Reducing back injury in nursing: A case study using mechanical equipment and a hospital transport team as a lift team

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Abstract
A one-year research study to evaluate a method to reduce back injury in nursing was undertaken in a 200-bed acute care facility in northern California. The method, using an already existing transport team as a lift team, and providing the proper amount of mechanical patient-lifting equipment, reduced injuries and modified-duty days from the two comparable years, 1996 (11 lost-time injuries and 151 modified-duty days) and 1997 (nine lost-time injuries and 171 modified-duty days), to the study year of two non-lost-time injuries with two modified-duty days. The health care facility cross-trained an already existing transport team to become the designated patient lifters. Nurses were instructed by policy not to lift patients, and the transport department was required to use mechanical transfer equipment for each total body transfer. Manual lifting was forbidden. The facility was given five transfer stretchers, two vertical lifts, and five transfer patient chairs—12 pieces of mechanical patient lifters at an approximate cost of $66,305. The transport department acting as a lift team accomplished 3,188 lifts during the study year without lost time injury to the transport staff. Only one nurse reported injury during the study year with no lost time. This nurse did not use a mechanical lifting device when the injury occurred. Transport staff reported only one non-lost-time injury. Two days of modified duty were reported during the study year for a total compensable injury cost of $356, compared with $23,000 (1996) and $63,000 (1997), respectively, in the nonstudy years.

Introduction
Every day in the United States, 9,000 health care workers sustain a disabling injury on the job. The most serious disabling injury is the occupationally related back pain that affects 38 percent of nurses in their careers. For many years, articles have addressed the perils related to injuries associated with patient transfer. The Bureau of Labor Statistics (BLS) identifies that nursing aides and orderlies experience the third highest number of injuries and illness for all private-sector occupations. The BLS also indicates that nursing and personal care facilities lead all industries in the area of overexertion injuries. An additional study shows that more than 18 percent of all nursing home workers are injured annually due to overexertion.

Back pain is the most common reason for filing workers’ compensation claims and often causes lost workdays. For industries employing mostly female workers, hospitals reported 531,000 back injury cases in 1988 and nursing homes reported 243,000 cases. In that same year, hospitals led all industries in last-day cases for back pain (203,000 cases). Occupationaly related back and shoulder injuries continue to be a significant problem for health care workers. In April 1995, the BLS reported that nursing assistants in nursing homes ranked first in the United States for overexertion injuries. The trigger event for most of these injuries is the manual transfer of patients. In fact, the BLS now classifies health care patients as a cause of on-the-job injury.

Manual lifting, according to Fragala, is one of the primary reasons health care workers are experiencing back injuries. "Through laboratory experiment, we have learned that manual bed to chair and chair to bed transfers present a high level of risk to health care workers." Fragala, in his study, stipulates that the compressive forces on L5-S1 during manual lifting from chair to bed exceed both the National Institute for Occupational Safety and Health (NIOSH) design limit and the NIOSH upper limit for a patient weighing 141 pounds. Despite this new study showing that manual lifting is exceeding weight limits for the most common manual lifts, and that some manual lifts exceed 6400 Newtons/force, which is in the microfracture range, few hospitals, in the experience of the author, have the proper amount of mechanical patient-lifting equipment. It is also the experience of the author that not many hospitals have a mandated policy that requires the use of mechanical lifting equipment for total body transfers.

Managed care has also had a profound effect on health care workers’ injury rates. Shogren, in her study of the effects of managed care injury rates in Minnesota, showed that, in a four-year period, the state downsized the nursing workforce by nine percent with a 65 percent incremental increase in injuries. Most of these were back and shoulder injuries from moving patients and due to needlesticks.

Background
Three studies have shown that lift teams can prevent the human
and economic costs associated with the risk of moving patients, insofar as they put risk where it can be controlled in a team of two individuals, rather than hundreds of nurses or nurses’ aides. While lift teams have been shown to be successful in reducing back injuries in health care personnel, not all hospitals can afford to hire extra full-time equivalent employees (FTEs) to staff a lift team, even if the cost-benefit analysis shows a positive pay-back. This study used a similar paradigm to the lift team. By using already existing FTEs (transport department) as a lift team and providing necessary mechanical lifting equipment to the appropriate departments, it was believed that these two variables would reduce the back injury rate of the hospital under study.

