	**0.02** *
shcprev_d		-0.0906	0.7	-0.0478	0.8	-0.0553	0.8	-0.0152	0.9
shctotal	Total of the shc binaries	-0.0561	0.3	-0.0480	0.3	-0.0718	0.2	-0.0640	0.2
rateequp_d		0.1151	0.4	0.1657	0.2	0.0797	0.5	0.1249	0.3
ratetrng_d		-0.1074	0.5	-0.0408	0.8	-0.0692	0.7	-0.0101	1.0
ratepoli_d	All binary 1,2 vs. 3-5	-0.2955	0.09	-0.2501	0.2	-0.3141	**0.04** *	-0.2766	0.08
ratemcei_d		-0.0632	0.6	0.0114	0.9	-0.0221	0.8	0.0481	0.7
ratecase_d		-0.0912	0.6	-0.0425	0.8	-0.1960	0.3	-0.1515	0.4
ratezero_d		0.0812	0.6	0.1371	0.3	0.0595	0.6	0.1090	0.4
sumzero	Total of the rate binaries	-0.0120	0.7	0.0089	0.8	-0.0137	0.7	0.0049	0.9
totalpt	Physical therapists	-0.0047	0.6	-0.0040	0.7	0.0029	0.8	0.0034	0.7
bedfast	Low mobility	-0.0084	0.5			-0.0063	0.5		
presores	Pressure sores	0.0028	0.9			0.0083	0.6		
behsx	Behavioural symptoms	-0.0027	0.5			-0.0047	0.3		
numdef	# of deficiences	0.0269	**0.01**			0.0224	**0.02**		

Table 24. Compensable Non-traumatic Back, Neck & Upper Extremity Claims among NACs with Source Other Person. Univariate Models with Non-imputed Data as Continuous

With prerate	as continuous			With year			With bedgroup			With year and bedgroup		
Variable name	*Description*	*Coef.*	*p-val.*	*Coef.*	*p-val.*		*Coef.*	*p-val.*		*Coef.*	*p-val.*	
handnacs	logit((handlift+1/2)/(nacs+1))	0.1254	**0.001**	0.1216	**0.002**	**	0.0918	**0.02**	*	0.0877	**0.03**	*
mechnacs	logit((mechlift+1/2)/(nacs+1))	0.0500	0.2	0.0936	**0.03**	*	0.0323	0.4		0.0688	0.09	
ssnacs	logit((sslift+1/2)/(nacs+1))	0.0896	**0.01**	*	0.1287	**<0.001**	***	0.0561	0.09		0.0880	**0.01**	**
mechsslnacs	logit((mechsslift+1/2)/(nacs+1))	0.0322	0.4		0.0799	**0.04**	*	0.0197	0.6		0.0589	0.1	
sumliftnacs	logit((sumlift+1/2)/(nacs+1))	0.1229	**0.04**	*	0.1901	**0.001**	***	0.0974	0.09		0.1575	**0.006**	**
equipscrnacs	logit((equipscore+1/2)/(nacs+1))	0.0485	0.2		0.0975	**0.01**	*	0.0356	0.3		0.0786	**0.04**	*
prnew	mechssl/sumlift	-0.0977	0.3		-0.0579	0.6		-0.0932	0.3		-0.0559	0.6	
prnewest	sslift/sumlift	-0.0906	0.5		-0.0288	0.8		-0.1026	0.4		-0.0471	0.7	
pdvscomp	PD	-0.1467	0.1		-0.1495	0.1		-0.1390	0.1		-0.1411	0.10	
pda	PD after 1997	-0.1467	0.1		-0.1495	0.1		-0.1390	0.1		-0.1411	0.10	
pdeff	PD after 1998	-0.2674	**0.008**	**	-0.2358	**0.03**	*	-0.2589	**0.009**	**	-0.2302	**0.03**	*
finstate	Financial status	0.1407	0.1		0.1414	0.1		0.1488	0.05		0.1457	0.06	
chain	Chain	0.1618	**0.02**	*	0.1649	**0.02**	*	0.1699	**0.004**	**	0.1704	**0.004**	**
finxchn	finstate * chain	0.1446	**0.04**	*	0.1482	**0.03**	*	0.1507	**0.01**	*	0.1509	**0.01**	*
facbeds	Number of beds	-0.0048	**<0.001**	***	-0.0048	**<0.001**	***	-0.0033	**0.03**	*	-0.0034	**0.02**	*
occu	numres/fabeds	-0.4772	0.1		-0.4222	0.2		-0.5791	**0.05**	*	-0.5348	0.07	
nacratio	numres/nacs	0.30631	**<0.001**	***	0.30914	**<0.001**	***	0.35205	**<0.001**	***	0.3533	**<0.001**	***
sameadmn	Same administrator	-0.1312	0.05		-0.1252	0.07		-0.1550	**0.009**	**	-0.1493	**0.01**	*
nacturn	hirenac/nacs	0.1398	**0.01**	**	0.1429	**0.01**	**	0.1403	**0.009**	**	0.1423	**0.01**	**
logturn	ln of nacturn	0.1565	**0.003**	**	0.1606	**0.003**	**	0.1645	**0.001**	***	0.1670	**0.001**	***
turnscrr	nacturn categorized	0.0059	0.6		0.0105	0.3		0.0098	0.4		0.0146	0.2	
numdns_d	numdns > 2 or 1,2	0.1192	0.1		0.1212	0.1		0.1171	0.1		0.1188	0.1	
numadmn_d	numadmn > 2 or 1,2	0.1636	**0.04**	*	0.1583	**0.05**	*	0.1922	**0.02**	*	0.1877	**0.02**	*
numadmdns	sum(numadmn_d+numdns_d)	0.1045	0.05		0.1037	0.05		0.1124	**0.03**	*	0.1118	**0.03**	*
numsdc	Number of SDCs	0.0281	0.4		0.0215	0.6		0.0647	0.07		0.0586	0.1	

Table 24 continued

With prerate	as continuous			With year			With bedgroup			With year and bedgroup		
Variable name	*Description*	*Coef.*	*p-val.*	*Coef.*	*p-val.*		*Coef.*	*p-val.*		*Coef.*	*p-val.*	
numsdc_d	numsdc > 2 or 1,2	0.1343	**0.02**	*	0.1985	**0.02**	*	0.1478	**0.008**	**	0.2168	**0.01**	**
turmlmgt	sum(numadmn_d+numdns_d+numsdc_d)	0.0932	**0.02**	*	0.1196	**0.007**	**	0.1040	**0.005**	**	0.1300	**0.002**	**
shcinvst_d	All binary 1,2 vs. 3-5	-0.0327	0.8		-0.0129	0.9		-0.0868	0.5		-0.0696	0.6	
shcdisc_d		-0.1847	0.1		-0.1609	0.2		-0.1986	0.07		-0.1781	0.1	
shcrec_d		-0.2074	**0.04**	*	-0.2120	**0.03**	*	-0.2188	**0.02**	*	-0.2223	**0.02**	*
shcprev_d		-0.2472	**0.04**	*	-0.2260	**0.05**	*	-0.2067	0.06		-0.1876	0.09	
shctotal	Total of the shc binaries	-0.0724	**0.05**	*	-0.0675	0.05		-0.0810	**0.02**	*	-0.0763	**0.03**	*
rateequp_d	All binary 1,2 vs. 3-5	0.0172	0.9		0.0451	0.7		0.0036	1.0		0.0273	0.8	
ratetrng_d		-0.0647	0.7		-0.0221	0.9		-0.0273	0.8		0.0103	0.9	
ratepoli_d		-0.1067	0.5		-0.0768	0.7		-0.1179	0.4		-0.0934	0.5	
ratemcei_d		-0.2261	**0.02**	*	-0.2001	**0.05**	*	-0.1822	**0.04**	*	-0.1564	0.1	
ratecase_d		-0.0800	0.7		-0.0499	0.8		-0.1483	0.4		-0.1222	0.5	
ratezero_d		-0.0624	0.6		-0.0333	0.8		-0.0685	0.5		-0.0437	0.7	
sumzero	Total of the rate binaries	-0.0316	0.3		-0.0207	0.5		-0.0289	0.3		-0.0192	0.5	
totalpt	Physical therapists	0.0004	1.0		0.0025	0.8		0.0063	0.5		0.0082	0.4	
bedfast	Low mobility	-0.0094	0.4					-0.0078	0.4				
presores	Pressure sores	0.0124	0.4					0.0141	0.3				
behsx	Behavioural symptoms	0.0016	0.6					-0.0001	1.0				
numdef	# of deficiences	0.0288	**<0.001**					0.0259	**<0.001**				

Table 25. Compensable Non-traumatic Back, Neck & Upper Extremity Claims among NACs with Source Other Person. Univariate Models with Non-imputed Data as Trichotomous

With prerate	as trichotomous			With year			With bedgroup			With year and bedgroup		
Variable name	*Description*	*Coef.*	*p-val.*	*Coef.*	*p-val.*		*Coef.*	*p-val.*		*Coef.*	*p-val.*	
handnacs	logit((handlift+1/2)/(nacs+1))	0.1356	**<0.001**	0.1336	**0.001**	***	0.1032	**0.007**	**	0.1004	**0.01**	*
mechnacs	logit((mechlift+1/2)/(nacs+1))	0.0627	0.1	0.1056	**0.01**	*	0.0440	0.3		0.0808	0.05	
ssnacs	logit((sslift+1/2)/(nacs+1))	0.0951	**0.01**	0.1337	**<0.001**	***	0.0614	0.09		0.0935	**0.01**	*
mechsslnacs	logit((mechsslift+1/2)/(nacs+1))	0.0402	0.3	0.0874	**0.03**	*	0.0270	0.4		0.0666	0.08	
sumliftnacs	logit((sumlift+1/2)/(nacs+1))	0.1417	**0.02**	0.2091	**<0.001**	***	0.1169	**0.05**	*	0.1786	**0.002**	**
equipscrnacs	logit((equipscore+1/2)/(nacs+1))	0.0595	0.1	0.1082	**0.008**	**	0.0464	0.2		0.0904	**0.03**	*
prnew	mechssl/sumlift	-0.0974	0.3	-0.0669	0.5		-0.0960	0.3		-0.0656	0.5	
prnewest	sslift/sumlift	-0.1019	0.5	-0.0520	0.7		-0.1152	0.4		-0.0679	0.6	
pdvscomp	PD	-0.1951	0.06	-0.1976	0.05		-0.1737	0.06		-0.1755	0.06	
pda	PD after 1997	-0.1951	0.06	-0.1976	0.05		-0.1737	0.06		-0.1755	0.06	
pdeff	PD after 1998	-0.3077	**0.004**	-0.2776	**0.01**	*	-0.2920	**0.006**	**	-0.2632	**0.02**	*
finstate	Financial status	0.1477	0.1	0.1487	0.1		0.1596	0.06		0.1566	0.06	
chain	Chain	0.1910	**0.006**	0.1946	**0.005**	**	0.1984	**0.001**	***	0.1995	**0.001**	***
finxchn	finstate * chain	0.1558	**0.03**	0.1600	**0.03**	*	0.1659	**0.01**	**	0.1668	**0.009**	**
facbeds	Number of beds	-0.0051	**<0.001**	-0.0051	**<0.001**	***	-0.0036	**0.01**	*	-0.0038	**0.009**	**
occu	numres/fabeds	-0.6554	**0.05**	-0.6090	0.08		-0.7451	**0.01**	*	-0.7071	**0.02**	*
nacratio	numres/nacs	0.33537	**<0.001**	0.33867	**<0.001**	***	0.37833	**<0.001**	***	0.38013	**<0.001**	***
sameadmn	Same administrator	-0.1412	**0.05**	-0.1353	0.06		-0.1687	**0.007**	**	-0.1630	**0.01**	**
nacturn	hirenac/nacs	0.1355	**0.02**	0.1358	**0.02**	*	0.1379	**0.01**	*	0.1374	**0.01**	*
logturn	ln of nacturn	0.1505	**0.005**	0.1518	**0.006**	**	0.1604	**0.002**	**	0.1604	**0.002**	**
turnscrr	nacturn categorized	0.0103	0.4	0.0149	0.2		0.0139	0.2		0.0187	0.08	
numdns_d	numdns > 2 or 1,2	0.1531	**0.05**	0.1553	**0.04**	*	0.1473	**0.04**	*	0.1490	**0.04**	*
numadmn_d	numadmn > 2 or 1,2	0.2131	**0.008**	0.2088	**0.009**	**	0.2296	**0.003**	**	0.2259	**0.003**	**
numadmdns	sum(numadmn_d+numdns_d)	0.1334	**0.01**	0.1327	**0.01**	*	0.1363	**0.007**	**	0.1358	**0.008**	**
numsdc	Number of SDCs	0.0544	0.1	0.0485	0.2		0.0918	**0.007**	**	0.0865	**0.01**	*

Table 25 continued

With prerate	**as trichotomous**				**With year**			**With bedgroup**			**With year and bedgroup**		
Variable name	*Description*	*Coef.*	*p-val.*		*Coef.*	*p-val.*		*Coef.*	*p-val.*		*Coef.*	*p-val.*	
numsdc_d	numsdc > 2 or 1,2	0.1506	**0.008**	**	0.2372	**0.006**	**	0.1657	**0.003**	**	0.2567	**0.003**	**
turmlmgt	sum(numadmn_d+numdns_d+numsdc_d)	0.1172	**0.003**	**	0.1498	**0.001**	***	0.1246	**0.001**	***	0.1554	**<0.001**	***
shcinvst_d	All binary 1,2 vs. 3-5	-0.0188	0.9		-0.0004	1.0		-0.0795	0.6		-0.0634	0.6	
shcdisc_d		-0.1576	0.2		-0.1353	0.3		-0.1828	0.1		-0.1633	0.2	
shcrec_d		-0.2082	**0.04**	*	-0.2129	**0.04**	*	-0.2236	**0.02**	*	-0.2278	**0.02**	*
shcprev_d		-0.2386	0.06		-0.2190	0.08		-0.2022	0.10		-0.1842	0.1	
shctotal	Total of the shc binaries	-0.0666	0.07		-0.0620	0.08		-0.0778	**0.03**	*	-0.0734	**0.04**	*
rateequp_d	All binary 1,2 vs. 3-5	0.0234	0.8		0.0491	0.6		0.0071	0.9		0.0290	0.8	
ratetrng_d		-0.0672	0.6		-0.0292	0.9		-0.0282	0.8		0.0064	1.0	
ratepoli_d		-0.1222	0.5		-0.0945	0.6		-0.1245	0.4		-0.1009	0.5	
ratemcei_d		-0.2454	**0.01**	**	-0.2268	**0.03**	*	-0.2017	**0.02**	*	-0.1817	0.06	
ratecase_d		-0.0939	0.6		-0.0665	0.7		-0.1688	0.4		-0.1451	0.4	
ratezero_d		-0.0564	0.6		-0.0302	0.8		-0.0671	0.5		-0.0447	0.7	
sumzero	Total of the rate binaries	-0.0333	0.2		-0.0237	0.5		-0.0306	0.3		-0.0219	0.5	
totalpt	Physical therapists	-0.0017	0.9		0.0004	1.0		0.0046	0.7		0.0065	0.5	
bedfast	Low mobility	-0.0091	0.4					-0.0074	0.4				
presores	Pressure sores	0.0137	0.3					0.0167	0.2				
behsx	Behavioural symptoms	0.0015	0.7					-0.0005	0.9				
numdef	# of deficiences	0.0311	**<0.001**					0.0277	**<0.001**				

Table 26. Compensable Non-traumatic Shoulder Claims among NACs with Source Other Person. Univariate Models with Non-imputed Data as Continuous

With prerate	as continuous				With year				With bedgroup				With year and bedgroup			
Variable name	*Description*	*Coef.*	*p-val.*		*Coef.*	*p-val.*			*Coef.*	*p-val.*			*Coef.*	*p-val.*		
handnacs	logit((handlift+1/2)/(nacs+1))	0.27523	0.2		0.2983	0.2			0.23245	0.3			0.25049	0.3		
mechnacs	logit((mechlift+1/2)/(nacs+1))	0.30998	**0.1**		0.36353	0.1			0.27916	0.2			0.33114	0.1		
ssnacs	logit((sslift+1/2)/(nacs+1))	-0.0591	0.7		-0.0889	0.6			-0.1818	0.3			-0.2248	0.2		
mechsslnacs	logit((mechsslift+1/2)/(nacs+1))	0.07375	0.7		0.10018	0.6			0.03603	0.8			0.05719	0.8		
sumliftnacs	logit((sumlift+1/2)/(nacs+1))	0.25281	0.3		0.29292	0.3			0.19144	0.5			0.23051	0.4		
equipscrnacs	logit((equipscore+1/2)/(nacs+1))	0.06054	0.7		0.06614	0.8			0.02327	0.9			0.0284	0.9		
prnew	mechssl/sumlift	-0.2454	0.6		-0.3088	0.6			-0.2905	0.5			-0.3424	0.5		
prnewest	sslift/sumlift	-1.9404	**0.04**	*	-2.2288	**0.02**	*		-2.0239	**0.03**	*		-2.2774	**0.01**	*	
pdvscomp	PD	0.27872	0.5		0.26416	0.5			0.3008	0.4			0.28599	0.4		
pda	PD after 1997	0.27872	0.5		0.26416	0.5			0.3008	0.4			0.28599	0.4		
pdeff	PD after 1998	0.14006	0.8		0.0859	0.9			0.14668	0.7			0.0994	0.8		
finstate	Financial status	1.06812	**0.03**	*	1.06465	**0.03**	*		0.99441	**0.04**	*		0.99702	**0.04**	*	
chain	Chain	0.39742	0.2		0.38328	0.2			0.35511	0.3			0.34506	0.3		
finxchn	finstate * chain	0.61145	0.06		0.59912	0.07			0.54343	0.09			0.53697	0.09		
facbeds	Number of beds	-0.0081	**0.07**		-0.008	**0.07**			-0.0006	0.9			-0.0009	0.9		
occu	numres/fabeds	-3.0828	**0.01**	**	-3.1869	**0.01**	*		-3.2812	**0.008**	**		-3.3587	**0.008**	**	
nacratio	numres/nacs	0.40226	**<0.001**	***	0.40182	**<0.001**	***		0.43286	**<0.001**	***		0.4329	**<0.001**	***	
sameadmn	Same administrator	-0.1016	0.8		-0.0991	0.8			-0.128	0.7			-0.1235	0.7		
nacturn	hirenac/nacs	0.75278	**0.002**	**	0.70634	**0.005**	**		0.69192	**0.004**	**		0.64829	**0.01**	**	
logturn	ln of nacturn	1.03114	**0.001**	***	0.99331	**0.002**	**		0.98805	**0.001**	***		0.95216	**0.003**	**	
turnscrr	nacturn categorized	0.08663	**0.1**		0.1104	**0.06**			0.09094	**0.09**			0.11396	**0.05**	*	
numdns_d	numdns > 2 or 1,2	0.33877	0.5		0.34937	0.4			0.33316	0.5			0.33654	0.5		
numadmn_d	numadmn > 2 or 1,2	-0.3072	0.5		-0.334	0.5			-0.2336	0.6			-0.2631	0.6		
numadmdns	sum(numadmn_d+numdns_d)	0.05135	0.9		0.0477	0.9			0.07816	0.8			0.07186	0.8		
numsdc	Number of SDCs	0.41715	**0.02**	*	0.40142	**0.04**	*		0.45281	**0.02**	*		0.43891	**0.02**	*	

Table 26 continued

With prerate	**as continuous**				**With year**			**With bedgroup**			**With year and bedgroup**		
Variable name	*Description*	*Coef.*	*p-val.*		*Coef.*	*p-val.*		*Coef.*	*p-val.*		*Coef.*	*p-val.*	
numsdc_d	numsdc > 2 or 1,2	0.06243	0.9		0.27158	0.6		0.04806	0.9		0.22807	0.6	
turmlmgt	sum(numadmn_d+numdns_d+numsdc_d)	0.06847	0.8		0.14675	0.6		0.07223	0.8		0.1418	0.6	
shcinvst_d		0.1724	0.8		0.20321	0.8		0.18453	0.8		0.2238	0.8	
shcdisc_d	All binary 1,2 vs. 3-5	-0.4029	0.6		-0.3787	0.6		-0.445	0.5		-0.4137	0.6	
shcrec_d		2.18472	**0.04**	*	2.16849	**0.04**	*	2.18163	**0.04**	*	2.17886	**0.04**	*
shcprev_d		-0.1572	0.8		-0.127	0.9		0.00123	1.0		0.03379	1.0	
shctotal	Total of the shc binaries	0.23161	0.5		0.23789	0.4		0.24008	0.5		0.25447	0.4	
rateequp_d		0.2549	0.7		0.32756	0.6		0.27737	0.6		0.33885	0.6	
ratetrng_d		-0.1201	0.9		-0.0076	1.0		0.01974	1.0		0.12852	0.9	
ratepoli_d	All binary 1,2 vs. 3-5	-0.7306	0.3		-0.6736	0.3		-0.6744	0.3		-0.6253	0.4	
ratemcei_d		0.06753	0.9		0.20417	0.7		0.11049	0.8		0.24011	0.7	
ratecase_d				***									
ratezero_d		-0.2841	0.6		-0.2181	0.7		-0.2302	0.7		-0.176	0.8	
sumzero	Total of the rate binaries	-0.0166	0.9		0.01028	1.0		0.00299	1.0		0.02949	0.9	
totalpt	Physical therapists	-0.0757	0.2		-0.0783	0.2		-0.0502	0.3		-0.0527	0.3	
bedfast	Low mobility	1.0362	0.5										
presores	Pressure sores	1.14807	0.1										
behsx	Behavioural symptoms	1.02385	0.1										
numdef	# of deficiences	1.03194	0.6										

Table 27. Compensable Non-traumatic Shoulder Claims among NACs with Source Other Person. Univariate Models with Non-imputed Data as Trichotomous

With prerate	as trichotonomous			With year			With bedgroup			With year and bedgroup		
Variable name	*Description*	*Coef.*	*p-val.*	*Coef.*	*p-val.*		*Coef.*	*p-val.*		*Coef.*	*p-val.*	
handnacs	logit((handlift+1/2)/(nacs+1))	0.30285	0.1	0.32723	0.1		0.24764	0.2		0.26714	0.2	
mechnacs	logit((mechlift+1/2)/(nacs+1))	0.32195	**0.1**	0.37295	0.1		0.28472	0.2		0.33106	0.2	
ssnacs	logit((sslift+1/2)/(nacs+1))	-0.0414	0.8	-0.071	0.6		-0.1766	0.3		-0.221	0.2	
mechsslnacs	logit((mechsslift+1/2)/(nacs+1))	0.07231	0.7	0.09512	0.7		0.02996	0.9		0.04498	0.8	
sumliftnacs	logit((sumlift+1/2)/(nacs+1))	0.26755	0.3	0.30291	0.3		0.19443	0.5		0.22824	0.4	
equipscrnacs	logit((equipscore+1/2)/(nacs+1))	0.05922	0.8	0.05888	0.8		0.01802	0.9		0.01765	0.9	
prnew	mechssl/sumlift	-0.2954	0.5	-0.3784	0.5		-0.3337	0.5		-0.4026	0.4	
prnewest	sslift/sumlift	-2.0393	**0.03**	*	-2.3461	**0.01**	*	-2.1087	**0.02**	*	-2.3673	**0.009**	**
pdvscomp	PD	0.20438	0.6	0.19179	0.6		0.23259	0.5		0.21962	0.5	
pda	PD after 1997	0.20438	0.6	0.19179	0.6		0.23259	0.5		0.21962	0.5	
pdeff	PD after 1998	0.07285	0.9	0.01663	1.0		0.08493	0.8		0.03476	0.9	
finstate	Financial status	1.12018	**0.02**	*	1.12013	**0.02**	*	1.04624	**0.03**	*	1.05208	**0.03**	*
chain	Chain	0.45035	0.2	0.43631	0.2		0.39493	0.2		0.3846	0.2	
finxchn	finstate * chain	0.67206	**0.05**	*	0.66016	0.05	*	0.58317	0.08		0.57679	0.08	
facbeds	Number of beds	-0.0095	**0.03**	*	-0.0095	**0.03**	*	-0.0023	0.8		-0.0025	0.8	
occu	numres/fabeds	-3.42144	**0.008**	**	-3.5414	**0.008**	**	-3.463	**0.008**	**	-3.5483	**0.008**	**
nacratio	numres/nacs	0.40803	**<0.001**	***	0.4076	**<0.001**	***	0.43992	**<0.001**	***	0.43998	**<0.001**	***
sameadmn	Same administrator	-0.0561	0.9	-0.0549	0.9		-0.0979	0.8		-0.095	0.8	
nacturn	hirenac/nacs	0.7668	**0.002**	**	0.72433	**0.005**	**	0.70071	**0.003**	**	0.65972	**0.009**	**
logturn	ln of nacturn	1.05099	**0.001**	***	1.01918	**0.002**	**	1.00224	**0.001**	***	0.97053	**0.002**	**
turnscrr	nacturn categorized	0.08558	**0.1**	0.10882	**0.07**		0.08974	**0.10**		0.11138	**0.06**	
numdns_d	numdns > 2 or 1,2	0.40615	0.4	0.41186	0.4		0.35294	0.4		0.35339	0.4	
numadmn_d	numadmn > 2 or 1,2	-0.232	0.6	-0.2552	0.6		-0.2017	0.7		-0.2274	0.6	
numadmdns	sum(numadmn_d+numdns_d)	0.10268	0.7	0.09952	0.8		0.09596	0.7		0.08987	0.8	
numsdc	Number of SDCs	0.44244	**0.02**	*	0.42792	**0.03**	*	0.47322	**0.01**	*	0.46079	**0.02**	*

Table 27 continued

With prerate	as trichotonomous			With year		With bedgroup		With year and bedgroup	
Variable name	*Description*	*Coef.*	*p-val.*	*Coef.*	*p-val.*	*Coef.*	*p-val.*	*Coef.*	*p-val.*
numsdc_d	numsdc > 2 or 1,2	0.11356	0.8	0.36743	0.4	0.08905	0.8	0.31426	0.5
turmlmgt	sum(numadmn_d+numdns_d+numsdc_d)	0.11489	0.6	0.19753	0.4	0.09779	0.7	0.17312	0.5
shcinvst_d		0.24623	0.7	0.27347	0.7	0.23899	0.7	0.27407	0.7
shcdisc_d	All binary 1,2 vs. 3-5	-0.3174	0.7	-0.2925	0.7	-0.3698	0.6	-0.3396	0.6
shcrec_d		2.26354	**0.03** *	2.2511	**0.03** *	2.23932	**0.03** *	2.24013	**0.03** *
shcprev_d		-0.0852	0.9	-0.056	0.9	0.07315	0.9	0.10402	0.9
shctotal	Total of the shc binaries	0.27636	0.4	0.28223	0.3	0.27567	0.4	0.28991	0.3
rateequp_d		0.2224	0.7	0.29964	0.7	0.26537	0.7	0.32795	0.6
ratetrng_d		-0.0626	0.9	0.04629	1.0	0.06265	0.9	0.16814	0.8
ratepoli_d	All binary 1,2 vs. 3-5	-0.6236	0.3	-0.5687	0.4	-0.6095	0.3	-0.5627	0.4
ratemcei_d		0.01344	1.0	0.14585	0.8	0.10639	0.8	0.22986	0.7
ratecase_d									
ratezero_d		-0.3507	0.5	-0.2905	0.6	-0.2709	0.7	-0.2209	0.7
sumzero	Total of the rate binaries	-0.0182	0.9	0.00947	1.0	0.00495	1.0	0.03117	0.9
totalpt	Physical therapists	-0.0856	0.1	-0.0878	0.1	-0.0531	0.3	-0.0549	0.3
bedfast	Low mobility	1.04213	0.4						
presores	Pressure sores	1.20259	0.1						
behsx	Behavioural symptoms	1.02039	0.1						
numdef	# of deficiences	1.02835	0.6						

Table 28A Multivariate Analysis of Claims Rates, Years: 2000-2001

Observations: 123 **Homes: 103**

Non-Imputed Multivariate Analysis

Outcome	*Predictor*	*Coef.*	*SE.*	*p-value*	*Coef.*	*SE.*	*p-value*	*Coef.*	*SE.*	*p-value*	*Coef.*	*SE.*	*p-value*
Compensable Back, NACs, Source Other Person	*Prerate as logit*							2.125	0.860	**0.01**	2.122	0.841	**0.01**
	Prerate medium	-0.101	0.152	0.5	-0.095	0.153	0.5						
	Prerate high	0.259	0.148	0.08	0.270	0.145	0.06						
	Bedgroup small	**0.594**	**0.155**	**<0.001**	**0.590**	**0.156**	**<0.001**	**0.574**	**0.155**	**<0.001**	**0.572**	**0.156**	**<0.001**
	Bedgroup large	-0.294	0.157	0.06	**-0.316**	**0.157**	**0.04**	-0.279	0.159	0.08	-0.300	0.160	0.06
	Year 6				0.174	0.134	0.2				0.163	0.138	0.2
	nacratio	0.220	0.120	0.07	0.214	0.117	0.07	0.239	0.120	**0.05**	0.234	0.119	0.05
	pdvscomp	-0.293	0.161	0.07	-0.284	0.163	0.08	-0.250	0.146	0.09	-0.239	0.148	0.1
	sameadmn	-0.130	0.154	0.4	-0.133	0.152	0.4	-0.126	0.154	0.4	-0.131	0.150	0.4
	finstate	-0.028	0.171	0.9	-0.022	0.171	0.9	-0.031	0.176	0.9	-0.026	0.176	0.9
	chain	-0.056	0.140	0.7	-0.065	0.139	0.6	-0.064	0.140	0.6	-0.072	0.138	0.6
	shcrec_d	-0.178	0.147	0.2	-0.170	0.139	0.2	-0.170	0.149	0.3	-0.161	0.141	0.3
	nacturn	**0.186**	**0.078**	**0.02**	**0.161**	**0.078**	**0.04**	**0.224**	**0.075**	**0.003**	**0.200**	**0.076**	**0.009**
	numadmn_d	0.149	0.174	0.4	0.134	0.170	0.4	0.135	0.164	0.4	0.120	0.162	0.5
	handnacs	0.063	0.067	0.3	0.062	0.066	0.3	0.054	0.069	0.4	0.054	0.068	0.4
	ratemcei_d	0.048	0.107	0.7	0.081	0.114	0.5	0.049	0.109	0.7	0.080	0.116	0.5

Table 28A continued

Outcome	Predictor	Coef.	SE.	p-value	Coef.	SE.	p-value	Coef.	SE.	p-value	Coef.	SE.	p-value
Compensable Neck, Back, UE in NACs	*Prerate as logit*							**2.670**	**0.551**	**<0.001**	**2.673**	**0.556**	**<0.001**
	Prerate medium	0.067	0.133	0.6	0.067	0.132	0.6						
	Prerate high	**0.376**	**0.115**	**0.001**	**0.375**	**0.115**	**0.001**						
	Bedgroup small	**0.476**	**0.108**	**<0.001**	**0.476**	**0.108**	**<0.001**	**0.469**	**0.108**	**<0.001**	**0.470**	**0.108**	**<0.001**
	Bedgroup large	-0.245	0.151	0.1	-0.243	0.149	0.1	-0.238	0.146	0.1	-0.233	0.144	0.1
	Year 6				-0.014	0.113	0.9				-0.035	0.114	0.8
	nacratio	**0.269**	**0.115**	**0.02**	**0.270**	**0.115**	**0.02**	**0.282**	**0.105**	**0.007**	**0.283**	**0.105**	**0.007**
	pdvscomp	-0.274	0.147	0.06	-0.275	0.148	0.06	-0.235	0.134	0.08	-0.237	0.135	0.08
	sameadmn	-0.054	0.122	0.7	-0.054	0.122	0.7	-0.066	0.122	0.6	-0.065	0.123	0.6
	finstate	0.170	0.166	0.3	0.170	0.166	0.3	0.179	0.158	0.3	0.178	0.158	0.3
	chain	-0.072	0.126	0.6	-0.071	0.125	0.6	-0.099	0.118	0.4	-0.098	0.117	0.4
	shcrec_d	-0.157	0.119	0.2	-0.158	0.120	0.2	-0.175	0.118	0.1	-0.176	0.120	0.1
	nacturn	0.078	0.068	0.3	0.080	0.069	0.3	0.100	0.065	0.1	0.104	0.067	0.1
	numadmn_d	0.175	0.139	0.2	0.176	0.140	0.2	0.122	0.128	0.3	0.126	0.131	0.3
	handnacs	0.017	0.057	0.8	0.017	0.058	0.8	0.004	0.057	0.9	0.004	0.058	0.9
	ratemcei_d	-0.089	0.093	0.3	-0.091	0.098	0.4	-0.045	0.093	0.6	-0.051	0.097	0.6

Table 28A continued

Outcome	Predictor	Coef.	SE.	p-value	Coef.	SE.	p-value	Coef.	SE.	p-value	Coef.	SE.	p-value
Compensable Shoulders in NACs	*Prerate as logit*							15.005	10.915	0.2	13.735	11.993	0.3
	Prerate high	**1.321**	**0.604**	**0.03**	**1.466**	**0.544**	**0.007**						
	Bedgroup small	0.058	0.879	0.9	0.122	0.775	0.9	-0.079	0.815	0.9	0.046	0.748	1.0
	Bedgroup large	-0.357	0.680	0.6	-0.647	0.715	0.4	0.060	0.762	0.9	-0.115	0.768	0.9
	Year 6				1.220	0.842	0.1				1.018	0.758	0.2
	nacratio	-0.367	0.817	0.7	-0.607	0.831	0.5	-0.262	0.726	0.7	-0.385	0.742	0.6
	pdvscomp	1.200	0.657	0.07	1.236	0.668	0.06	**1.479**	**0.720**	**0.04**	**1.436**	**0.721**	**0.05**
	sameadmn	0.641	0.724	0.4	0.643	0.718	0.4	0.330	0.773	0.7	0.395	0.754	0.6
	finstate	2.270	1.471	0.1	2.171	1.344	0.1	1.943	1.205	0.1	1.928	1.181	0.1
	chain	0.872	0.732	0.2	1.121	0.782	0.2	0.385	0.718	0.6	0.590	0.718	0.4
	shcrec_d	1.998	1.314	0.1	2.192	1.383	0.1	1.754	1.261	0.2	1.820	1.258	0.1
	nacturn	0.173	0.336	0.6	0.077	0.315	0.8	0.060	0.355	0.9	-0.045	0.340	0.9
	numadmn_d	-1.223	0.831	0.1	-1.443	0.870	0.10	-1.013	0.754	0.2	-1.052	0.752	0.2
	handnacs	**1.006**	**0.370**	**0.007**	**1.126**	**0.383**	**0.003**	**0.981**	**0.353**	**0.005**	**1.030**	**0.359**	**0.004**
	ratemcei_d	-0.206	0.772	0.8	-0.043	0.747	1.0	-0.356	0.741	0.6	-0.157	0.745	0.8

Table 28B. Multivariate Analysis of Claims Rates, Years: 1998-2001

Observations: 123 **Homes: 103**

Non-Imputed Multivariate Analysis

Outcome	*Predictor*	*Coef.*	*SE.*	*p-value*	*Coef.*	*SE.*	*p-value*	*Coef.*	*SE.*	*p-value*	*Coef.*	*SE.*	*p-value*
Compensable Back, NACs, Source Other Person	*Prerate as logit*							1.312	0.705	0.06	1.304	0.708	0.07
	Prerate medium	0.022	0.097	0.8	0.024	0.097	0.8						
	Prerate high	**0.217**	**0.106**	**0.04**	**0.219**	**0.106**	**0.04**						
	Bedgroup small	**0.472**	**0.105**	**<0.001**	**0.456**	**0.104**	**<0.001**	**0.468**	**0.105**	**<0.001**	**0.451**	**0.104**	**<0.001**
	Bedgroup large	-0.174	0.104	0.10	-0.191	0.103	0.06	-0.178	0.105	0.09	-0.196	0.103	0.06
	Year 4				0.156	0.143	0.3				0.158	0.144	0.3
	Year 5				0.014	0.133	0.9				0.012	0.134	0.9
	Year 6				0.167	0.125	0.2				0.158	0.125	0.2
	nacratio	**0.228**	**0.071**	**0.001**	**0.233**	**0.070**	**0.001**	**0.226**	**0.071**	**0.002**	**0.232**	**0.070**	**0.001**
	pdvscomp	-0.194	0.117	0.10	-0.184	0.116	0.1	-0.164	0.113	0.1	-0.154	0.112	0.2
	sameadmn	-0.190	0.091	**0.04**	-0.182	0.090	**0.04**	-0.195	0.092	**0.03**	-0.187	0.091	**0.04**
	finstate	0.035	0.124	0.8	0.037	0.126	0.8	0.021	0.123	0.9	0.022	0.125	0.9
	chain	-0.008	0.104	0.9	-0.005	0.105	1.0	-0.011	0.105	0.9	-0.007	0.106	0.9
	nacturn	**0.122**	**0.059**	**0.04**	0.110	0.059	0.06	**0.143**	**0.058**	**0.01**	**0.132**	**0.059**	**0.03**
	handnacs	**0.097**	**0.047**	**0.04**	0.098	0.049	**0.05**	**0.100**	**0.046**	**0.03**	0.101	0.048	**0.04**

Table 28B continued

Outcome	Predictor	Coef.	SE.	p-value	Coef.	SE.	p-value	Coef.	SE.	p-value	Coef.	SE.	p-value
Compensable Neck, Back, UE in NACs	*Prerate as logit*							2.047	0.488	**<0.001**	2.043	0.488	**<0.001**
	Prerate medium	0.045	0.095	0.6	0.052	0.096	0.6						
	Prerate high	**0.231**	**0.093**	**0.01**	**0.237**	**0.094**	**0.01**						
	Bedgroup small	**0.441**	**0.085**	**<0.001**	**0.421**	**0.085**	**<0.001**	**0.437**	**0.083**	**<0.001**	**0.418**	**0.083**	**<0.001**
	Bedgroup large	-0.175	0.095	0.06	**-0.194**	**0.096**	**0.04**	-0.164	0.097	0.09	-0.183	0.097	0.06
	Year 4				0.074	0.124	0.6				0.068	0.124	0.6
	Year 5				-0.103	0.121	0.4				-0.105	0.120	0.4
	Year 6				0.005	0.108	1.0				-0.008	0.108	0.9
	nacratio	**0.322**	**0.061**	**<0.001**	**0.331**	**0.062**	**<0.001**	**0.298**	**0.063**	**<0.001**	**0.308**	**0.064**	**<0.001**
	pdvscomp	-0.201	0.124	0.1	-0.196	0.123	0.1	-0.195	0.117	0.10	-0.189	0.116	0.1
	sameadmn	**-0.205**	**0.083**	**0.01**	**-0.194**	**0.083**	**0.02**	**-0.208**	**0.082**	**0.01**	**-0.197**	**0.082**	**0.02**
	finstate	0.004	0.121	1.0	0.003	0.124	1.0	0.006	0.116	1.0	0.004	0.118	1.0
	chain	0.034	0.095	0.7	0.043	0.096	0.7	0.012	0.094	0.9	0.022	0.094	0.8
	nacturn	0.077	0.056	0.2	0.075	0.057	0.2	0.085	0.055	0.1	0.085	0.055	0.1
	handnacs	0.051	0.040	0.2	0.048	0.042	0.3	0.047	0.039	0.2	0.044	0.042	0.3

Table 28B continued

Outcome	Predictor	Coef.	SE.	p-value	Coef.	SE.	p-value	Coef.	SE.	p-value	Coef.	SE.	p-value
Compensable Shoulders in NACs	*Prerate as logit*							8.473	7.304	0.2	8.386	7.434	0.3
	Prerate high	0.501	0.425	0.2	0.521	0.434	0.2						
	Bedgroup small	0.453	0.463	0.3	0.428	0.483	0.4	0.338	0.456	0.5	0.324	0.472	0.5
	Bedgroup large	-0.480	0.478	0.3	-0.508	0.495	0.3	-0.473	0.482	0.3	-0.484	0.503	0.3
	Year 4				0.223	0.718	0.8				0.228	0.704	0.7
	Year 5				-0.208	0.729	0.8				-0.152	0.712	0.8
	Year 6				0.485	0.726	0.5				0.516	0.719	0.5
	nacratio	0.313	0.274	0.3	0.323	0.285	0.3	0.277	0.268	0.3	0.286	0.278	0.3
	pdvscomp	0.382	0.444	0.4	0.392	0.449	0.4	0.500	0.447	0.3	0.505	0.452	0.3
	sameadmn	0.385	0.421	0.4	0.413	0.439	0.3	0.356	0.416	0.4	0.383	0.432	0.4
	finstate	0.957	0.619	0.1	0.980	0.620	0.1	0.862	0.601	0.2	0.892	0.612	0.1
	chain	0.118	0.458	0.8	0.131	0.472	0.8	0.045	0.446	0.9	0.057	0.458	0.9
	nacturn	**0.540**	**0.219**	**0.01**	**0.495**	**0.230**	**0.03**	**0.525**	**0.223**	**0.02**	0.475	0.235	**0.04**
	handnacs	0.355	0.213	0.10	0.383	0.218	0.08	0.359	0.217	0.10	0.386	0.223	0.08

Table 29. Mean Compensable Claims Rate per 100 NACs with and without imputation, by year

			Year			
		imputation	4	5	6	7
Compensable Back NACs, Source Other Person	PD	before	3.6	1.9	2.6	2.5
		after	3.5	2.5	2.9	2.3
	Non-PD	before	3.1	0.9	3.2	2.4
		after	3.0	3.0	3.3	2.4
	Overall	before	3.2	2.7	3.1	2.4
		after	3.1	2.9	3.3	2.4
Compensable Neck, Back & UE, NACs, Source Other Person	PD	before	4.4	2.6	3.2	3.7
		after	4.4	3.3	3.6	3.2
	Non-PD	before	4.2	3.7	3.9	3.1
		after	4.1	3.8	4.0	3.1
	Overall	before	4.2	3.5	3.8	3.2
		after	4.2	3.8	3.9	3.1
Compensable Shoulder NACs, Source Other Person	PD	before	13.6	5.3	18.2	6.7
		after	11.4	6.7	14.1	8.4
	Non-PD	before	7.6	10.1	10.5	9.3
		after	7.8	10.0	10.7	10.3
	Overall	before	8.5	9.4	11.8	8.9
		after	8.3	9.6	11.2	10.0
Compensable Shoulder NACs, Source Other Person (weighted)	PD	before	17.1	3.9	13.9	6.1
		after	13.5	5.3	11.3	7.8
	Non-PD	before	7.2	11.2	8.4	8.2
		after	7.4	10.3	9.4	9.7
	Overall	before	8.7	10.1	9.3	7.8
		after	8.3	9.6	9.7	9.4