Method and design

Setting
This study was initiated in a 220-bed acute care facility in northern California. The study design was calculated to remove nurses from the responsibility of patient transfer by cross-training already existing FTEs, from the transport department, for patient lifting and transfer. This type of design saves the hospital system from hiring additional personnel to staff a lift team. By using the transport department, a staff of 20 personnel, to do patient lifting, rather than the nursing department, a staff of 1,000 personnel, it was believed that this design would follow the same risk-management philosophy already proven successful with lift teams: “putting risk where it can be controlled.” 12-14 Another important study parameter was the introduction of the proper amount of mechanical lifting devices. As manual lifting of patients has been shown to exceed NIOSH guidelines, the availability of mechanical lifting devices and their use was an essential variable that needed to be included in this study. The study covered every area of the hospital with the exception of the operating rooms. This study compared injury data and lost days for two years prior to the introduction of the study, 1996 and 1997, and then compared the injury rates and lost-day data to the implementation study year of 1998-1999. OSHA 200 logs were used for the pertinent injury data. Medical and compensation data were also compared. The data were retrieved using the workers’ compensation carrier’s system for the hospital.

Instruments and equipment
An equipment inventory was taken prior to the study. The facility had only one vertical lift for a 200-bed facility and it was not operational. This finding is consistent with the author’s anecdotal experience, which shows that most health care facilities in the country are drastically under the ratio of numbers of patients versus numbers and types of mechanical lifting equipment. It has also been found that when hospitals have mechanical lifting equipment, it is kept in poor condition, stored in non-accessible areas, and, if the equipment is electric, batteries are not kept in a charged condition. It has also been generally acknowledged that the health care workers who need the equipment rarely know where to access it and are undertrained in its use. Moreover, health care facilities rarely have standard operating procedures (SOPs) that mandate the use of mechanical lifting equipment for total body transfers. Ratios on the amounts of mechanical equipment needed in health care facilities are usually based on patient census. Although nothing has been found in the peer-reviewed literature as a scientific basis for this determinant, many mechanical lift manufacturers base their assessments on the number of patients when recommending equipment. However, some experts use number of staff, number of medical inpatient wards, and geography or layout of the hospital wards as the determining factors in choosing the quantity of mechanical equipment. This study used the number of staff, number of medical wards, and geography of the hospital as the bases for providing mechanical equipment. For example, in this particular hospital, vertical lifts could be shared between two or more wards because of layout parameters.

The hospital was evaluated for mechanical equipment needs. It was decided that the following equipment would be given to the hospital during the course of the study: five lateral transfer lifts, three of which would remain in the emergency department. These lifts have the ability to transfer a patient horizontally without lifting, using a hand crank to move the patient laterally from stretcher to bed. The role of the lifts in the emergency department is to allow patients to be transferred an inpatient ward without the need for lifting. Some of these lateral transfer stretchers were used by the transport department for everyday patient-transfer needs. Five transfer chairs were assigned as mechanical lifts during this study. These are stretchers that have a lateral transfer capacity and then become patient chairs. Two vertical lifts were also assigned to the hospital during the study and were shared between two medical wards. The total cost of all the supplied equipment was $66,305.

Transport department as designated lifters
The transport department consisted of 10 FTEs, eight women and two men. The average age was 32 years and the director of the department evaluated the physical condition of these transporters as fair. The transport department staff was trained in the use of all three mechanical devices. They were called by the nursing department for all patient transfers. The transport department agreed to collect all the data relating to patient transfers, number of transfers per day, and type of mechanical device used for the transfer.