Sample size	**Non-imputed**			**imputed**		
Year	*PD*	*Non-PD*	*All*	*PD*	*Non-PD*	All
4	21	119	140	33	195	228
5	19	107	126	33	195	228
6	22	105	127	33	195	228
7	15	97	112	33	195	228

Table 30. Compensable Back Claims Among NACs with Source=Other Person, 1995-2001 Univariate Models with Imputed Data

With prerate	as continuous			With year			With bedgroup			With year and bedgroup		
Variable name	*Description*	*Coef.*	*p-val.*	*Coef.*	*p-val.*		*Coef.*	*p-val.*		*Coef.*	*p-val.*	
handnacs	logit((handlift+1/2)/(nacs+1))	0.1257	**<0.001**	0.1289	**0.002**	**	0.0920	**0.006**	**	0.0939	**0.02**	*
mechnacs	logit((mechlift+1/2)/(nacs+1))	0.0366	0.5	0.0708	0.1		0.0082	0.9		0.0380	0.4	
ssnacs	logit((sslift+1/2)/(nacs+1))	0.0950	**0.03**	*	0.1147	**0.006**	**	0.0551	0.2		0.0719	0.07	
mechsslnacs	logit((mechsslift+1/2)/(nacs+1))	0.0356	0.4	0.0677	0.1		0.0128	0.7		0.0404	0.3	
sumliftnacs	logit((sumlift+1/2)/(nacs+1))	0.1260	0.10	0.1769	**0.005**	**	0.0840	0.2		0.1292	**0.03**	*
equipscrnacs	logit((equipscore+1/2)/(nacs+1))	0.0533	0.3	0.0898	**0.04**	*	0.0299	0.5		0.0619	0.1	
prnew	mechssl/sumlift	-0.1133	0.2	-0.0980	0.4		-0.1121	0.2		-0.0897	0.4	
prnewest	sslift/sumlift	-0.0485	0.8	-0.0478	0.8		-0.0592	0.7		-0.0506	0.8	
pdvscomp	PD	-0.0758	0.4	-0.0758	0.4		-0.0589	0.5		-0.0587	0.5	
pda	PD after 1997	-0.0758	0.4	-0.0758	0.4		-0.0589	0.5		-0.0587	0.5	
pdeff	PD after 1998	-0.1604	0.1	-0.1548	0.2		-0.1403	0.2		-0.1304	0.2	
finstate	Financial status	0.0948	0.3	0.0934	0.3		0.0869	0.3		0.0856	0.3	
chain	Chain	0.1088	0.1	0.1111	0.1		0.1162	0.08		0.1186	0.08	
finxchn	finstate * chain	0.1013	0.2	0.1036	0.2		0.1054	0.1		0.1080	0.1	
facbeds	Number of beds	-0.0058	**<0.001**	-0.0058	**<0.001**	***	-0.0048	**0.02**	*	-0.0049	**0.02**	*
occu	numres/facbeds	-0.0178	0.9	-0.0163	0.9		-0.0734	0.6		-0.0730	0.5	
nacratio	numres/nacs	0.0906	0.4	0.0945	0.3		0.1062	0.4		0.1113	0.3	
sameadmn	Same administrator	-0.0694	0.4	-0.0694	0.4		-0.0860	0.2		-0.0861	0.2	
nacturn	hirenac/nacs	0.1094	**0.03**	*	0.0990	**0.03**	*	0.0941	**0.05**	*	0.0837	0.06	
logturn	ln of nacturn	0.0928	0.08	0.0820	0.1		0.0863	0.08		0.0759	0.1	
turnscrr	nacturn categorized	0.0423	0.1	0.0366	0.2		0.0380	0.1		0.0325	0.2	
numdns_d	numdns > 2 or 1,2	-0.0337	0.7	-0.0408	0.6		-0.0009	1.0		-0.0091	0.9	
numadmn_d	numadmn > 2 or 1,2	0.0655	0.5	0.0560	0.5		0.1211	0.2		0.1115	0.2	
numadmdns	sum(numadmn_d+numdns_d)	0.0091	0.9	0.0027	1.0		0.0429	0.4		0.0362	0.4	
numsdc	Number of SDCs	0.0397	0.3	0.0319	0.4		0.0651	0.09		0.0578	0.1	
numsdc_d	numsdc > 2 or 1,2	0.0714	0.6	0.1217	0.3		0.1045	0.4		0.1694	0.1	

Table 30 continued

With prerate	**as continuous**			**With year**		**With bedgroup**		**With year and bedgroup**	
Variable name	*Description*	*Coef.*	*p-val.*	*Coef.*	*p-val.*	*Coef.*	*p-val.*	*Coef.*	*p-val.*
turmlmgt	sum(numadmn_d+numdns_d+numsdc_d)	0.0266	0.6	0.0271	0.5	0.0572	0.3	0.0599	0.1
shcinvst_d		-0.0204	0.9	0.0293	0.8	-0.0603	0.7	-0.0129	0.9
shcdisc_d	All binary 1,2 vs. 3-5	-0.1645	0.4	-0.0936	0.6	-0.1864	0.3	-0.1173	0.5
shcrec_d		-0.0991	0.4	-0.0985	0.4	-0.0995	0.3	-0.0992	0.3
shcprev_d		-0.0993	0.6	-0.0397	0.8	-0.1060	0.6	-0.0482	0.8
shctotal	Total of the shc binaries	-0.0470	0.4	-0.0310	0.6	-0.0538	0.4	-0.0384	0.5
rateequp_d		0.0202	0.9	0.0678	0.6	0.0117	0.9	0.0571	0.6
ratetrng_d		-0.0509	0.7	0.0075	1.0	-0.0190	0.9	0.0383	0.8
ratepoli_d	All binary 1,2 vs. 3-5	-0.1338	0.4	-0.0993	0.5	-0.1191	0.4	-0.0850	0.5
ratemcei_d		-0.0953	0.5	-0.0195	0.8	-0.0645	0.6	0.0131	0.9
ratecase_d		-0.0712	0.7	-0.0124	0.9	-0.0972	0.6	-0.0403	0.8
ratezero_d		-0.0014	1.0	0.0482	0.7	0.0048	1.0	0.0522	0.7
sumzero	Total of the rate binaries	-0.0176	0.6	0.0018	1.0	-0.0136	0.7	0.0054	0.8
totalpt	Physical therapists	-0.0125	0.2	-0.0122	0.3	-0.0046	0.7	-0.0042	0.7
bedfast	Low mobility	-0.0036	0.8			-0.0013	0.9		
presores	Pressure sores	-0.0068	0.7			0.0000	1.0		
behsx	Behavioural symptoms	-0.0029	0.5			-0.0042	0.3		
numdef	# of deficiences	0.0033	0.8			0.0082	0.4		

Table 31. Compensable Back Claims Among NACs with Source Other Person, 1995-2001 Univariate Models with Imputed Data

With prerate	as trichotonomous				With year				With bedgroup				With year and bedgroup			
Variable name	*Description*	*Coef.*	*p-val.*		*Coef.*	*p-val.*			*Coef.*	*p-val.*			*Coef.*	*p-val.*		
handnacs	logit((handlift+1/2)/(nacs+1))	0.1263	**<0.001**	***	0.1297	**0.001**	***		0.0926	**0.005**	**		0.0945	**0.01**	*	
mechnacs	logit((mechlift+1/2)/(nacs+1))	0.0454	0.3		0.0807	0.06			0.0141	0.7			0.0441	0.3		
ssnacs	logit((sslift+1/2)/(nacs+1))	0.1024	**0.02**	*	0.1224	**0.003**	**		0.0581	0.1			0.0747	0.06		
mechsslnacs	logit((mechsslift+1/2)/(nacs+1))	0.0432	0.3		0.0765	0.06			0.0175	0.6			0.0453	0.2		
sumliftnacs	logit((sumlift+1/2)/(nacs+1))	0.1350	0.07		0.1863	**0.002**	**		0.0896	0.2			0.1343	**0.02**	*	
equipscrnacs	logit((equipscore+1/2)/(nacs+1))	0.0600	0.2		0.0973	**0.02**	*		0.0338	0.5			0.0657	0.10		
prnew	mechssl/sumlift	-0.1055	0.2		-0.0897	0.4			-0.1084	0.2			-0.0861	0.4		
prnewest	sslift/sumlift	-0.0341	0.8		-0.0333	0.9			-0.0578	0.7			-0.0498	0.8		
pdvscomp	PD	-0.1021	0.3		-0.1021	0.3			-0.0840	0.3			-0.0839	0.3		
pda	PD after 1997	-0.1021	0.3		-0.1021	0.3			-0.0840	0.3			-0.0839	0.3		
pdeff	PD after 1998	-0.1825	0.1		-0.1781	0.1			-0.1629	0.1			-0.1543	0.2		
finstate	Financial status	0.0892	0.3		0.0878	0.4			0.0897	0.3			0.0884	0.3		
chain	Chain	0.1120	0.1		0.1143	0.1			0.1175	0.08			0.1198	0.08		
finxchn	finstate * chain	0.0941	0.2		0.0965	0.2			0.1012	0.2			0.1037	0.1		
facbeds	Number of beds	-0.0059	**<0.001**	***	-0.0059	**<0.001**	***		-0.0048	**0.02**	*		-0.0048	**0.02**	*	
occu	numres/fabeds	-0.0327	0.8		-0.0317	0.8			-0.0842	0.6			-0.0839	0.5		
nacratio	numres/nacs	0.0940	0.4		0.0979	0.3			0.1083	0.4			0.1135	0.3		
sameadmn	Same administrator	-0.0824	0.3		-0.0824	0.3			-0.0929	0.2			-0.0930	0.2		
nacturn	hirenac/nacs	0.1102	**0.03**	*	0.0997	**0.04**	*		0.0919	0.06			0.0814	0.08		
logturn	ln of nacturn	0.0904	0.1		0.0794	0.2			0.0836	0.1			0.0730	0.2		
turnscrr	nacturn categorized	0.0427	0.1		0.0370	0.2			0.0374	0.2			0.0317	0.2		
numdns_d	numdns > 2 or 1,2	-0.0192	0.8		-0.0267	0.7			0.0093	0.9			0.0007	1.0		
numadmn_d	numadmn > 2 or 1,2	0.0989	0.3		0.0889	0.3			0.1405	0.1			0.1306	0.1		
numadmdns	sum(numadmn_d+numdns_d)	0.0270	0.6		0.0203	0.7			0.0538	0.3			0.0470	0.3		
numsdc	Number of SDCs	0.0450	0.3		0.0370	0.3			0.0704	0.07			0.0630	0.09		

Table 31 continued

With prerate	as trichotonomous			With year		With bedgroup		With year and bedgroup	
Variable name	*Description*	*Coef.*	*p-val.*	*Coef.*	*p-val.*	*Coef.*	*p-val.*	*Coef.*	*p-val.*
numsdc_d	numsdc > 2 or 1,2	0.0776	0.5	0.1363	0.2	0.1131	0.4	0.1884	0.08
turmlmgt	sum(numadmn_d+numdns_d+numsdc_d)	0.0388	0.5	0.0418	0.3	0.0655	0.2	0.0693	0.09
shcinvst_d		-0.0210	0.9	0.0293	0.8	-0.0681	0.7	-0.0203	0.9
shcdisc_d	All binary 1,2 vs. 3-5	-0.1506	0.4	-0.0787	0.6	-0.1824	0.3	-0.1127	0.5
shcrec_d		-0.1033	0.4	-0.1027	0.4	-0.1050	0.3	-0.1045	0.3
shcprev_d		-0.0714	0.7	-0.0112	1.0	-0.0897	0.6	-0.0315	0.9
shctotal	Total of the shc binaries	-0.0450	0.5	-0.0288	0.6	-0.0546	0.3	-0.0391	0.5
rateequp_d		0.0284	0.8	0.0763	0.5	0.0150	0.9	0.0606	0.6
ratetrng_d		-0.0528	0.7	0.0065	1.0	-0.0143	0.9	0.0439	0.8
ratepoli_d	All binary 1,2 vs. 3-5	-0.1342	0.4	-0.0993	0.5	-0.1169	0.4	-0.0825	0.5
ratemcei_d		-0.0926	0.5	-0.0154	0.9	-0.0603	0.6	0.0186	0.9
ratecase_d		-0.0861	0.6	-0.0267	0.9	-0.1146	0.5	-0.0572	0.7
ratezero_d		0.0050	1.0	0.0553	0.7	0.0076	1.0	0.0555	0.6
sumzero	Total of the rate binaries	-0.0168	0.6	0.0028	0.9	-0.0130	0.7	0.0063	0.8
totalpt	Physical therapists	-0.0122	0.2	-0.0119	0.3	-0.0040	0.7	-0.0036	0.7
bedfast	Low mobility	-0.0012	0.9			0.0000	1.0		
presores	Pressure sores	-0.0065	0.7			0.0015	0.9		
behsx	Behavioural symptoms	-0.0028	0.5			-0.0042	0.3		
numdef	# of deficiences	0.0042	0.7			0.0088	0.4		

Table 32. Compensable Back, Neck & UE Claims among NACs with Source Other PersonUnivariate Models with Imputed Data

With prerate	as continuous				With year				With bedgroup				With year and bedgroup			
Variable name	*Description*	*Coef.*	*p-val.*		*Coef.*	*p-val.*			*Coef.*	*p-val.*			*Coef.*	*p-val.*		
handnacs	logit((handlift+1/2)/(nacs+1))	0.1074	**<0.001**	***	0.1063	**0.001**	***		0.0784	**0.01**	**		0.0761	**0.02**	*	
mechnacs	logit((mechlift+1/2)/(nacs+1))	0.0333	0.4		0.0784	**0.03**	*		0.0100	0.8			0.0495	0.2		
ssnacs	logit((sslift+1/2)/(nacs+1))	0.0799	**0.03**	*	0.1107	**0.005**	**		0.0444	0.2			0.0713	0.06		
mechsslnacs	logit((mechsslift+1/2)/(nacs+1))	0.0266	0.4		0.0713	0.05	*		0.0072	0.8			0.0458	0.2		
sumliftnacs	logit((sumlift+1/2)/(nacs+1))	0.1001	0.07		0.1620	**0.003**	**		0.0634	0.2			0.1184	**0.02**	*	
equipscrnacs	logit((equipscore+1/2)/(nacs+1))	0.0419	0.3		0.0896	**0.02**	*		0.0214	0.5			0.0631	0.07		
prnew	mechssl/sumlift	-0.0942	0.2		-0.0497	0.6			-0.0921	0.2			-0.0455	0.6		
prnewest	sslift/sumlift	-0.0569	0.7		-0.0148	0.9			-0.0716	0.6			-0.0277	0.8		
pdvscomp	PD	-0.0923	0.3		-0.0923	0.3			-0.0786	0.3			-0.0784	0.3		
pda	PD after 1997	-0.0923	0.3		-0.0923	0.3			-0.0786	0.3			-0.0784	0.3		
pdeff	PD after 1998	-0.1756	0.07		-0.1494	0.1			-0.1589	0.09			-0.1327	0.2		
finstate	Financial status	0.1087	0.2		0.1079	0.2			0.0996	0.2			0.0977	0.2		
chain	Chain	0.0972	0.1		0.1025	0.1			0.1056	0.06			0.1096	0.05	*	
finxchn	finstate * chain	0.0887	0.2		0.0948	0.2			0.0947	0.1			0.0993	0.1		
facbeds	Number of beds	-0.0052	**<0.001**	***	-0.0053	**<0.001**	***		-0.0042	**0.01**	*		-0.0043	**0.01**	*	
occu	numres/fabeds	-0.0477	0.6		-0.0291	0.8			-0.1024	0.4			-0.0862	0.5		
nacratio	numres/nacs	0.0940	0.4		0.1050	0.3			0.1082	0.3			0.1198	0.2		
sameadmn	Same administrator	-0.0631	0.4		-0.0631	0.4			-0.0842	0.2			-0.0843	0.2		
nacturn	hirenac/nacs	0.0869	**0.04**	*	0.0819	0.07			0.0747	0.07			0.0695	0.1		
logturn	ln of nacturn	0.0761	0.06		0.0711	0.1			0.0716	0.07			0.0665	0.1		
turnscrr	nacturn categorized	0.0366	0.1		0.0339	0.2			0.0336	0.1			0.0308	0.2		
numdns_d	numdns > 2 or 1,2	0.0306	0.7		0.0248	0.7			0.0569	0.4			0.0506	0.5		
numadmn_d	numadmn > 2 or 1,2	0.0661	0.4		0.0593	0.5			0.1147	0.2			0.1081	0.2		
numadmdns	sum(numadmn_d+numdns_d)	0.0360	0.4		0.0312	0.5			0.0636	0.2			0.0588	0.2		
numsdc	Number of SDCs	0.0272	0.4		0.0211	0.5			0.0487	0.1			0.0431	0.2		

Table 32 continued

With prerate	as continuous			With year		With bedgroup		With year and bedgroup	
Variable name	*Description*	*Coef.*	*p-val.*	*Coef.*	*p-val.*	*Coef.*	*p-val.*	*Coef.*	*p-val.*
numsdc_d	numsdc > 2 or 1,2	0.1153	0.2	0.1317	0.2	0.1423	0.1	0.1699	0.10
turmlmgt	sum(numadmn_d+numdns_d+numsdc_d)	0.0525	0.2	0.0494	0.2	0.0767	0.08	0.0760	0.06
shcinvst_d		-0.0286	0.8	0.0058	1.0	-0.0678	0.6	-0.0351	0.8
shcdisc_d	All binary 1,2 vs. 3-5	-0.1548	0.2	-0.1083	0.4	-0.1752	0.2	-0.1294	0.3
shcrec_d		-0.1105	0.2	-0.1093	0.2	-0.1094	0.2	-0.1084	0.2
shcprev_d		-0.1856	0.1	-0.1493	0.2	-0.1933	0.1	-0.1577	0.2
shctotal	Total of the shc binaries	-0.0548	0.2	-0.0443	0.2	-0.0611	0.1	-0.0509	0.2
rateequp_d		-0.0179	0.9	0.0141	0.9	-0.0216	0.8	0.0093	0.9
ratetrng_d		-0.0049	1.0	0.0369	0.8	0.0197	0.9	0.0608	0.6
ratepoli_d	All binary 1,2 vs. 3-5	-0.0320	0.8	-0.0056	1.0	-0.0216	0.9	0.0046	1.0
ratemcei_d		-0.1522	0.1	-0.1084	0.2	-0.1241	0.2	-0.0765	0.4
ratecase_d		-0.0837	0.6	-0.0418	0.8	-0.0984	0.5	-0.0576	0.7
ratezero_d		-0.0729	0.5	-0.0413	0.7	-0.0623	0.5	-0.0313	0.8
sumzero	Total of the rate binaries	-0.0236	0.4	-0.0108	0.7	-0.0194	0.4	-0.0066	0.8
totalpt	Physical therapists	-0.0088	0.3	-0.0080	0.4	-0.0027	0.8	-0.0018	0.8
bedfast	Low mobility	-0.0039	0.7			-0.0022	0.8		
presores	Pressure sores	-0.0036	0.8			0.0026	0.8		
behsx	Behavioural symptoms	-0.0005	0.9			-0.0016	0.6		
numdef	# of deficiences	0.0079	0.4			0.0121	0.2		

Table 33. Compensable Back, Neck & UE Claims among NACs with Source Other Person Univariate Models with Imputed Data

With prerate	as trichotonomous			With year		With bedgroup		With year and bedgroup	
Variable name	*Description*	*Coef.*	*p-val.*	*Coef.*	*p-val.*	*Coef.*	*p-val.*	*Coef.*	*p-val.*
handnacs	logit((handlift+1/2)/(nacs+1))	0.1118	**<0.001** ***	0.1109	**<0.001** ***	0.0831	**0.005** **	0.0808	**0.01** *
mechnacs	logit((mechlift+1/2)/(nacs+1))	0.0439	0.2	0.0920	**0.01** *	0.0212	0.5	0.0634	0.07
ssnacs	logit((sslift+1/2)/(nacs+1))	0.0908	**0.01** *	0.1230	**0.002** **	0.0548	0.1	0.0830	**0.03** *
mechsslnacs	logit((mechsslift+1/2)/(nacs+1))	0.0366	0.3	0.0847	**0.02** *	0.0174	0.6	0.0590	0.08
sumliftnacs	logit((sumlift+1/2)/(nacs+1))	0.1186	**0.03** *	0.1836	**0.001** ***	0.0824	0.1	0.1401	**0.005** **
equipscrnacs	logit((equipscore+1/2)/(nacs+1))	0.0538	0.2	0.1047	**0.004** **	0.0334	0.4	0.0781	**0.02** *
prnew	mechssl/sumlift	-0.0893	0.3	-0.0431	0.6	-0.0866	0.2	-0.0381	0.7
prnewest	sslift/sumlift	-0.0392	0.8	0.0050	1.0	-0.0568	0.7	-0.0111	0.9
pdvscomp	PD	-0.1268	0.2	-0.1268	0.2	-0.1022	0.2	-0.1018	0.2
pda	PD after 1997	-0.1268	0.2	-0.1268	0.2	-0.1022	0.2	-0.1018	0.2
pdeff	PD after 1998	-0.2047	**0.04** *	-0.1790	0.07	-0.1821	0.06	-0.1557	0.1
finstate	Financial status	0.1020	0.2	0.1012	0.2	0.1001	0.2	0.0981	0.2
chain	Chain	0.1139	0.08	0.1197	0.07	0.1206	**0.04** *	0.1248	**0.03** *
finxchn	finstate * chain	0.0876	0.2	0.0942	0.2	0.0968	0.1	0.1018	0.1
facbeds	Number of beds	-0.0055	**<0.001** ***	-0.0056	**<0.001** ***	-0.0046	**0.007** **	-0.0047	**0.006** **
occu	numres/fabeds	-0.0773	0.5	-0.0600	0.6	-0.1323	0.4	-0.1172	0.5
nacratio	numres/nacs	0.1004	0.4	0.1117	0.3	0.1145	0.3	0.1263	0.2
sameadmn	Same administrator	-0.0810	0.3	-0.0810	0.3	-0.0992	0.1	-0.0993	0.1
nacturn	hirenac/nacs	0.0913	**0.03** *	0.0863	0.06	0.0802	0.06	0.0748	0.1
logturn	ln of nacturn	0.0751	0.07	0.0700	0.1	0.0722	0.08	0.0668	0.1
turnscrr	nacturn categorized	0.0385	0.09	0.0357	0.2	0.0360	0.1	0.0331	0.2
numdns_d	numdns > 2 or 1,2	0.0447	0.5	0.0386	0.6	0.0695	0.3	0.0628	0.4
numadmn_d	numadmn > 2 or 1,2	0.1056	0.2	0.0982	0.2	0.1473	0.08	0.1402	0.09
numadmdns	sum(numadmn_d+numdns_d)	0.0560	0.2	0.0509	0.3	0.0804	0.08	0.0754	0.09
numsdc	Number of SDCs	0.0358	0.3	0.0295	0.4	0.0569	0.08	0.0511	0.1

Table 33 continued

With prerate	**as trichotonomous**			**With year**		**With bedgroup**		**With year and bedgroup**	
Variable name	*Description*	*Coef.*	*p-val.*	*Coef.*	*p-val.*	*Coef.*	*p-val.*	*Coef.*	*p-val.*
numsdc_d	numsdc > 2 or 1,2	0.1248	0.2	0.1550	0.1	0.1532	0.08	0.1953	0.06
turmlmgt	sum(numadmn_d+numdns_d+numsdc_d)	0.0673	0.1	0.0677	0.1	0.0896	**0.05** *	0.0912	**0.03** *
shcinvst_d		-0.0248	0.8	0.0103	0.9	-0.0673	0.6	-0.0341	0.8
shcdisc_d	All binary 1,2 vs. 3-5	-0.1315	0.3	-0.0829	0.5	-0.1631	0.2	-0.1156	0.4
shcrec_d		-0.1094	0.2	-0.1083	0.2	-0.1103	0.2	-0.1093	0.2
shcprev_d		-0.1716	0.2	-0.1344	0.3	-0.1900	0.1	-0.1535	0.2
shctotal	Total of the shc binaries	-0.0511	0.2	-0.0403	0.3	-0.0600	0.1	-0.0496	0.2
rateequp_d		-0.0111	0.9	0.0217	0.8	-0.0142	0.9	0.0175	0.8
ratetrng_d		-0.0203	0.9	0.0221	0.9	0.0100	0.9	0.0519	0.7
ratepoli_d	All binary 1,2 vs. 3-5	-0.0461	0.7	-0.0191	0.9	-0.0284	0.8	-0.0014	1.0
ratemcei_d		-0.1584	0.10	-0.1148	0.2	-0.1276	0.2	-0.0795	0.4
ratecase_d		-0.0975	0.5	-0.0551	0.7	-0.1098	0.5	-0.0684	0.6
ratezero_d		-0.0708	0.5	-0.0384	0.7	-0.0594	0.6	-0.0276	0.8
sumzero	Total of the rate binaries	-0.0253	0.3	-0.0124	0.6	-0.0202	0.4	-0.0071	0.8
totalpt	Physical therapists	-0.0098	0.3	-0.0090	0.3	-0.0034	0.7	-0.0025	0.8
bedfast	Low mobility	-0.0031	0.8			-0.0017	0.9		
presores	Pressure sores	-0.0033	0.8			0.0036	0.8		
behsx	Behavioural symptoms	-0.0002	1.0			-0.0015	0.6		
numdef	# of deficiences	0.0088	0.4			0.0128	0.2		

Table 34. Compensable Shoulder Claims among NACs with Source Other Person Univariate Models with Imputed Data

With prerate	as continuous			With year			With bedgroup			With year and bedgroup		
Variable name	*Description*	*Coef.*	*p-val.*	*Coef.*	*p-val.*		*Coef.*	*p-val.*		*Coef.*	*p-val.*	
handnacs	logit((handlift+1/2)/(nacs+1))	0.26815	0.2	0.2817	0.2		0.21999	0.3		0.2313	0.3	
mechnacs	logit((mechlift+1/2)/(nacs+1))	0.31241	**0.05**	* 0.35633	0.06		0.25883	0.1		0.29761	0.1	
ssnacs	logit((sslift+1/2)/(nacs+1))	0.04252	0.8	0.03164	0.8		-0.0516	0.7		-0.0675	0.7	
mechsslnacs	logit((mechsslift+1/2)/(nacs+1))	0.13136	0.4	0.14415	0.4		0.08221	0.6		0.08978	0.6	
sumliftnacs	logit((sumlift+1/2)/(nacs+1))	0.36778	0.08	0.40462	0.09		0.29624	0.2		0.33094	0.2	
equipscrnacs	logit((equipscore+1/2)/(nacs+1))	0.1473	0.3	0.16159	0.3		0.10177	0.5		0.11321	0.5	
prnew	mechssl/sumlift	-0.2267	0.6	-0.2836	0.6		-0.2772	0.5		-0.3242	0.5	
prnewest	sslift/sumlift	-1.3185	0.09	-1.4689	0.06		-1.3759	0.08		-1.5015	0.05	
pdvscomp	PD	0.11204	0.8	0.11108	0.8		0.10847	0.8		0.10758	0.8	
pda	PD after 1997	0.11204	0.8	0.11108	0.8		0.10847	0.8		0.10758	0.8	
pdeff	PD after 1998	0.05988	0.9	0.02535	1.0		0.05014	0.9		0.0226	1.0	
finstate	Financial status	0.93181	**0.05**	* 0.93355	**0.05**	*	0.81606	0.07		0.82011	0.07	
chain	Chain	0.44528	0.1	0.44382	0.1		0.36907	0.2		0.36931	0.2	
finxchn	finstate * chain	0.59071	0.05	0.58977	0.05		0.50395	0.08		0.50524	0.08	
facbeds	Number of beds	-0.0084	**0.04**	* -0.0083	**0.04**	*	-0.0025	0.8		-0.0024	0.8	
occu	numres/fabeds	-0.491	0.4	-0.596	0.4		-0.5916	0.4		-0.692	0.3	
nacratio	numres/nacs	0.2282	0.5	0.23588	0.5		0.25102	0.4		0.26094	0.4	
sameadmn	Same administrator	-0.208	0.5	-0.2116	0.5		-0.2047	0.5		-0.2075	0.5	
nacturn	hirenac/nacs	0.49822	**0.004**	** 0.49262	**0.007**	**	0.42852	**0.01**	*	0.42201	**0.02**	*
logturn	ln of nacturn	0.61992	**0.008**	** 0.61511	**0.009**	**	0.54787	**0.02**	*	0.54211	**0.02**	*
turnscrr	nacturn categorized	0.28983	**0.002**	** 0.28686	**0.003**	**	0.2575	**0.007**	**	0.25398	**0.009**	**
numdns_d	numdns > 2 or 1,2	0.29228	0.4	0.28333	0.4		0.31269	0.4		0.30574	0.4	
numadmn_d	numadmn > 2 or 1,2	0.10719	0.8	0.098	0.8		0.14515	0.7		0.13752	0.7	
numadmdns	sum(numadmn_d+numdns_d)	0.15439	0.5	0.14898	0.5		0.1744	0.4		0.17038	0.5	
numsdc	Number of SDCs	0.15999	0.4	0.15547	0.4		0.16706	0.4		0.16164	0.4	

Table 34 continued

With prerate	as continuous			With year		With bedgroup		With year and bedgroup	
Variable name	*Description*	*Coef.*	*p-val.*	*Coef.*	*p-val.*	*Coef.*	*p-val.*	*Coef.*	*p-val.*
numsdc_d	numsdc > 2 or 1,2	0.07737	0.8	0.26402	0.6	0.10063	0.8	0.29	0.5
turmlmgt	sum(numadmn_d+numdns_d+numsdc_d)	0.13358	0.5	0.15423	0.4	0.14701	0.4	0.16662	0.4
shcinvst_d		0.19845	0.8	0.24231	0.7	0.13418	0.8	0.18081	0.8
shcdisc_d	All binary 1,2 vs. 3-5	-0.0533	0.9	0.00298	1.0	-0.1477	0.8	-0.0903	0.9
shcrec_d		0.774	0.2	0.78327	0.2	0.79032	0.2	0.80109	0.2
shcprev_d		0.03787	1.0	0.0868	0.9	0.10583	0.9	0.15394	0.9
shctotal	Total of the shc binaries	0.1781	0.5	0.19608	0.4	0.17216	0.5	0.19132	0.4
rateequp_d		0.12186	0.8	0.16609	0.7	0.14455	0.8	0.18447	0.7
ratetrng_d		-0.0517	0.9	0.00307	1.0	0.03685	1.0	0.09392	0.9
ratepoli_d	All binary 1,2 vs. 3-5	-0.5639	0.3	-0.5417	0.3	-0.5526	0.3	-0.5316	0.3
ratemcei_d		-0.1249	0.8	-0.0575	0.9	-0.0638	0.9	0.00763	1.0
ratecase_d									
ratezero_d		-0.3305	0.5	-0.303	0.5	-0.2676	0.6	-0.2428	0.6
sumzero	Total of the rate binaries	-0.0442	0.7	-0.0299	0.8	-0.0284	0.8	-0.0138	0.9
totalpt	Physical therapists	-0.0807	0.2	-0.0842	0.2	-0.0604	0.3	-0.0631	0.3
bedfast	Low mobility	0.02732	0.6						
presores	Pressure sores	0.07092	0.2						
behsx	Behavioural symptoms	0.01054	0.5						
numdef	# of deficiences	0.01833	0.7						

Table 35. Compensable Shoulder Claims among NACs with Source Other Person Univariate Models with Imputed Data

With prerate	as trichotomous			With year		With bedgroup		With year and bedgroup	
Variable name	*Description*	*Coef.*	*p-val.*	*Coef.*	*p-val.*	*Coef.*	*p-val.*	*Coef.*	*p-val.*
handnacs	logit((handlift+1/2)/(nacs+1))	0.30031	0.1	0.31393	0.1	0.2336	0.2	0.24491	0.2
mechnacs	logit((mechlift+1/2)/(nacs+1))	0.33058	**0.04** *	0.37617	0.05	0.26301	0.1	0.30206	0.1
ssnacs	logit((sslift+1/2)/(nacs+1))	0.07023	0.6	0.05979	0.7	-0.0393	0.8	-0.0558	0.7
mechsslnacs	logit((mechsslift+1/2)/(nacs+1))	0.14537	0.3	0.15864	0.4	0.08656	0.6	0.09371	0.6
sumliftnacs	logit((sumlift+1/2)/(nacs+1))	0.40823	0.07	0.44893	0.08	0.31263	0.2	0.34878	0.2
equipscrnacs	logit((equipscore+1/2)/(nacs+1))	0.16375	0.3	0.17856	0.3	0.10757	0.5	0.11876	0.5
prnew	mechssl/sumlift	-0.2614	0.6	-0.3293	0.5	-0.2981	0.5	-0.3505	0.5
prnewest	sslift/sumlift	-1.3411	0.09	-1.5085	0.06	-1.377	0.08	-1.5109	0.05
pdvscomp	PD	0.07272	0.8	0.07189	0.8	0.0837	0.8	0.083	0.8
pda	PD after 1997	0.07272	0.8	0.07189	0.8	0.0837	0.8	0.083	0.8
pdeff	PD after 1998	0.02048	1.0	-0.0198	1.0	0.02476	1.0	-0.0067	1.0
finstate	Financial status	0.91536	0.05	0.91746	0.05	0.79177	0.08	0.79681	0.08
chain	Chain	0.45618	0.1	0.45419	0.1	0.37564	0.2	0.37571	0.2
finxchn	finstate * chain	0.61404	0.05	0.61253	0.05	0.51542	0.08	0.51656	0.08
facbeds	Number of beds	-0.0097	**0.01** *	-0.0096	**0.01** *	-0.0037	0.7	-0.0035	0.7
occu	numres/fabeds	-0.62001	0.4	-0.7349	0.3	-0.6615	0.3	-0.7659	0.3
nacratio	numres/nacs	0.24294	0.5	0.2508	0.4	0.26544	0.4	0.27591	0.4
sameadmn	Same administrator	-0.1468	0.7	-0.1507	0.7	-0.1731	0.6	-0.1764	0.6
nacturn	hirenac/nacs	0.51826	**0.004** **	0.51343	**0.006** **	0.43129	**0.02** *	0.4245	**0.02** *
logturn	ln of nacturn	0.6324	**0.01** *	0.62803	**0.01** **	0.5482	**0.02** *	0.54199	**0.02** *
turnscrr	nacturn categorized	0.29864	**0.003** **	0.29587	**0.003** **	0.25899	**0.009** **	0.25521	**0.01** *
numdns_d	numdns > 2 or 1,2	0.32083	0.4	0.31222	0.4	0.32648	0.3	0.31865	0.4
numadmn_d	numadmn > 2 or 1,2	0.11426	0.8	0.10578	0.8	0.14826	0.7	0.14069	0.7
numadmdns	sum(numadmn_d+numdns_d)	0.16838	0.5	0.16338	0.5	0.18129	0.4	0.17703	0.4
numsdc	Number of SDCs	0.1591	0.4	0.1544	0.4	0.16711	0.4	0.16142	0.4

Table 35 continued

With prerate	as trichotomous			With year		With bedgroup		With year and bedgroup	
Variable name	*Description*	*Coef.*	*p-val.*	*Coef.*	*p-val.*	*Coef.*	*p-val.*	*Coef.*	*p-val.*
numsdc_d	numsdc > 2 or 1,2	0.08552	0.8	0.29714	0.5	0.11566	0.7	0.33076	0.5
turmlmgt	sum(numadmn_d+numdns_d+numsdc_d)	0.14477	0.4	0.16744	0.4	0.15629	0.4	0.17688	0.4
shcinvst_d		0.17827	0.8	0.22297	0.7	0.11923	0.9	0.16635	0.8
shcdisc_d	All binary 1,2 vs. 3-5	-0.0597	0.9	-0.003	1.0	-0.141	0.8	-0.0822	0.9
shcrec_d		0.78469	0.2	0.79293	0.2	0.79333	0.2	0.80345	0.2
shcprev_d		0.0913	0.9	0.13921	0.9	0.14122	0.9	0.1892	0.8
shctotal	Total of the shc binaries	0.17738	0.5	0.19468	0.4	0.17174	0.5	0.19052	0.4
rateequp_d		0.07143	0.9	0.11611	0.8	0.11521	0.8	0.15666	0.8
ratetrng_d		-0.0414	0.9	0.0145	1.0	0.04128	0.9	0.09985	0.9
ratepoli_d	All binary 1,2 vs. 3-5	-0.5484	0.3	-0.5267	0.3	-0.5475	0.3	-0.5265	0.3
ratemcei_d		-0.1761	0.7	-0.1163	0.8	-0.0875	0.8	-0.0185	1.0
ratecase_d									
ratezero_d		-0.3994	0.4	-0.375	0.4	-0.3173	0.5	-0.293	0.6
sumzero	Total of the rate binaries	-0.0569	0.6	-0.0438	0.7	-0.0367	0.8	-0.0224	0.9
totalpt	Physical therapists	-0.0916	0.1	-0.0952	0.1	-0.0633	0.3	-0.066	0.3
bedfast	Low mobility	0.02557	0.6						
presores	Pressure sores	0.07566	0.2						
behsx	Behavioural symptoms	0.01143	0.5						
numdef	# of deficiences	0.01696	0.7						

Table 36A. Multivariate models using GEE with Imputed Data, 2000-2001

Observations: 751 **Homes: 188** **AFTER 2/12/03 CORRECTION** (see methods)

Outcome	*Predictor*	*Coef.*	*SE.*	*p-value*	*Coef.*	*SE.*	*p-value*	*Coef.*	*SE.*	*p-value*	*Coef.*	*SE.*	*p-value*
Compensable Back, NACs, Source Other Person	*Prerate as logit*							1.104	0.667	0.1	1.143	0.661	0.09
	Prerate medium	-0.002	0.109	1.0	-0.007	0.108	0.9						
	Prerate high	0.173	0.113	0.1	0.180	0.111	0.1						
	Bedgroup small	**0.429**	**0.124**	**0.001**	**0.435**	**0.121**	**0.001**	**0.410**	**0.127**	**0.003**	**0.416**	**0.125**	**0.002**
	Bedgroup large	**-0.276**	**0.123**	**0.03**	**-0.287**	**0.122**	**0.02**	**-0.278**	**0.120**	**0.02**	**-0.288**	**0.120**	**0.02**
	Year 6				0.205	0.158	0.2				0.200	0.160	0.2
	nacratio	0.110	0.150	0.5	0.111	0.130	0.4	0.110	0.148	0.5	0.110	0.130	0.4
	pdvscomp	-0.100	0.138	0.5	-0.105	0.141	0.5	-0.080	0.139	0.6	-0.084	0.142	0.6
	sameadmn	0.036	0.106	0.7	0.038	0.103	0.7	0.028	0.106	0.8	0.030	0.103	0.8
	finstate	0.035	0.113	0.8	0.045	0.114	0.7	0.031	0.113	0.8	0.041	0.114	0.7
	chain	0.032	0.097	0.7	0.033	0.098	0.7	0.029	0.099	0.8	0.030	0.099	0.8
	shcrec_d	-0.073	0.087	0.4	-0.079	0.086	0.4	-0.069	0.087	0.4	-0.074	0.086	0.4
	nacturn	0.063	0.079	0.4	0.039	0.071	0.6	0.067	0.077	0.4	0.044	0.071	0.5
	numadmn_d	0.105	0.122	0.4	0.101	0.120	0.4	0.079	0.120	0.5	0.075	0.118	0.5
	handnacs	0.050	0.059	0.4	0.059	0.057	0.3	0.048	0.059	0.4	0.057	0.057	0.3
	ratemcei_d	-0.010	0.115	0.9	0.062	0.098	0.5	-0.020	0.114	0.9	0.051	0.098	0.6

Table 36A continued

Outcome	Predictor	Coef.	SE.	p-value	Coef.	SE.	p-value	Coef.	SE.	p-value	Coef.	SE.	p-value
Compensable Back, Neck, UE, NACs, Other Person	*Prerate as logit*							**1.451**	**0.519**	**0.006**	**1.468**	**0.518**	**0.006**
	Prerate medium	0.062	0.091	0.5	0.059	0.091	0.5						
	Prerate high	**0.225**	**0.089**	**0.01**	**0.226**	**0.089**	**0.01**						
	Bedgroup small	**0.370**	**0.108**	**0.001**	**0.375**	**0.107**	**0.001**	**0.352**	**0.110**	**0.003**	**0.356**	**0.109**	**0.002**
	Bedgroup large	**-0.245**	**0.102**	**0.02**	**-0.254**	**0.102**	**0.01**	**-0.244**	**0.101**	**0.02**	**-0.253**	**0.101**	**0.01**
	Year 6				0.129	0.132	0.3				0.129	0.132	0.3
	nacratio	0.112	0.128	0.4	0.116	0.120	0.4	0.109	0.123	0.4	0.112	0.115	0.4
	pdvscomp	-0.086	0.117	0.5	-0.087	0.118	0.5	-0.066	0.117	0.6	-0.067	0.118	0.6
	sameadmn	0.020	0.089	0.8	0.023	0.088	0.8	0.012	0.087	0.9	0.014	0.086	0.9
	finstate	0.115	0.102	0.3	0.123	0.104	0.2	0.123	0.102	0.2	0.130	0.103	0.2
	chain	-0.002	0.082	1.0	-0.002	0.082	1.0	-0.017	0.080	0.8	-0.017	0.080	0.8
	shcrec_d	-0.080	0.087	0.4	-0.083	0.086	0.3	-0.082	0.085	0.3	-0.084	0.085	0.3
	nacturn	0.031	0.066	0.6	0.013	0.067	0.8	0.032	0.063	0.6	0.015	0.065	0.8
	numadmn_d	0.090	0.111	0.4	0.088	0.110	0.4	0.060	0.109	0.6	0.058	0.108	0.6
	handnacs	0.048	0.050	0.3	0.053	0.050	0.3	0.046	0.050	0.4	0.051	0.050	0.3
	ratemcei_d	-0.083	0.095	0.4	-0.037	0.096	0.7	-0.086	0.095	0.4	-0.039	0.095	0.7