Results
During the course of the year, the transport department handled approximately 3,188 lifts (see Table 1).
Table 1. Types and numbers of lifts and injury data

<table>
<thead>
<tr>
<th>Month</th>
<th>Number of lifts transfer stretchers</th>
<th>Number of lifts transfer chairs</th>
<th>Number of lifts vertical lifts</th>
<th>Total number of injuries</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>228</td>
<td>8</td>
<td>1</td>
<td>1 (non-lost-time)</td>
</tr>
<tr>
<td>February</td>
<td>259</td>
<td>2</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>March</td>
<td>266</td>
<td>6</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>April</td>
<td>278</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>May</td>
<td>264</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>June</td>
<td>274</td>
<td>0</td>
<td>0</td>
<td>1 (non-lost-time)</td>
</tr>
<tr>
<td>July</td>
<td>274</td>
<td>0</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>August</td>
<td>268</td>
<td>0</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>September</td>
<td>254</td>
<td>0</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>October</td>
<td>265</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>November</td>
<td>278</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>December</td>
<td>254</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total YTD</td>
<td>3160</td>
<td>17</td>
<td>11</td>
<td>2 (non-lost-time)</td>
</tr>
</tbody>
</table>

The majority of the lifts (3,160) were done with the lateral transfer equipment (98 percent). Some 17 lifts were performed by using the lateral transfer chair (one percent), and 11 lifts were performed by using a vertical lift (one percent).

In 1996, the hospital had 11 reported lost-time injuries with 23 lost days and 151 modified duty (light duty) days, where compensable and medical costs totaled $20,632. In 1997, the hospital had nine reported lost-time injuries with 31 lost days and 171 modified duty days, where medical and compensation costs rose to $63,796. In 1999, the year of the study, the hospital had two reported injuries with no lost days and two restricted days. Compensable dollars incurred during the study year totaled $336. (See Table 2.)

Discussion of results

This study, though statistically small, shows that, by providing the proper amount of mechanical equipment with a designated lift-team approach, injury rates can be substantially reduced, by 78 percent and 91 percent, respectively. The study also shows a 100 percent reduction in lost-time injury. Another compelling piece of data is the reduction in the numbers of restricted days from 151 and 171, respectively, to two restricted days during the year of the study. The cost savings in restricted time alone would be enough to pay for the cost of the equipment provided. There were no lost days reported during the course of this study, as compared with 23 and 31, respectively.

Another measure of the cost-benefit approach for this can be calculated. The $63,000 spent in 1999 on the cost of the equipment saved the equivalent of the workers' compensation dollars spent in 1997, the last year of available data, when nine reported injuries cost the system $63,000 in compensation and medical dollars. Therefore, the equipment costs were paid for in one year through injury prevention. The translation of saved sick time and modified duty time into calculated dollars can be made as well, and it reveals a substantial saving in real cost to the affected department.

Hospitals should take seriously the profound effect that the mechanization of lifts could have on the reduction of injury. This study proves the cost-benefit of mechanization. Every medical ward should have the required minimum of one lateral and one vertical lift. Hospitals could evaluate the number of mechanical lifts necessary by using the formula below:

\[
\text{# of medical wards} \times 2 \text{ lifts (1 lateral, 1 vertical)} = \# \text{ of mechanical equipment}
\]

Special consideration should be given to critical care areas, where the ratio of lateral transfer devices to
patients might be higher. Smaller hospitals may use a similar formula, but adjusted for ward proximity, where some equipment can be shared. Standard policies should be implemented that would not allow manual lifting unless patient emergencies arose. There should also be special written policies on the lifting and transferring of obese patients, as these patients often present special problems to caregivers.

Discussion of reported injury: non-lost-time

During the course of this study, there were two reported injuries. One injury occurred when a nurse did not use a mechanical lifting device to lift a 350-pound resistive patient to change linen. This nurse did not follow study protocol, as she did not call the transport department to do the lift. The second reported injury was to a transport department employee who was injured transferring a heavy patient.

There was no problem in the cross-training of the existing transport department personnel. Since the majority of the department’s personnel are women, the transfer of patients with the proper mechanical equipment should not be considered a gender-based issue due to the fact that the hydraulics and pneumatics of the equipment reduced the compressive forces and physical strength requirements of the transfer.

The transport department teams were mandated to use mechanical equipment for all total body transfers, and they were responsible for maintaining the equipment in good working order. Nurses were trained to call the transport team when a patient needed transfer, and this procedure allowed the nursing staff to be removed from exposure to lifting.

Conclusion

This study, carried out in a 200-bed acute care, tertiary hospital, continues to support the philosophy that lifting