Table 36A continued

Outcome	Predictor	Coef.	SE.	p-value	Coef.	SE.	p-value	Coef.	SE.	p-value	Coef.	SE.	p-value
Compensable Shoulder, NAC, Source Other Person	Prerate as logit							7.371	9.558	0.4	7.317	9.609	0.4
	Prerate high	-0.055	0.486	0.9	-0.055	0.488	0.9						
	Bedgroup small	0.183	0.613	0.8	0.192	0.614	0.8	0.115	0.618	0.9	0.123	0.619	0.8
	Bedgroup large	-0.522	0.578	0.4	-0.533	0.581	0.4	-0.513	0.581	0.4	-0.523	0.583	0.4
	Year 6				0.175	0.585	0.8				0.174	0.581	0.8
	nacratio	0.130	0.308	0.7	0.135	0.301	0.7	0.123	0.302	0.7	0.129	0.296	0.7
	pdvscomp	0.061	0.585	0.9	0.048	0.598	0.9	0.088	0.576	0.9	0.075	0.589	0.9
	sameadmn	-0.153	0.486	0.8	-0.147	0.492	0.8	-0.190	0.485	0.7	-0.184	0.491	0.7
	finstate	1.274	0.966	0.2	1.284	0.967	0.2	1.295	0.961	0.2	1.304	0.961	0.2
	chain	0.331	0.462	0.5	0.336	0.461	0.5	0.302	0.451	0.5	0.307	0.449	0.5
	shcrec_d	0.842	0.625	0.2	0.844	0.636	0.2	0.830	0.630	0.2	0.832	0.640	0.2
	nacturn	0.126	0.280	0.7	0.106	0.285	0.7	0.129	0.281	0.6	0.108	0.288	0.7
	numadmn_d	-0.326	0.524	0.5	-0.327	0.528	0.5	-0.343	0.522	0.5	-0.345	0.527	0.5
	handnacs	0.401	0.298	0.2	0.407	0.299	0.2	0.396	0.299	0.2	0.401	0.300	0.2
	ratemcei_d	-0.019	0.471	1.0	0.041	0.502	0.9	-0.031	0.467	0.9	0.029	0.497	1.0

Table 36B. Multivariate models using GEE with Imputed Data, 1998-2001

Observations: 751 **Homes: 188** **AFTER 2/12/03 CORRECTION** (see methods)

Outcome	*Predictor*	*Coef.*	*SE.*	*p-value*	*Coef.*	*SE.*	*p-value*	*Coef.*	*SE.*	*p-value*	*Coef.*	*SE.*	*p-value*
Compensable Back, NACs, Source Other Person	*Prerate as logit*							**1.172**	**0.476**	**0.02**	**1.182**	**0.476**	**0.01**
	Prerate medium	0.037	0.078	0.6	0.037	0.077	0.6						
	Prerate high	**0.217**	**0.087**	**0.02**	**0.219**	**0.086**	**0.01**						
	Bedgroup small	**0.343**	**0.082**	**<0.001**	**0.346**	**0.082**	**<0.001**	**0.321**	**0.083**	**<0.001**	**0.325**	**0.082**	**<0.001**
	Bedgroup large	**-0.222**	**0.083**	**0.008**	**-0.229**	**0.082**	**0.006**	**-0.232**	**0.082**	**0.005**	**-0.239**	**0.082**	**0.004**
	Year 4				0.163	0.174	0.4				0.162	0.174	0.4
	Year 5				0.107	0.204	0.6				0.105	0.205	0.6
	Year 6				0.198	0.165	0.3				0.195	0.166	0.3
	nacratio	0.085	0.099	0.4	0.090	0.089	0.3	0.083	0.099	0.4	0.088	0.089	0.3
	pdvscomp	-0.096	0.090	0.3	-0.093	0.090	0.3	-0.075	0.088	0.4	-0.072	0.088	0.4
	sameadmn	-0.046	0.078	0.6	-0.045	0.078	0.6	-0.042	0.078	0.6	-0.041	0.078	0.6
	finstate	0.024	0.087	0.8	0.024	0.087	0.8	0.020	0.088	0.8	0.019	0.088	0.8
	chain	0.074	0.075	0.3	0.076	0.075	0.3	0.075	0.075	0.3	0.078	0.075	0.3
	nacturn	0.072	0.050	0.2	0.060	0.046	0.2	0.076	0.048	0.1	0.064	0.045	0.2
	handnacs	**0.077**	**0.034**	**0.03**	0.076	0.039	0.06	**0.078**	**0.035**	**0.03**	0.076	0.041	0.07

Table 36B continued

Outcome	Predictor	Coef.	SE.	p-value	Coef.	SE.	p-value	Coef.	SE.	p-value	Coef.	SE.	p-value
Compensable Back, Neck, UE, NACs, Other Person	*Prerate as logit*							1.598	0.396	**<0.001**	1.587	0.394	**<0.001**
	Prerate medium	0.082	0.067	0.2	0.082	0.066	0.2						
	Prerate high	**0.236**	**0.072**	**0.002**	**0.234**	**0.072**	**0.002**						
	Bedgroup small	**0.324**	**0.067**	**<0.001**	**0.328**	**0.067**	**<0.001**	**0.302**	**0.066**	**<0.001**	**0.306**	**0.067**	**<0.001**
	Bedgroup large	**-0.221**	**0.078**	**0.005**	**-0.233**	**0.077**	**0.003**	**-0.223**	**0.077**	**0.004**	**-0.235**	**0.077**	**0.003**
	Year 4				0.206	0.105	0.06				0.206	0.105	0.06
	Year 5				0.121	0.118	0.3				0.121	0.117	0.3
	Year 6				0.147	0.121	0.2				0.147	0.121	0.2
	nacratio	0.097	0.102	0.4	0.109	0.093	0.3	0.092	0.097	0.4	0.104	0.089	0.3
	pdvscomp	-0.114	0.087	0.2	-0.110	0.088	0.2	-0.094	0.085	0.3	-0.090	0.086	0.3
	sameadmn	-0.054	0.071	0.5	-0.051	0.071	0.5	-0.045	0.070	0.5	-0.043	0.069	0.5
	finstate	0.028	0.079	0.7	0.024	0.079	0.8	0.036	0.076	0.6	0.032	0.077	0.7
	chain	0.079	0.064	0.2	0.084	0.063	0.2	0.067	0.063	0.3	0.071	0.062	0.2
	nacturn	0.060	0.046	0.2	0.052	0.046	0.3	0.055	0.044	0.2	0.048	0.045	0.3
	handnacs	0.063	0.035	0.08	0.057	0.037	0.1	0.061	0.035	0.09	0.055	0.037	0.1

Table 36B continued

Outcome	Predictor	Coef.	SE.	p-value	Coef.	SE.	p-value	Coef.	SE.	p-value	Coef.	SE.	p-value
Compensable Shoulder, NAC, Source Other Person	*Prerate as logit*							9.140	7.062	0.2	9.023	7.102	0.2
	Prerate high	0.167	0.322	0.6	0.164	0.322	0.6						
	Bedgroup small	0.363	0.394	0.4	0.364	0.399	0.4	0.235	0.424	0.6	0.236	0.429	0.6
	Bedgroup large	-0.531	0.388	0.2	-0.528	0.387	0.2	-0.508	0.386	0.2	-0.505	0.384	0.2
	Year 4				-0.042	0.503	0.9				-0.044	0.498	0.9
	Year 5				0.038	0.483	0.9				0.032	0.479	0.9
	Year 6				0.087	0.530	0.9				0.080	0.529	0.9
	nacratio	0.170	0.261	0.5	0.174	0.255	0.5	0.156	0.253	0.6	0.160	0.247	0.5
	pdvscomp	-0.086	0.358	0.8	-0.078	0.359	0.8	-0.020	0.354	1.0	-0.014	0.356	1.0
	sameadmn	0.009	0.362	1.0	0.008	0.361	1.0	-0.018	0.356	1.0	-0.019	0.355	1.0
	finstate	0.588	0.471	0.2	0.595	0.473	0.2	0.597	0.480	0.2	0.603	0.482	0.2
	chain	0.191	0.320	0.6	0.186	0.320	0.6	0.145	0.309	0.6	0.141	0.308	0.6
	nacturn	**0.358**	**0.176**	**0.05**	0.347	0.182	0.06	**0.350**	**0.172**	**0.05**	0.339	0.179	0.06
	handnacs	0.192	0.201	0.3	0.199	0.208	0.3	0.181	0.204	0.4	0.187	0.211	0.4

Appendix 1

Survey Year 1
Survey Year 2
Survey Year 3
Survey Year 4

SHARP
Safety & Health Assessment & Research for Prevention

NURSING HOME
RESIDENT TRANSFER SURVEY

NAME OF FACILITY_____ **COUNTY**_____ **DATE** ___/___/___

YOUR NAME _____ **POSITION** _____

GENERAL INFORMATION

1. How long have you been at this facility? Years___ Months___

2. Number of licensed beds? _____ total # of beds

   Medicare _____ Specialty unit _____ Alzheimer's unit_____ Long term care _____

   Other_____

3. How many residents do you currently have? _____

4. How many resident care staff do you currently have? (Number of people) _____

   4a. RNs_____ 4b. LPNs_____ 4c. NACs_____ 4d. Rehab Assistants_____

   4e.OT/PT_____ 4f. Other ___ (please describe)_____

5. Roughly, what percent of your NACs are female? ____%

6. Roughly what percent of your NACs have English as a second language? ____%

7. About how many nursing assistants did you hire in the last twelve months? ____

8. Do you have a nursing assistant certification program in-house? Yes____ No ____

   8a. *If YES*, how many nursing assistants are in the program now? ____

RESIDENT TRANSFER EQUIPMENT

9. Do you have any resident mechanical transfer devices? Yes____ No ____

9a. If YES, please list the kind (total assist, sit/stand), Manufacturer and how many:

KIND	MANUFACTURER	QUANTITY

10. Do you use transfer belts? Yes____ No _____

11. Do you use gait belts with handles? Yes____ No _____

12. Do you use a special lift team? Yes____ No _____

13. Do you use slip-sheets? Yes____ No _____

14. Do you use other ways or equipment to transfer or reposition residents? Yes____ No _____

14.a ***If YES***, please describe_____

RESIDENT TRANSFER POLICIES

15. Do you have any policies on performing resident transfers? Yes____ No _____
(*please attach policy*)

If YES, does your policy specifically cover:

a) When to use a mechanical total assist Yes____No _____ Don't use _____
b) When to use a mechanical sit-stand assist Yes____No _____ Don't use _____
c) When to use a gait belt Yes____No _____ Don't use _____
d) When to use a one person transfer Yes____No _____ Don't use _____
e) When to use a two person transfer Yes____No _____ Don't use _____
f) When to use a three person transfer Yes____No _____ Don't use _____
g) When to use a slip sheet Yes____No _____ Don't use _____
h) When to get help Yes____No _____ Don't use _____

If YES, How are your resident transfer policies enforced? (*Please check all that apply*)

i)Employee recognition _____ j)Hold supervisor responsible _____ k)PT Follow-up_____

l)Retraining if improper transfer noted____ m)Individual counseling ____

n)Team counseling _____ o) Warning _____ p) Reprimand_____

q)Other_____

16. Who determines resident transfer needs? (*Please check all that apply*)

Physical Therapy_____ RN _____ LPN_____ NACs_____ Other_____

17. How are resident transfer needs communicated to staff? (*Please describe*)

_____

TRAINING

18. Do you have in-service training on **RESIDENT TRANSFER TECHNIQUES**? Yes___ No ___

If YES, (*Please check all that apply to your training*)

a)Content: 1)Body mechanics __ 2)Ergonomics__ 3)Transfer belt use__4)Gait belt use___
5)Total assist mechanical device__ 6)Sit/stand assist device___ 7)Slip-sheet use_____
8)Communicating with resident___ 9)Other (please describe)_____

b) ***Method:*** 1)Video ___ (name of video)_____2)Demonstration_____
3)Hands-on use of equipment___ 4)Unit follow-up by trainer __ 5)Other _____

c)***Frequency***: 1)New employee orientation__ 2)Quarterly___ 3)Yearly____4)Other_____

d)***Length***: 1)Orientation training_____hrs 2) Follow-up training_____hrs

e)*Who* developed this training? _____

19. Do you have training for NACs on **MANAGING DIFFICULT RESIDENTS**? Yes___ No ____

IF YES, (*Please check all that apply to your training)*

a)*Content* _____

b)Method: 1)Video _____ (name of video)_____2)Demonstration_____

c)Frequency:1)New employee orientation____ 2)Quarterly____3)Yearly_____4)Other____

d) *Length*: 1)Orientation training_____2) Follow-up training_____

e)*Who* developed this training? _____

20. What do you like best about your resident transfer training program?

    1)_____ 2)_____3)_____

21. How do you know if your resident handling policies, training, equipment works?

    _____

22. Is your employee-management health and safety committee involved in:

    a) Investigating resident handling injuries to staff? Yes___ No___

    b) Identifying where, when or what resident handling equipment to use? Yes___ No___

23. What are the three biggest barriers to reducing resident handling injuries?

    1)_____

    2)_____

    3)_____

24. Do you obtain Workers' Compensation insurance through the State Fund (L&I) or are you self-insured? 1) State Fund__ 2) Self-Insured __

25. If your insurance is through the State Fund, do you participate in a Retrospective (Retro) Rating Program? Yes____ No_____

If you have questions regarding this survey, please call:
Dr. Barbara Silverstein, Dr. Susan Sama or Ninica Howard at SHARP

(Toll free) 1-888-66SHARP

Please use the enclosed envelope to send the survey to SHARP or FAX the survey to SHARP

FAX: 360-902-5672

Please respond by: November 16th, 1998

Thank you for participating in this survey.
Overall survey results will be sent to you when available.

YEAR 2

SHARP
Safety & Health Assessment & Research for Prevention

FACILITY NAME _____ **TODAY'S DATE** _____

YOUR NAME _____ **POSITION** _____

GENERAL INFORMATION: RESIDENTS AND STAFF

1. How many resident beds are there at your facility? _____

   How many beds are in each of the following categories (if applicable)?

   Medicare _____ Long term care _____ Alzheimer's unit _____ Acute/subacute care _____

   Specialty _____ Other unit _____

2. How many residents do you currently have? _____

3. How many people on your resident care staff do you have in the following categories?

_____ RNs _____ LPNs _____ NACs _____ Rehab Assistants

_____ PT/OT (employee) _____ PT/OT (contract) _____ Other (describe): _____

4. Roughly, what percent of your NACs are female? _____ %
5. Roughly, what percent of your NACs have English as a second language? _____ %
6. About how many nursing assistants did you hire in the last year? _____
7. Do you have a nursing assistant certification program in-house? Yes _____ No _____
8. In the past three years, how many ***Administrators*** have worked at your facility? _____
9. In the past three years, how many ***Directors of Nursing Services*** have worked at your facility? _____

EQUIPMENT FOR RESIDENT TRANSFERS

10. Do you have any handling devices for total body assists? ***Yes*** ___ ***No*** _____

If Yes, please describe and note numbers below.

KIND Electric or battery operated; hand crank	MANUFACTURER(S)	HOW MANY

11. ***Do you have any sit-to-stand transfer devices?*** ***Yes*** _____ ***No*** _____

If Yes, please describe and note numbers below:

MANUFACTURER(S)	HOW MANY

12. ***Do you have any low friction (slipp) sheets for repositioning residents?*** ***Yes*** _____ ***No*** _____

If Yes, please describe and note numbers below.

MANUFACTURER(S)	HOW MANY

13. Do you use transfer belts? Yes _____ No _____
14. Do you use gait belts with handles? Yes _____ No _____

POLICIES AND TRANSFER NEEDS

15. Do you have any policies on performing resident transfer? Yes _____ No _____

If Yes, do any of your policies specifically cover (please check all that apply):

a) When to use a gait belt? Yes ____ No ____ Don't use ____
b) When to use a total assist lift? Yes ____ No ____ Don't use ____
c) When to use a sit-to-stand lift? Yes ____ No ____ Don't use ____
d) When to use a low-friction (slipp) sheet for repositioning? Yes ____ No ____ Don't use ____

If Yes, how are your resident transfer policies enforced? (please check all that apply):

Employee recognition _____ Hold supervisor responsible _____ PT follow-up _____
Retraining _____ Individual counseling _____ Team counseling _____
Warning _____ Reprimand _____ _____
Other (please describe)

Please check all that apply to the following two questions:

16. Who determines the transfer needs of residents **upon admission**?

Physical Therapy _____ RN _____ LPN _____ NAC _____ Other _____

17. Who is involved with **ongoing evaluation** of the transfer needs of residents?

Physical Therapy _____ RN _____ LPN _____ NAC _____ Other _____

18. How are the transfer needs of residents communicated to staff? (Please describe)

_____

TRAINING AND INJURY PREVENTION

(When answering the following questions, do ***NOT*** include training that is part of a certification program.)

19. Do you have in-service training for NACs on ***resident handling techniques***? Yes ___ No ___

If Yes, please check all that apply to your training:

CONTENT:
Body mechanics _____ Ergonomics ____ Use of transfer belt ____
Use of total assist device _____ Use of sit-stand device ____ Use of gait belt with handles ____
Communicating with resident _____ Other (please describe) _____

METHODS:
Video _____ If used, name of video: _____
Demonstration _____ Hands-on use of equipment _____
Unit follow-up by trainer _____ Other _____

HOW OFTEN:
New employee orientation _____ Quarterly _____ Yearly _____
Other _____

Who developed this training?

20. Do you have in-service training for NACs on ***managing difficult residents***? Yes ___ No ___

If Yes, please describe your training:

CONTENT: _____

_____

_____

METHODS:
Video _____ If used, name of video: _____
Demonstration _____ Role play ____ Techniques to deal with the residents ____

HOW OFTEN:
New employee orientation _____ Quarterly _____ Yearly _____
Other _____

Who developed this training?

21. What do you like best about your training program on resident handling?

a) _____

b) _____

c) _____

22. How do you know if your resident handling policies, training, equipment works?

a) _____

b) _____

c) _____

23. Is your employee-management health and safety committee involved in:

a) Investigating resident handling injuries to staff? Yes ___ No ___

b) Identifying where, when or what resident handling equipment to use? Yes ___ No ___

24. What are the three biggest barriers to reducing injuries related to resident handling?

a) _____

b) _____

c) _____

JOB MODIFICATION AND ZERO LIFT

25. Have you heard of the special fund available for job modifications through L&I? Yes ___ No ___

If Yes, have you ever used this fund to obtain a job modification for an injured employee? Yes ___ No ___

If Yes, please describe your experience with this process:

_____

_____

26. Have you implemented ***any*** aspects of a zero-lift program in your facility? Yes _____ No _____ Not sure ___

If yes, has this made any differences in your facility? Yes _____ No _____ Not sure ___

Please take a moment to describe what you have done, what has worked, what hasn't worked, and how you think it has made a difference:

_____

_____

_____

_____

_____

If you have any questions regarding this survey, please call us at SHARP:

(Toll free) 1-888-66SHARP (667-4277)

Ask to speak with Kathleen Rockefeller, Ninica Howard, or Dr. Barbara Silverstein.

Please use the enclosed envelope to send the survey to us at SHARP

OR you can fax the survey to 360-902-5672.

We would appreciate a return by Friday November 5th

THANK YOU SO MUCH for participating in this survey!!

Facility: _____ **Phone #:** _____ **Today's Date:** _____

Your name _____ **Your position:** _____

How long have you been in long-term care? ___ **Yrs OR** ___ **Mo** **How long have you been at this facility?** ___ **Yrs OR** ___ **Mo** **How long have you been in this position?** ___ **Yrs OR** ___ **Mo**

GENERAL INFORMATION: RESIDENTS AND STAFF

1. How many **resident beds** are there at your facility? _____

   How many **beds** are in each of the following categories (if applicable)?

   Medicare _____ **Long term care** _____ **Alzheimer's unit** _____ **Acute/subacute care** _____

   Specialty _____ **Other unit(s)** _____ **(Describe other)** _____

2. How many **residents** do you currently have? _____

3. How many **employees providing resident care** do you have in the following categories?

   RNs _____ **NACs** _____ **PT/OT (employee)** _____ **Other** _____

   LPNs _____ **Rehab Assistants** _____ **PT/OT (contract)** _____ **(Describe other)** _____

4. Roughly, what percent of your NACs are **female**? _____ **%**

5. Roughly, what percent of your NACs have **English as a second language**? _____ **%**

6. About how many NACs did you **hire** in the last year? _____

7. Do you have a nursing assistant certification program in-house? **Yes** _____ **No** _____

8. In the past **three (3)** years, how many ***Administrators*** have worked at your facility? _____

9. In the past **three (3)** years, how many ***Directors of Nursing Services*** have worked at your facility? _____

10. In the past **three (3)** years, how many ***Staff Development Coordinators*** have worked at your facility? _____

EQUIPMENT FOR RESIDENT TRANSFERS

11. Do you have any equipment for moving residents who need total assistance (total lifts)? **Yes** _____ **No** _____

If ***Yes***, please describe and note numbers below.

HOW MANY (# you have)	KIND OF LIFT (how operated, please check box)		NAME OF LIFT	NAME OF MANUFACTURER (made by)
	☐Electric/battery	☐Hand crank		
	☐Electric/battery	☐Hand crank		
	☐Electric/battery	☐Hand crank		
	☐Electric/battery	☐Hand crank		
	☐Electric/battery	☐Hand crank		

12. Do you have any sit-to-stand transfer devices? **Yes** _____ **No** _____

If ***Yes***, please describe and note numbers below:

HOW MANY	NAME OF DEVICE	NAME OF MANUFACTURER

13. Do you have any low friction (slipp) sheets for repositioning residents? **Yes** _____ **No** _____

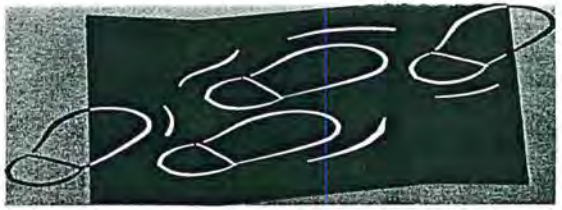
If ***Yes***, please describe and note numbers below.

HOW MANY (# you have)	NAME OF DEVICE	NAME OF MANUFACTURER (made by)

14. Do the NACs use transfer belts? ***Yes*** _____ ***No*** _____

If ***Yes***, do you provide them with the belts? Yes _____ No _____ **Other (please clarify):** _____

_____



RESIDENT TRANSFER NEEDS

Please check ***all that apply*** to the following two questions:

15. Who determines the transfer needs of residents ***upon admission***?
    Physical Therapy _____ RN _____ LPN _____ NAC _____ Other _____

16. Who is involved with ***on-going*** evaluation of the transfer needs of residents?
    Physical Therapy _____ RN _____ LPN _____ NAC _____ Other _____

17. Please briefly describe how the transfer needs of residents are communicated to staff.

_____

_____

SAFETY AND HEALTH COMMITTEE

18. How ***frequently*** is your employee/management Health & Safety Committee involved in the following activities?

	Never	***Occasionally***	***Sometimes***	***Often***	***Always***
a) Investigating injuries that have happened to ***employees.***	☐	☐	☐	☐	☐
b) Discussing lifting, transferring, and moving residents.	☐	☐	☐	☐	☐
c) Recommending equipment to purchase.	☐	☐	☐	☐	☐
d) Discussing how to prevent injuries from happening to residents and staff.	☐	☐	☐	☐	☐

TRAINING, OUTCOMES, AND INJURY PREVENTION

19. What do you like best about your training on resident handling?

_____

_____

20. How do you know the outcomes of your policies, training, and equipment on resident handling and injuries?

21. What do ***you*** think are the three biggest ***barriers*** to reducing NAC injuries related to resident handling?

JOB MODIFICATION AND ZERO LIFT

22. Have you heard of the special funds available for job modifications through L&I? Yes _____ No _____

    If ***Yes***, have you ever used this fund to obtain a job modification for an injured employee? Yes _____ No _____

    If ***Yes***, we would appreciate your feedback on what you thought of this program and process:

In summary, there are five (5) main components of a fully implemented **"zero lift" program**. In the following section, each component is listed, along with the key elements that define it. Please take a moment to reflect on these components, and then rate where you believe ***your facility is today*** with respect to having implemented each component, by checking a box on the accompanying scale.

1. EQUIPMENT

• Have an adequate # of total lifts, sit-to-stand lifts, and other devices to suit the resident population and staff **OR** have defined and approved plans to obtain such equipment	• Process in place for: o Keeping equipment charged o Sling cleaning and inspection o Equipment maintenance
• Have an adequate # of repositioning devices (e.g., low-friction "slipp" sheets, etc.)	
• Equipment is easily accessible to staff who need to use it	

Where we are now with respect to <u>equipment</u>:

No or little implementation (10% or less)	Some implementation (about 25%)	Good implementation (about 50%)	*Very good implementation (about 75%)*	*Excellent implementation (90% or better)*
☐	☐	☐	☐	☐

2. TRAINING

• Training on equipment is developed and integrated into overall training and staff development plan	• Training includes "hands on" practice with opportunities for feedback and coaching
• Training on equipment is part of orientation **AND** regular on-going sessions	• Regular skills check are conducted
• **ALL** nursing staff know how to use equipment (not just NACs)	• Strategies for managing difficult residents offered

Where we are now with respect to <u>training</u>:

No or little implementation (10% or less)	Some implementation (about 25%)	Good implementation (about 50%)	*Very good implementation (about 75%)*	*Excellent implementation (90% or better)*
☐	☐	☐	☐	☐

3. POLICIES, PROCEDURES, ENFORCEMENT

• Have policies and procedures for resident handling, including expected use of equipment o All employees aware of policies o Employees follow policies and procedures o System is in place for correction and coaching; progressive discipline as appropriate	• Assessment of resident function takes into account availability of equipment
	• Up-to-date information on transfer status easily available to NACs

Where we are now with respect to <u>policies</u>:

No or little implementation (10% or less)	Some implementation (about 25%)	Good implementation (about 50%)	*Very good implementation (about 75%)*	*Excellent implementation (90% or better)*
☐	☐	☐	☐	☐

4. MANAGEMENT COMMITMENT AND EMPLOYEE INVOLVEMENT

• Funds allocated in the budget for zero-lift program, both for start-up and on-going	• Employees, especially NACs, are involved with design and implementation of zero-lift
• Management team understands and supports concept of zero-lift	• Employees, especially NACs, are involved with selection of equipment
• Someone is accountable for zero-lift program	• Employees understand and support concept of zero-lift

Where we are now with respect to <u>commitment and involvement</u>:

No or little implementation (10% or less)	Some implementation (about 25%)	Good implementation (about 50%)	*Very good implementation (about 75%)*	*Excellent implementation (90% or better)*
☐	☐	☐	☐	☐

5. INJURY INVESTIGATION AND MEDICAL CASE MANAGEMENT

• Accidents are investigated to better understand how they occurred	• Facility actively involved with the medical case management of workers who are injured
• If a third party administrator (TPA) is involved, they know about the equipment available at facility	• Alternative "light" duty work available
• Physicians know about the equipment available at facility	

Where we are now with respect to injury investigation and case management:

No or little implementation (10% or less)	Some implementation (about 25%)	Good implementation (about 50%)	*Very good implementation (about 75%)*	*Excellent implementation (90% or better)*
☐	☐	☐	☐	☐

Finally, **consider your facility as a whole** with respect to the implementation of an overall zero-lift program. Please rate on the scale below.

Overall, where we are now with respect to implementing zero-lift at our facility:

No or little implementation (10% or less)	Some implementation (about 25%)	Good implementation (about 50%)	*Very good implementation (about 75%)*	*Excellent implementation (90% or better)*
☐	☐	☐	☐	☐

Any additional comments you have on zero-lift, positive or negative, would be greatly appreciated. Please note them in the space below. Thank you so very much for sharing your time, information, and thoughts.

SHARP is a research group within L&I and not related to regulatory enforcement. All information collected during this project will be kept confidential and will only be used for research purposes. No individual nursing home information will be provided to other parties.

SHARP Safety & Health Assessment & Research for Prevention

SHARP NURSING HOME ZEROLIFT SURVEY 4

Facility: _____ **Phone #:** _____ **Today's Date:** _____

Your name _____ **Your position:** _____

Your time in long-term care? ____ Yrs OR ____ Mos Your time at this facility? ____ Yrs OR ____ Mos Your time in this position? ____ Yrs OR ____ Mos

GENERAL INFORMATION: RESIDENTS AND STAFF

1. # of **resident beds** at your facility? _____ ***1.a.*** # of **residents** you have today? _____

2. How many **employees providing resident care** do you have in the following categories?

# of RNs: _____ **# of LPNs:** _____ **# of NACs:** _____

3. # of NACs **hired** in the last **year**? _____ ***3.a.*** # of NAC **vacancies** in the last **month**? _____

4. In the past **three (3)** years, how many ***Administrators*** have worked at your facility? _____

5. In the past **three (3)** years, how many ***Directors of Nursing Services*** have worked at your facility? _____

6. In the past **three (3)** years, how many ***Staff Development Coordinators*** have worked at your facility? _____

EQUIPMENT FOR RESIDENT HANDLING (transfers & repositioning)

7.a. # of electric or battery operated ***total lifts***: _____ **7.b.** # of hand-operated ***total lifts***: _____

8. # of ***sit-to-stand*** transfer devices? _____

9. # of ***repositioning*** devices (low friction or "slipp" sheets, etc.)? _____

10. Any other devices commonly used for resident handling (besides gait or transfer belts)?

_____

_____

SAFETY AND HEALTH COMMITTEE

10. How ***frequently*** is your employee/management Health & Safety Committee involved in the following activities?

	Never	*Occasionally*	*Sometimes*	*Often*	*Always*
a) Investigating injuries that have happened to ***employees***.	☐	☐	☐	☐	☐
b) Discussing lifting, transferring, and moving residents.	☐	☐	☐	☐	☐
c) Recommending equipment to purchase.	☐	☐	☐	☐	☐
d) Discussing how to prevent injuries from happening to residents and staff.	☐	☐	☐	☐	☐

INJURY PREVENTION

11. What do ***you*** think are the three biggest ***barriers*** to reducing NAC injuries related to resident handling?

_____

_____

_____

RATE YOUR FACILITY ON "*Getting to Zero Lift*"

In summary, there are five (5) main components of a fully implemented **"zero lift" program**. In the following section, each component is listed, along with the key elements that define it. Please take a moment to reflect on these components, and then rate where you believe ***your facility is today*** with respect to having implemented each component, by checking a box on the accompanying scale.

1. EQUIPMENT

• Have an adequate # of total lifts, sit-to-stand lifts, and other devices to suit the resident population and staff **OR** have defined and approved plans to obtain such equipment	• Process in place for: o Keeping equipment charged o Sling cleaning and inspection o Equipment maintenance
• Have an adequate # of repositioning devices (e.g., low-friction "slipp" sheets, etc.)	
• Equipment is easily accessible to staff who need to use it	

Where we are now with respect to equipment:

No or little implementation (10% or less)	Some implementation (about 25%)	Good implementation (about 50%)	Very good implementation (about 75%)	Excellent implementation (90% or better)
☐	☐	☐	☐	☐

2. TRAINING

• Training on equipment is developed and integrated into overall training and staff development plan	• Training includes "hands on" practice with opportunities for feedback and coaching
• Training on equipment is part of orientation **AND** regular on-going sessions	• Regular skills check are conducted
• **ALL** nursing staff know how to use equipment (not just NACs)	• Strategies for managing difficult residents offered

Where we are now with respect to <u>training</u>:

No or little implementation (10% or less)	Some implementation (about 25%)	Good implementation (about 50%)	Very good implementation (about 75%)	Excellent implementation (90% or better)
☐	☐	☐	☐	☐

3. POLICIES, PROCEDURES, ENFORCEMENT

Have policies and procedures for resident handling, including expected use of equipment • All employees aware of policies • Employees follow policies and procedures • System is in place for correction and coaching; progressive discipline as appropriate	Assessment of resident function takes into account availability of equipment
	Up-to-date information on transfer status easily available to NACs

Where we are now with respect to <u>policies</u>:

No or little implementation (10% or less)	Some implementation (about 25%)	Good implementation (about 50%)	Very good implementation (about 75%)	Excellent implementation (90% or better)
☐	☐	☐	☐	☐

4. MANAGEMENT COMMITMENT AND EMPLOYEE INVOLVEMENT

Funds allocated in the budget for zero-lift program, both for start-up and on-going	Employees, especially NACs, are involved with design and implementation of zero-lift
Management team understands and supports concept of zero-lift	Employees, especially NACs, are involved with selection of equipment
Someone is accountable for zero-lift program	Employees understand and support concept of zero-lift

Where we are now with respect to <u>commitment and involvement</u>:

No or little implementation (10% or less)	Some implementation (about 25%)	Good implementation (about 50%)	Very good implementation (about 75%)	Excellent implementation (90% or better)
☐	☐	☐	☐	☐

5. INJURY INVESTIGATION AND MEDICAL CASE MANAGEMENT

Accidents are investigated to better understand how they occurred	Facility active with medical case management of injured workers
Third party administrator (TPA) knows about equipment available at facility	Alternative "light" duty work available
Physicians know about the equipment available at facility	

Where we are now with respect to injury investigation and case management:

No or little implementation (10% or less)	Some implementation (about 25%)	Good implementation (about 50%)	Very good implementation (about 75%)	Excellent implementation (90% or better)
☐	☐	☐	☐	☐

Finally, **consider your facility as a whole** with respect to the implementation of an overall zero-lift program.

Overall, where we are now with respect to implementing zero-lift at our facility:

No or little implementation (10% or less)	Some implementation (about 25%)	Good implementation (about 50%)	*Very good implementation (about 75%)*	*Excellent implementation (90% or better)*
☐	☐	☐	☐	☐

Any additional comments you have on zero-lift, positive or negative, would be greatly appreciated. Please note them in the space below. Thank you so very much for sharing your time, information, and thoughts.

Send or FAX your questionnaire to SHARP at 360-902-5672

SHARP is a research group within L&I and not related to regulatory enforcement. All information collected during this project will be kept confidential and will only be used for research purposes. No individual nursing home information will be provided to other parties.

SHARP
Safety & Health Assessment & Research for Prevention

Appendix 2

"Getting to Zero" Site Visit List
Training Interview Questionnaire

Facility: _____ Date: _____

"Getting to Zero"

Site Visit List

#	FORM	Who best suited to give information?	Entered
	Administration		
	Case Management		
	Equipment		
	Injury Log		
	Nursing Assistant(s)		
	Safety Committee		
	Chair		
	Member		
	Staffing		
	Training		
	Resident Mobility		

NOTES:

Facility: _____ **Study ID#:** _____ **Date:** _____

Information obtained from: _____ Position: _____
How long in industry: _____ How long here: _____

1. Facility units, beds, and residents (as of this week):

Total # of units: _____ **Total # of beds:** _____ **Total # of residents** _____

Type of bed	#	Has any of this changed in the last year?
Medicare		
Long term care		
Dementia (Alzheimers)		
Specialty		
Other		

2. Experience of the management team in long-term care:

Position	***Yrs in industry***	***Yrs here at facility***	***# changes in past year***	***# changes in past 3 years***
Administrator				
DNS				
Staff development coordinator				
Ownership				

RNs with primarily administrative or management functions: _____

Functions: ☐DNS ☐ADNS ☐MDS ☐Staff Development

Other: _____

3. Role of physical therapy:

How many physical therapists (PTs) work here?

Employees: _____ Contract: _____ Other: _____

What do the physical therapists do?
(Check all that apply)

- ☐ Assess residents
- ☐ Design plan for therapy
- ☐ Give classes/in-services
- ☐ Other
- ☐ Treat residents
- ☐ Oversee rehab aides
- ☐ Coach individuals

Has the role of physical therapy changed over the past year?
If Yes, how?

4. Nursing assistants

Do you offer a nursing assistant certification program here? ☐ Yes ☐ No

What is the entry-level base wage for NACs at this facility? $_____

Benefit	Check if offered	Requirement (co-pay, waiting time, etc.)	How many participate (%)?
Health care	☐		
Dental care	☐		
Vision	☐		
Sick leave	☐		
Paid vacation	☐		
Education	☐		
Child care	☐		
Other1			
Other2			

Describe others:

Have there been any changes in your NAC wages or benefit structure over the past year?
If yes, what and why?

About what percentage of the nursing assistants:

Are female? _____ % Have English as their second language? _____ %

Tell me about your biggest challenges in ***attracting*** nursing assistants.

Tell me about your biggest challenges in ***retaining*** nursing assistants.

Have there been any changes in these challenges over the past year?

5. Policies and Enforcement

Does this facility have policies on how to move and transfer residents?	☐ Yes	☐ No
If Yes, are the policies written?	☐ Yes	☐ No
Is there a specific policy on using mechanical total body assists?	☐ Yes	☐ No
Is there a specific policy on using mechanical sit-stand assists?	☐ Yes	☐ No
Have there been any changes in your policies over the past year?	☐ Yes	☐ No

If no "policies" ask what is procedure or practice.

Have there been any changes in policies and procedures over the past year?
If yes, please describe.
(If applicable, do you now have policies that include the zero lift equipment?)

Please describe how the policies on resident transfers are recognized and enforced.
Ask about (1) recognition and rewards; and (2) discipline.

(Check all that apply and list others mentioned)

☐ Employee recognition	☐ Hold supervisor responsible	☐ PT follow-up
☐ Retraining	☐ Individual counseling	☐ Team counseling
☐ Warning	☐ Reprimand	☐ Terminate
☐ Other		

(If applicable, do individual handling plans for residents now consider use of zero-lift equipment?)

How are the transfer needs of residents communicated to those providing care?
(Check all that apply)

☐ Care plan ☐ Flow sheet/care sheet ☐ Something in room
☐ Verbal report (scheduled) ☐ Verbal report (informal) ☐ Resident chart
☐ Other _____

6. Safety Committee and Employee Involvement

(These questions might be deferred to safety committee interviews)

If applicable, regarding Zero Lift program	Yes	Not Yet or No	Examples of Suggested Documentation
Have you formed a group (committee, task force, etc.) that had been focused on implementing the various components of the zero lift program?			Describe the group and how it fits within the facility
Is it part of a Health and Safety committee?			
Describe the membership of this group. Are NACs from all shifts represented somehow?	Job titles or functions, look for both NAC and management		
Is there a designated Coordinator for this group?			Name and title of Coordinator
Have there been meetings of this group?			Examples of minutes
Are written minutes on file?			
Has information about zero lift been shared with all employees? How?			Examples of communication

(THIS is the important question)
In general, how does the safety committee communicate with you, the administrator?

Does the committee share any concerns about issues relating to handling residents? If so, please describe/examples.

Please briefly describe any ideas the committee has come up with for addressing these problems.

Are you aware of NAC concerns about issues relating to handling residents? If so, please describe/examples:

7. The Big Picture

What would you say are the biggest obstacles to reducing injuries related to resident handling?

Are there any regulations that make it difficult to handle or move the residents?

8. Regarding Zero Lift

How do you think you are doing?

What do you think you still need?

Any additional questions, comments, requests?

THANK YOU SO MUCH FOR YOUR TIME AND THOUGHTS

***"Getting to Zero"* SHARP Study** **Case Management Interview**

Facility: _____ Study ID#: _____ Date: _____

Information obtained from: _____ Position: _____

How long in industry: _____ How long here: _____

Do you have a third party administrator (TPA)? ☐Yes ☐No

If yes, who is it? _____

(If applicable, does your TPA know about the availability of the zero lift equipment?)

Are you aware that Labor & Industries can provide funds for "job modifications" for workers with open injury claims? ☐Yes ☐No

If applicable, has your TPA provided you with information about this process? ☐Yes ☐No

If Yes, have you ever used this process to obtain funds for modifications? ☐Yes ☐No

If Yes, please describe the kind(s) of modification(s) obtained?

How would you describe the experience of securing job modification funds?

If an employee is injured here at work, what are they told to do?

Describe any process for finding out more about injuries to employees.

How are injuries to employees treated and followed? Please describe any case management process.
(If applicable, does your case management process now take into account zero lift equipment?)

Are light duty jobs available for injured employees?
(If applicable, does your light duty process now take into account zero lift equipment?)

Have any aspects of your case management/light duty process changed over the past year? If yes, please describe:

What would you say are the biggest obstacles to reducing injuries related to resident handling?

Any additional questions or comments?

THANK YOU SO MUCH FOR YOUR TIME

"Getting to Zero" **SHARP Research Study**

FACILITY: _____ **STUDY ID#:** _____ **DATE:** _____

Different facilities keep different types of records. Please fill out what you can on this form. This will help us to better understand your injury history and to give you suggestions targeted to your needs. Thanks!

INJURY HISTORY:

	1999				2000			
	Incident Log	**WC**	**WC Time Loss**	**OSHA Log**	**Incident Log**	**WC**	**WC Time Loss**	**OSHA Log**
Total # injuries								
Total # back injuries								
Total # back injuries handling residents								
Total # shoulder injuries								
Total # shoulder injuries handling residents								
Total # NAC injuries								
Total # NAC back injuries								
Total # NAC back injuries handling residents								
Total # NAC shoulder injuries								
Total # NAC shoulder injuries handling residents								

"Getting to Zero" SHARP Research Study	Resident Handling Devices

Facility: _____ **ID #:** _____ **Date:** _____

Information obtained from: _____ Position: _____

How long in industry: _____ How long here: _____

HANDLING DEVICES -- LIFTS

	Device #1	***Device #2***	***Device #3***
Type			
Brand Name			
Type of control: Electric			
Pneumatic			
Hand crank			
How many do you have?			
When obtained or purchased? OR How old is lift?			
Where kept or stored?			
Does this seem convenient for users?			
Types of transfer used for?			
Where used?			
How frequently used?			
How many staff are needed to use?			
How many staff are trained to use?			
How does someone report a problem with a lift?			
Does it require recharging?	☐Yes ☐No	☐Yes ☐No	☐Yes ☐No
If yes, how long does it take?			
Procedure for recharging?			

"Getting to Zero" SHARP Research Study	Resident Handling Devices

Total # **manual** total lifts		Total # **mechanical** total lifts		Total # sit-to-stand lifts	

HANDLING DEVICES – SLIPP SHEETS

# slipp sheets:		Who uses? For what type resident?	

Laundry Procedures	**Yes**	**No or Not Yet**	**Comments or Description**
Do the lifts have slings of different sizes?			
Are there laundry procedures for slings?			

Maintenance Procedures	**Yes**	**No or Not Yet**	**Comments or Description**
Is maintenance a designated job function here?			
Is there a procedure for reporting problems with equipment? **OR** How does someone let you know if there is a problem with a lift?			
Do you have maintenance procedures for resident handling equipment?			
How is this equipment maintained? ☐Regular, periodic ☐As needed ☐Preventive			
Have you had any problems with this equipment?			
How long does it/did it take to get serviced?			
Are maintenance records available?			

"Getting to Zero" SHARP Research Study	NAC Observation Interview

Facility: _____ Study ID#: _____ Date: _____

How long have you been a NAC? _____ Years _____ Months
How long have you been a NAC at this facility? _____ Years _____ Months

How often are you responsible for the same group of residents every day?

☐All the time ☐Most of the time ☐Some of the time ☐Seldom ☐Never

Who gives you feedback on how you handle the residents? _____

And what kind(s) of feedback do you get? _____

Do you know how to use a sit-to-stand lift? ☐Yes ☐No ☐Not sure ☐Don't have here

If yes, how many people are required to perform this type of assist? _____

If yes, what kind(s) of residents is it used for?

Do you know how to use a total assist lift? ☐Yes ☐No ☐Not sure ☐Don't have here

If yes, how many people are required to perform this type of assist? _____

If yes, what kind(s) of residents is it used for?

If you have concerns about handling residents, what do you do?

Are you informed when that concern has been addressed?
How?

What do YOU think makes handling the residents difficult?

With respect to jobs available to you, how would you rank this facility on wages and benefits?

How competitive are the wages here for NACs?

☐Very Competitive ☐Competitive ☐Average ☐Less than competitive

How competitive are the benefits here for NACs?

☐Very Competitive ☐Competitive ☐Average ☐Less than competitive

Would you recommend this job to someone else?

☐Strongly recommend ☐Recommend ☐Not recommend ☐Definitely not recommend

If you were looking for a job now, would you decide to take this job again?

☐Very likely ☐Likely ☐Not too likely ☐Definitely not likely

Overall, are you satisfied with your job?

☐Very satisfied ☐Satisfied ☐Not very satisfied ☐Definitely not satisfied

THANK YOU SO MUCH FOR YOUR TIME AND THOUGHTS!!!

"Getting to Zero" SHARP Study **Resident Mobility Status**

Facility: _____ Study ID#: _____ Date: _____

Information obtained from: _____ Position: _____

How long in industry: _____ How long here: _____

1. What is the total number of residents you currently have? _____

2. What is the total number of residents you currently have in the following categories?

Total Dependence	Extensive Assistance	Limited Assistance	Supervision	Independent
#	#	#	#	#

3. How many residents fall into each of the following categories on each unit?

Unit Name	Type of Unit	# Residents Needing Total Assist	# Residents Partial Weight Bearing-sit/stand	# Residents Needing Repositioning in Bed

4. Additional comments about resident mobility:

"Getting to Zero" SHARP Research Study	Safety Committee Interview

Facility: _____ **ID #:** _____ **Date:** _____

Information obtained from: _____ **Position:** _____

How long have you been at this facility? _____

How long have you been in this position? _____

How long have you been on the committee? _____

Who runs the committee? _____

What is your role (job) on the committee? _____

If you are the chair of the committee, about how many hours per week or month do you work on things related to the committee? _____

What jobs or functions are represented on the committee?

- ☐ Nursing (NAC, all shifts?)
- ☐ Nursing (mgt)
- ☐ Administration (mgt)
- ☐ Maintenance
- ☐ Dietary
- ☐ Office staff
- ☐ Laundry
- ☐ Rehab aides
- ☐ PT/OT
- ☐ Other: _____

How is information about the committee shared with all shifts? All staff?

How often does the committee meet?

Who keeps the minutes?

Who sees that things are done in-between meetings?

How has the safety committee been involved with zero-lift?

What has the committee accomplished in the past year?

What do you like best about the committee?

What would you like to change or improve about the committee?

(Give this page to the individual to complete.)

Listed below, you will see some statements about a safety committee. With respect to the committee here, at this facility, please mark the box that best describes how often the action in the statement occurs.

	Never	***Rarely***	***Sometimes***	***Often***	***Always***
1. The committee investigates injuries that have happened to ***residents***.					
2. The committee investigates injuries that have happened to ***employees***.					
3. The committee discusses lifting, transferring, and moving residents.					
4. The committee is involved with the purchase of lifting equipment.					
5. The committee keeps a current list of things that need to be done.					
6. In between meetings, someone is accountable for seeing that the things on the list are done.					
7. Ideas are voiced freely in the committee.					
8. Administration is interested in what the committee does.					
9. NACs are involved with the committee.					
10. Nursing management is involved with the committee.					
11. The committee discusses how to prevent injuries from happening to residents and staff.					
12. Concerns are brought to the attention of the committee.					

THANK YOU SO MUCH FOR YOUR TIME AND YOUR THOUGHTS!

"Getting to Zero" SHARP Study **Staffing Interview**

Facility: _____ Study ID#: _____ Date: _____

Information obtained from: _____ Position: _____

How long in industry: _____ How long here: _____

1. What is the total number of employees at this facility? _____

2. What is the total number of employees in each of the following categories?

Category Total number of employees in category

RNs _____ **LPNs** _____ **NACs** _____ **RAs** _____

3. Please use the table below to list the staff currently providing care on the different shifts.

	DAYS	SWING	NIGHTS
RNs			
LPNs			
NACs			
RAs			

4. How many NACs did you hire over the past year? _____

5. Have any of your staffing or hiring practices changed in the past year? If yes, please describe:

6a. How many "call ins" from NACs did you receive over the past 7 days? _____

6b. Please describe the procedures for coverage when NACs are absent.

7. Tell me about your biggest challenges in ***attracting*** nursing assistants.

8. Tell me about your biggest challenges in ***retaining*** nursing assistants.

9. What would you say are the biggest obstacles to reducing injuries related to resident handling?

10. Additional comments?

"Getting to Zero" SHARP Study **Training Interview**

Facility: _____ Study ID#: _____ Date: _____ Information obtained from: _____

Position: _____ How long in industry: _____ How long here: _____

The following questions apply to regular, on-going training; not to training for NAC certification.

Training	***New Employee Orientation***	***Resident Handling (including equipment)***	***Managing Difficult Residents***
When is it given? How often?			
How long does it last (hrs/days)?			
Who gives it/position?			
Where is it given?			
Average size of group?			
What are the goals of the training? (primary educational objectives of knowledge, skills, attitudes)			
	What subjects are covered? ☐Body mechanics ☐Ergonomics ☐Communication with resident ☐Communication with coworker(s) ☐Mechanical total lifts ☐Mechanical sit-to-stand ☐Other:	**What subjects are covered?** ☐Body mechanics ☐Ergonomics ☐Communication with resident ☐Communication with coworker(s) ☐Mechanical total lifts ☐Mechanical sit-to-stand ☐Other:	
	How is material presented? ☐Lecture ☐Video ☐Demonstration ☐Role play ☐Practice	**How is material presented?** ☐Lecture ☐Video ☐Demonstration ☐Role play ☐Practice	**How is material presented?** ☐Lecture ☐Video ☐Demonstration ☐Role play ☐Practice

"Getting to Zero" SHARP Study **Training Interview**

Training	*New Employee Orientation*	*Resident Handling (including equipment)*	*Managing Difficult Residents*
	How long do the NACs work with a buddy during orientation?	Do any NACs use gait belts **WITH** handles?	
After training, how do the NACs receive feedback on their techniques?			
Is any evaluation of the training done? If so, please describe.			

What do you like best about your training programs?

What would you change about your training programs?

What would you say are the biggest obstacles to reducing injuries related to resident handling?

Has your **facility** received a copy of WHCA's ***"Getting to Zero"*** video? ☐ Yes ☐ No ☐ Not sure

If Yes, have **you** watched the video? ☐ Yes ☐ No ☐ Not sure

If Yes, have you **shown** the video to others? ☐ Yes ☐ No ☐ Not sure

If you did receive and watched the video:
On the following scale, please rate the following aspects of the video by placing a check in the box that best represents *your* opinion.

	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
The information was interesting.						
The video was effective.						
The information applied to the jobs here.						

The next statements apply to the implementation of a zero-lift program in your facility.
On the following scale, please rate how much you agree or disagree with each statement by placing a check in the box that best represents *your* opinion.

	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
Administration will be supportive of a zero-lift program.						
A zero-lift program will provide a safer environment for the residents.						
A zero-lift program will provide a safer environment for the NACs.						
I feel comfortable showing the NACs how to operate the lifts.						

Appendix - 3

PATH Codes

PATH Codes

SHOULDER

	POSITION OF SHOULDER JOINT(S)	VISUAL CUE
1	Both below 80° elevation in frontal or sagittal plane	Both elbows below 60°
2	One => 80° elevation in frontal or sagittal plane	One elbow above 60°
3	Both => 80° elevation in frontal or sagittal plane	Both elbows above 60°
4	One extended behind plane of body	One arm extended behind body
5	Both extended behind plane of body	Both arms extended behind body

ELBOW

	POSITION OF ELBOW JOINT(S)	VISUAL CUE
1	Flexion	Both bent; within "close reach"
2	One extended	One extended; full reach
3	Both extended	Both extended; full reach

TRUNK

1	Neutral
2	Moderate forward flexion
3	Severe forward flexion > 45 degrees
4	Lateral bending/Twisting in neutral
5	Lateral bending/Twisting in flexion

LEGS

	POSITION OF LEG(S)	VISUAL CUE
1	Stand	Neutral
2	Lunge	One knee bent
3	Squatting	Both knees bent
4	Walking	
5	Kneeling	One or both knees on surface
6	Sitting	

PATIENT STATUS

1	Independent
2	Supervision
3	Limited Assistance
4	Extensive Assistance
5	Total dependence

PATH Sampling Intake Sheet

DATE: _____

FACILITY: _____ ID #: _____

Experience:

As a NAC here:

As a NAC total:

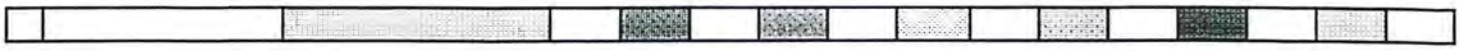
Other health care:

Age: _____ Gender: _____

Height: _____ Weight: _____

Unit: _____ Shift: _____

			1	2	3	4	5	6	7	8	9	10	11	12	13
	Task	Pt Handling													
		Other Pt Related													
		Hskpg/Lndry/Food													
		Administration													
		Other													
	Posture: Shoulder	1 -- 5													
	Elbow	1 -- 3													
	Trunk	1 -- 5													
	Legs	1 -- 6													
	Weight in	< 5													
	Hands (lbs.)	5 -- 50													
		> 50													
	MMH	Lift/Hold													
		Lower													
		Carry													
		Move/Place													
		Push/Pull/Drag													
		Precision Work													
	General	Walk													
	Activities	Stand													
		Inbetween/idle													
		Support Pt/tool													
		Support self													
		Diligent watch													
		Not obs/not sure													
	NA Activities	***Transfer/Transport***													
		Reposition Pt													
		Change clothing													
		Instruct/Talk													
		Peri care													
		Feeding													
		Grooming/Washing													
		Get/Return equip													
		Adj/Op equipment													
	Tools/Equipment														
	Bed	Standard height													
		On floor													
	Chairs/Walkers	Wheelchair													
		Side chair													
		Scooter/Walker													
		Com/Tlet/ShwrChr													
	Lifts	Total Life													
		Sit/stand lift													
		Other lift													
		Straps & slings													
	Belts & Sheets	Transfer/Gait belt													
		Slipp sheets													
		Other devices													
	Carts	Food/Laundry													
	Food	Trays/Pitchers/Items													
	Laundry	Bibs/Bed/Table/Bag													
		Load													
	Personal	Brush/BP/Razor													
		Clothing													
		Pen/Pencil/Chart													
	Patient Status	1 -- 5													



Appendix - 4

Four Years of Progress: 1999-2002 Summary of Statewide Surveys
Safe at Home

"GETTING TO ZERO LIFT" IN WASHINGTON STATE NURSING HOMES

Kathleen A. Rockefeller, PT, ScD, MPH
Barbara A. Silverstein, PhD, MPH, CPE
Ninica Howard, MS, CPE

Safety & Health Assessment and Research for Prevention (SHARP)
Washington State Department of Labor & Industries
Technical Report xx-x-2002
1 August, 2002

Four Years of Progress: 1999-2002
Summary of Statewide Surveys

Once again, a hearty thank you to everyone who responded to our surveys, either by the written questionnaire or the telephone interview. The response rates for the first three surveys were EXCELLENT. And even though we were somewhat disappointed to not hear from more of you in Survey 4, 81% response is still very good. We recognize the demands on your time and energy, and greatly appreciate whatever amount of participation you were able to provide. ***THANK YOU***.

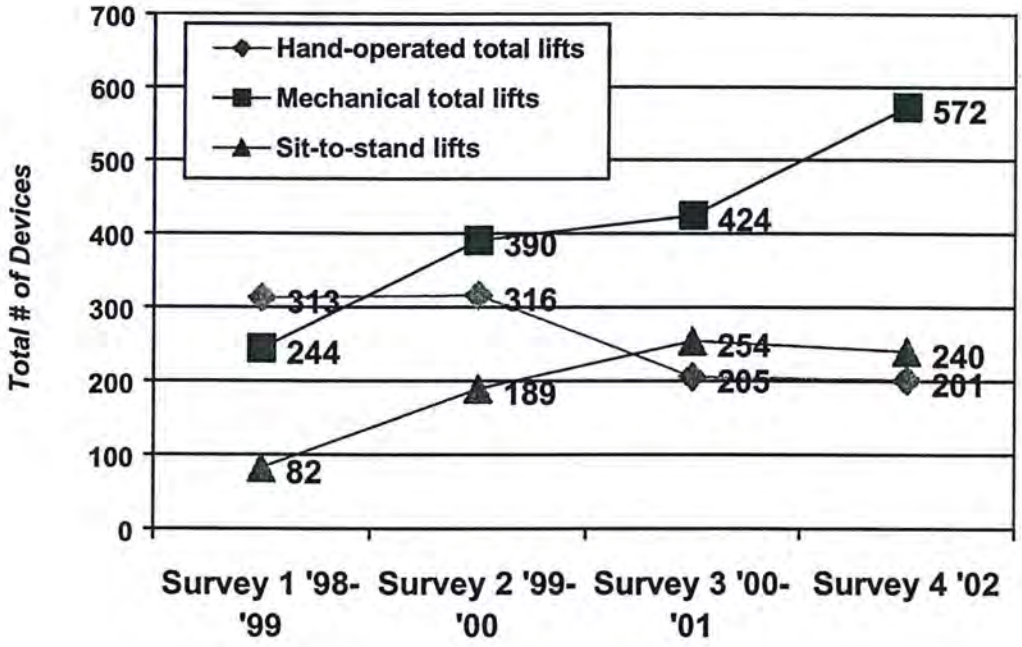
RESPONSE RATES FOR SURVEYS

Survey 1 '98-'99	Survey 2 '99-'00	Survey 3 '00-'01	Survey 4 '02
90%	96%	91%	81%

Whatever the underlying philosophy is called -- "zero lift" or "no lift" or "low lift" or "minimal lift" to name a few – the goal is similar – to decrease the risk of injuries to caregivers by decreasing the need to use their bodies as human derricks by substituting the use of appropriate mechanical devices instead.

The surveys reflected state-wide increases in the total amount of mechanical lifting devices, both total and sit-to-stand lifts, available for handling residents.

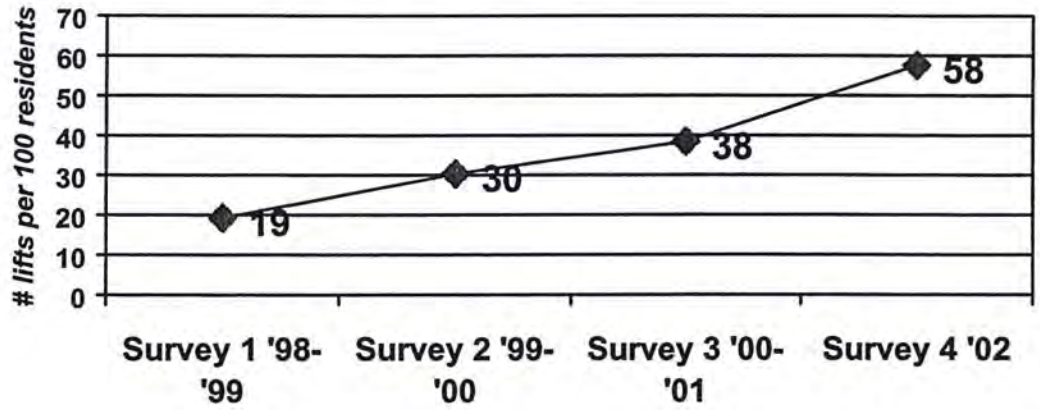
Total # of Lifting Devices per Survey



As expected, the number of hand-operated devices decreased as the number of newer mechanical devices increased. (The apparent decrease in sit-to-stand lifts from Survey 3 to Survey 4 likely reflects the lower response rate of Survey 4.)

It is important to have enough equipment for the number of residents in your care, and the number of "new" lifting devices (mechanical lifts, both total and sit-to-stand) per 100 residents increased steadily over the four years surveyed.

"New" lifting devices per 100 residents



But we all know it's not enough to just obtain equipment. Policies and procedures must be in place for its use and maintenance. Residents must be evaluated for what equipment is right for them. The goal is to increase safety for both caregivers and residents, while at the same time fostering as much resident independence as possible. The creative use of handling devices can assist in achieving both goals.

The use of equipment must become an expected part of daily operations. Training in the use of equipment must be integrated within the employee development plan. Medical case management should take into account the availability of equipment for resident handling.

Self-ratings on Zero Lift Implementation

In Surveys 3 & 4, one section listed what are believed to be five important components of fully implemented zero lift programs, along with a number of essential elements for each component. You were asked to rate your facility with respect to the level of implementation for each of these individual components. You were then asked to rate your facility's overall implementation of zero lift.

The rating scale is illustrated below, followed by a description of the key components and important elements, for your review:

1. No or little implementation (10% or less)	2. Some implementation (about 25%)	3. Good implementation (about 50%)	4. Very good implementation (about 75%)	5. Excellent implementation (90% or better)

1. EQUIPMENT

• Have an adequate # of total lifts, sit-to-stand lifts, and other devices to suit the resident population and staff **OR** have defined and approved plans to obtain such equipment	• Process in place for: o Keeping equipment charged o Sling cleaning and inspection o Equipment maintenance
• Have an adequate # of repositioning devices (e.g., low-friction "slipp" sheets, etc.)	• Equipment is easily accessible to staff who need to use it

2. TRAINING

• Training on equipment is developed and integrated into overall training and staff development plan	• Training includes "hands on" practice with opportunities for feedback and coaching
• Training on equipment is part of orientation **AND** regular on-going sessions	• Regular skills check are conducted
• **ALL** nursing staff know how to use equipment (not just NACs)	• Strategies for managing difficult residents offered

3. POLICIES, PROCEDURES, ENFORCEMENT

Have policies and procedures for resident handling, including expected use of equipment	Assessment of resident function takes into account availability of equipment

• All employees aware of policies • Employees follow policies and procedures • System is in place for correction and coaching; progressive discipline as appropriate	Up-to-date information on transfer status easily available to NACs

4. MANAGEMENT COMMITMENT AND EMPLOYEE INVOLVEMENT

Funds allocated in the budget for zero-lift program, both for start-up and on-going	Employees, especially NACs, are involved with design and implementation of zero-lift
Management team understands and supports concept of zero-lift	Employees, especially NACs, are involved with selection of equipment
Someone is accountable for zero-lift program	Employees understand and support concept of zero-lift

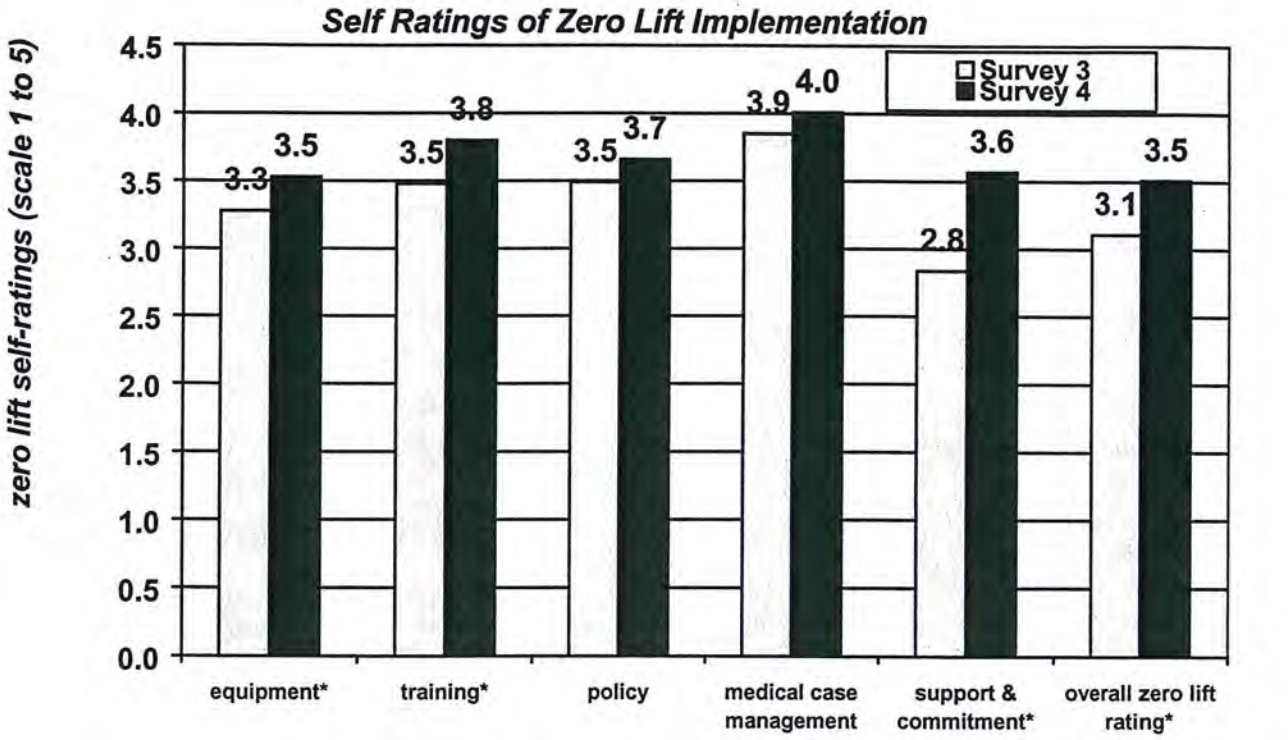
5. INJURY INVESTIGATION AND MEDICAL CASE MANAGEMENT

Accidents are investigated to better understand how they occurred	Facility active with medical case management of injured workers
Third party administrator (TPA) knows about equipment available at facility	Alternative "light" duty work available
Physicians know about the equipment available at facility	

6. OVERALL IMPLEMENTATION OF ZERO LIFT

Finally, **consider your facility as a whole** with respect to the implementation of an overall zero-lift program.

Here are the results of the self-ratings for the two surveys.



* statistically significant differences between surveys

We also wanted to try to better understand the relative importance of these components from YOUR perspective, so we did some additional analysis. You considered "support and commitment" to be the most important component in implementing zero lift, followed very closely by "equipment." This is consistent with what we have seen and heard. Obviously, having the requisite equipment is essential to start, but must be accompanied by management commitment and employee involvement or the practice of zero lift will not be easily integrated into daily operations and expected behaviors.

"Medical case management" ranked next in relative importance; "training" and "policy" were ranked last. This also makes sense, since training, policies, and procedures are already part of your normal daily operations and usually just need some additional work to include zero lift.

Health & Safety Committee Activities

In Surveys 3 & 4, one section asked about Health & Safety Committees and how frequently the committee participated in a number of activities. The specific activities were:

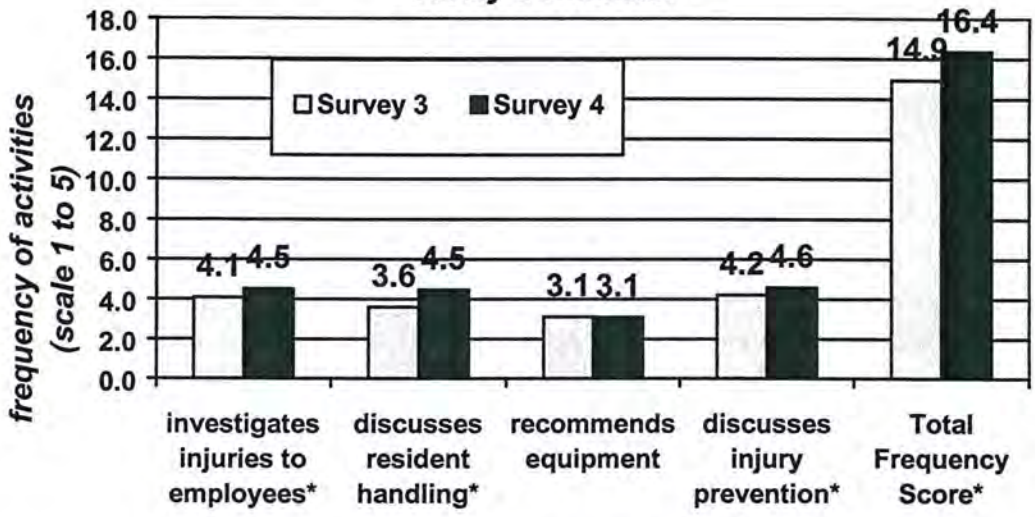
- Investigating injuries to ***employees***.
- Discussing lifting, transferring, and moving residents.

- Recommending equipment to purchase to improve safety.
- Discussing how to prevent injuries from happening to residents and staff.

The rating scale ranged from 1 to 5, as illustrated below.

Never (1) Occasionally (2) Sometimes (3) Often (4) Always (5)

Self-Rated Frequency of Activities done by Health & Safety Committee

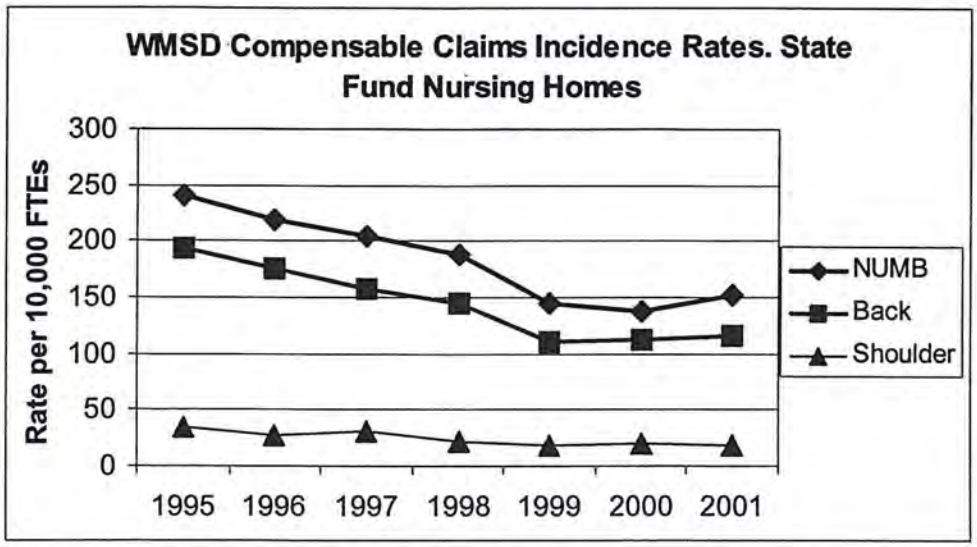


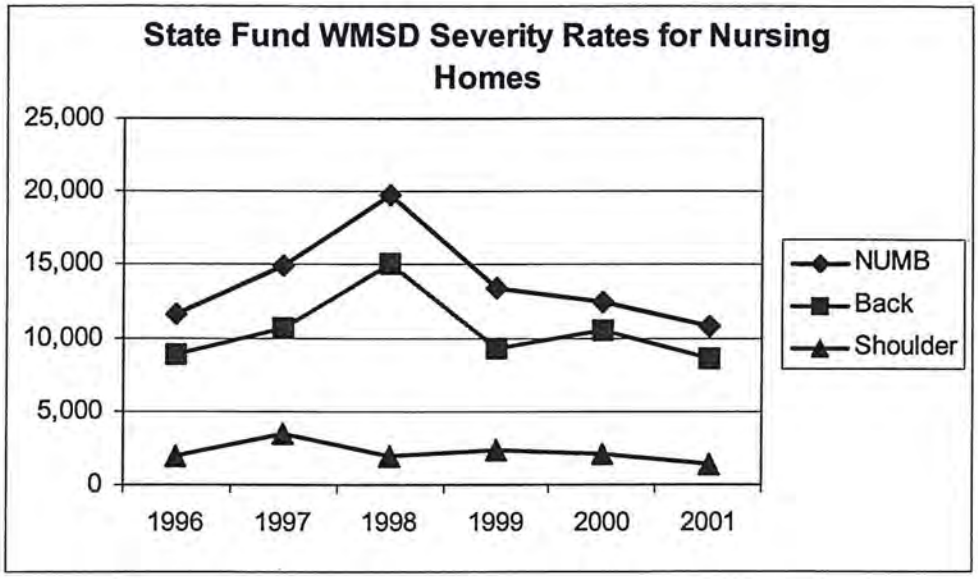
* statistically significant difference between surveys

An active health and safety committee appears to be important when implementing programs targeting related behaviors. We were pleased to see small but significant changes in the frequency of activities, but admit we were a bit concerned about seeing no change in involving the committee with recommending equipment. This activity could increase the amount of "buy-in" from employees and provide important information BEFORE significant resources are invested in the purchase or lease of equipment.

Compensable Musculoskeletal Disorders Workers Compensation Claims

During the study period, the compensable claims rate for back injuries associated with resident handling decreased significantly. We looked at a number of factors that may have contributed to this decline in claims rates. In addition to premium discount status, important factors included staffing ratios, nursing assistant turnover, DNS turnover, and most significantly, management commitment/employee involvement. Severity rate is the number of lost days per 19,000 full time equivalent employees. NUMB includes non-traumatic musculoskeletal disorders of the neck, upper extremity and back.

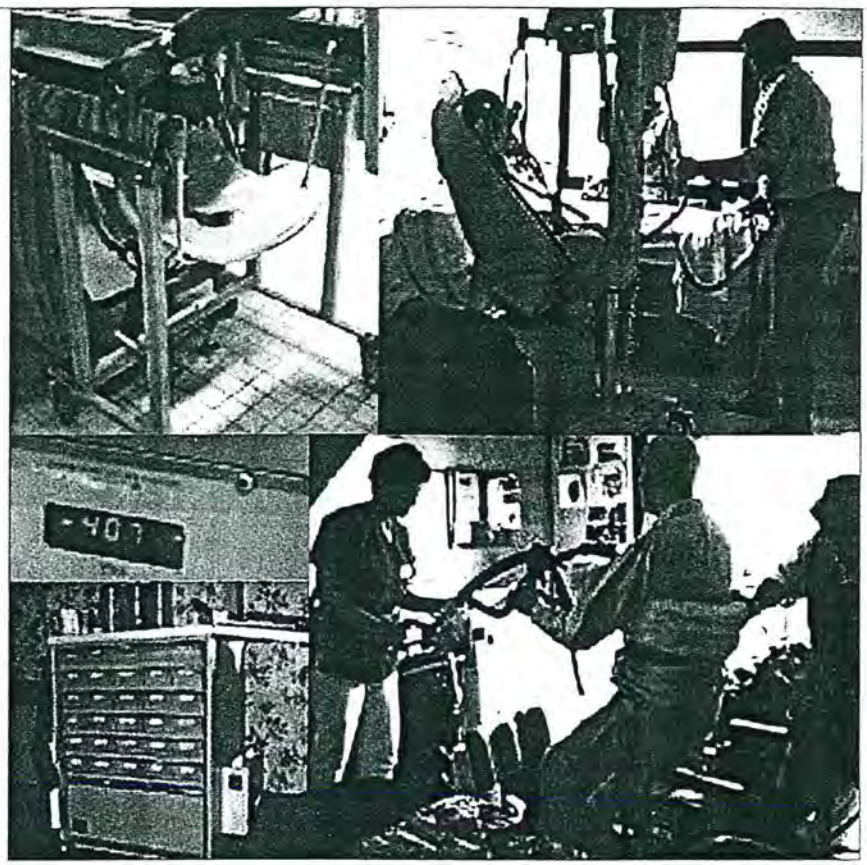




Congratulations on the good work you have done. We really appreciate your participation in this important study. As we begin publishing papers from this study, we will put that information on the SHARP website (www.lni.wa.gov/sharp).

Safe at Home

How one nursing home reduced staff injuries to near zero



Does "zero lift" mean success or failure? That depends on who you are. If you're a weight lifter, it means you failed to cleanly jerk a 200-pound bar over your head. Not good. But, if you're an administrator in a long term care facility, you've attained an admirable goal.

In long term care, a "zero lift" philosophy is one in which caregivers use lifting devices to transfer residents from one place to another, such as from the bed to a chair. This minimizes the risk of back and shoulder injuries to caregivers because they are not using their bodies as derricks.

At Bessie Burton Sullivan Skilled Nursing Residence in Seattle, "zero lift" is one element of a safety program that is serious about ergonomics: It is defined as matching jobs or workplaces to the capabilities and limitations of the human body. Carmen Steiner, executive administrator of the 139-bed facility owned by Seattle University, knows there is a payoff to the facility's safety efforts.

Steve Pierce is a public information manager with the Washington Department of Labor and Industries in Tumwater, Wash. He can be reached at 360-902-5405 or at piet235@lni.wa.gov

An injury-prone industry

Nationwide, nursing homes and personal-care facilities have one of the highest rates of nonfatal injury or illness cases—14.2 injuries and illnesses per 100 full-time workers, according to the Occupational Safety and Health Administration (OSHA). This is more than double the incident rate of 6.7 for industry as a whole.

OSHA research shows that nursing-home workers suffer most injuries (51.2 percent) when handling residents. And back injuries account for 42 percent of all injuries in nursing homes, compared with 27 percent of all injuries in the private sector.

There are no government-mandated ergonomics standards at the national level for nursing homes. However, in the state of Washington, the Department of Labor and Industries (L&I) adopted an ergonomics standard designed to reduce work-related musculoskeletal injuries such as back strain, tendinitis and carpal tunnel syndrome. The first of these requirements began in July; the others will be phased in over the next five years.

New equipment vs. new staff

Ergonomics safety at Steiner's facility is driven by the need to retain a healthy staff. With the shortage of qualified workers at a crisis point, there's no room for worker injuries that can cause time lost from jobs or, worse, turnover of staff. "With the tight labor market we're in, you don't know if you can replace them," Steiner says of workers injured on the job. Her facility even uses its "zero lift" workplace environment as a recruiting tool.

Steiner says she's aware that ergonomic changes can be a costly venture for many facilities, "but injuries are a costly venture. I don't think we can afford not to do it." In Washington, a back injury costs an average of $6,103 in medical and wage-replacement expenses for time-loss claims.

After four pieces of lift equipment were purchased about four years ago for $22,000, "we saw a payback in the first year." She says the reduction in the number of time-loss claims from musculoskeletal injuries such as back

sprains and strains was "remarkable." In 1997, Bessie Burton had 73 days of time loss for transfer-related back injuries. In 1998, it fell sharply, to 48 days. In 1999, it was down to two days and in 2000, seven days.

Steve Browne, a physical-therapist assistant at Bessie Burton Sullivan and chairman of the safety committee, says the initial purchase of lift equipment—from full-body lifts for immobile residents to "standing lifts" for residents who are partially weight-bearing—met with resistance from nursing assistants. He said they felt that use of the equipment would take too much time. As a result, nursing assistants were reluctant to use it.

However, after each staff member was individually trained on the equipment and shown that it could decrease the time required to move a resident, the lift equipment began to be used regularly. Now it's standard operating procedure, "and we have almost no claims now from lifting incidents," Browne says. He notes that residents' safety increases, too, because their transfer from one location to another is not dependent upon the strength of someone's back but, rather, use of sturdy, protective equipment.

Barbara Silverstein, research director for L&I's Safety and Health Assessment and Research for Prevention program, says Bessie Burton Sullivan's embracing of the "zero lift" philosophy is a good example for the long term care industry. "We know from looking at injury and illness statistics that this industry has the highest rate for back injuries," she says. "And so the probability is high .. that ou will have an injury at some point. doesn't have to be that way. This really can be an injury-free environment for both workers and residents."

Silverstein noted, too, that the viability of a nursing-home business could depend on preventing worker injuries. "The basic bottom line of whether they continue to operate successfully is whether their caregivers are giving adequate care," she said. "And if caregivers are in pain, they may not be providing adequate care."

Washington's ergonomics rule

Department of LABOR AND INDUSTRIES

- A workplace safety and health rule to protect employees from work-related musculoskeletal disorders such as back strain, tendinitis and carpal tunnel syndrome.
- The rule initially focuses on large employers in the industries with the highest risk of injuries—for example, nursing homes, sawmills and several of the building trades.
- Employers must determine whether they have any "caution zone jobs" that include physical risk factors described in the rule. Businesses with these jobs must analyze them further and meet certain employee-education requirements.
- If exposure to risk—frequent lifting or repetitive motion, for example—reaches a hazardous level, the employer must reduce the exposure to a non-hazardous level or to the extent feasible.
- The rule phases in over five years, beginning July 1, 2002. The amount of time employers have to comply depends on the size of the business and the type of industry. Enforcement for each phase will be delayed two years.
- Educational materials, technical assistance and model programs to help employers implement the rule are available from the Department of Labor and Industries. For more information, contact an L&I office or visit www.lni.wa.gov/wisha/ergo.
- More information about Bessie Burton Sullivan's ergonomics and safety program is available at www.lni.wa.gov/wisha/ergo/demofnl/nursing-fnl.pdf.

Not just backs get injured

Since its success with the "zero lift" policy, Bessie Burton Sullivan has looked at another potentially injury-inducing task. Medication dispensing can cause injuries, too—specifically to the thumbs of staff members who had to push hundreds of pills out of foil-encased pouches. The problem was solved with the purchase of new plastic pill cassettes with easy-to-open tab lids.

The facility also purchased smaller and lighter medicine carts that most staff members found easier to push. An added benefit was that the new carts meant less congestion in the hallways and a lower likelihood of related injuries, such as a large, heavy cart inadvertently running over the toes of a resident.

In other areas, Bessie Burton is busy trying to provide workplace and ergonomic safety for staff members and residents. Among the steps taken: scheduling changes were instituted to deal with fatigue, non-skid rubber mats were installed in some areas, safety shoes were purchased for workers exposed to potentially slippery areas, new lightweight PVC linen carts were added to reduce lifting and bending, and new user-friendly food-tray carts were added. Many of the steps taken to reduce injuries and save money have gone beyond the requirements of the Washington ergonomics rule.

Steiner says her philosophy for her facility is "to be the best in the state," and, she says, that includes ergonomic safety. CLTC

Reference
U.S. Department of Labor, Occupational Safety & Health Administration Web site, www.osha-slc.gov/SLTC/nursinghome/index.html

DEPARTMENT OF HEALTH AND HUMAN SERVICES

Public Health Service
Centers for Disease Control
and Prevention (CDC)

Memorandum

Date: January 22, 2004

From: Michael J. Galvin, Ph.D., Program Official
Office of Extramural Programs, NIOSH, E-74

Subject: Final Report Submitted for Entry into NTIS for Grant 5R01OH003749-04.

To: William D. Bennett
Data Systems Team, Information Resources Branch, EID, NIOSH, P03/C18

The attached final report has been received from the principal investigator on the subject NIOSH grant. If this document is forwarded to the National Technical Information Service, please let us know when a document number is known so that we can inform anyone who inquires about this final report.

Any publications that are included with this report are highlighted on the list below.

Attachment
cc: Sherri Diana, EID, P03/C13

List of Publications

Title: Intervention Effectiveness In Nursing Homes
Investigator: Barbara Silverstein
Affiliation: Washington State Department Of Labor And Industries
City & State: Olympia, WA
Telephone: (360) 902-5668
Award Number: R01OH3749
Start & End Date: 9/30/1998-9/29/2002
Total Project Cost: 100461
Program Area:
Key Words: effectiveness research, injury prevention, musculoskeletal disorders

Final Report Abstract:

BACKGROUND. The huge toll caused by back injuries among nursing home workers has been well documented at both the national and state level. These injuries have been primarily related to patient/resident handling. There is strong evidence that reduction in low back load would reduce the risk for injury. Zero-lift programs are designed to reduce these back loads and involve 5 basic components including 1) management commitment and employee involvement in implementation, 2) having enough of the right equipment for transfers and repositioning available and used, 3) appropriate training of staff, 4) relevant policies in place and complied with, 5) active case management to assist workers in a safe return to work if they are injured. Training materials and mechanical lifting devices continue to be developed and improved; yet back injuries are still occurring in nursing homes at unacceptable rates. The challenge for the nursing home industry is to effectively implement programs that reduce the loads on the nursing assistants (NACs) while maintaining a safe and caring environment for the residents of the nursing homes.

METHODS. We took advantage of a partnership between the Department of Labor and Industries and the nursing home associations (particularly Washington Health Care Association) in Washington State to assess the impact of implementing different interventions on a) implementation ofzerolift and b) reduction in compensable (4 or more lost workdays) workers compensation claims rates for backs and shoulders related to resident handling. Out of six geographic regions in the state, two were assigned to a workers compensation (WC) premium discount (PD) offer intervention, one region was assigned an emphasis on implementing job modifications for injured workers as away to get lifting equipment into

these nursing homes, and the remaining three regions served as a comparison. In addition, WHCA (Washington Health Care Association) distributed training materials to their members and provided $1,000 rebates on lifting devices for their members who were part of their workers compensation group. These interventions crossed regions. We used four industrywide surveys (baseline and three yearly follow-ups) to assess the overall implementation in the industry. We conducted 30 baseline and 50 follow-up site visits to nursing homes in the three groups. PATH (postures, activities, tools and handling) analysis of NAC jobs was conducted during a subset of these site visits (8 PD and 8 comparison homes), to characterize exposures. A GEE (generalized estimating equations) ap-

proach to logistic regression was used to assess nursing home characteristics and zerolift implementation features' impact on WC claims rates in State Fund nursing homes.

RESUL TS. The PO group (35/55 eligible participated) implemented components (particularly equipment) of zerolift more quickly than the comparison group. By the 4th survey, the comparison group had almost caught up with the PO group in terms of equipment. The job modification focus program was not effectively implemented so this region became part of the overall comparison group. There was limited awareness of the WHCA training materials or of the existence of the job modification program that was actually available to all injured workers if it would help return them to work successfully. The PATH analysis before and one year after the PO was distributed revealed significant decreases in awkward trunk postures during resident transfers but increases in shoulder load. The trunk loads increased in the comparison group. There was good correlation between site visit and survey equipment and training parameters. Other parameters had poor correlations. Canonical correlations between sets of parameters (barriers, commitment/involvement, policies) were good (>0.6). There was essentially no variance in policies and reported training practices between nursing homes. In the WC analyses, important pre

Publications: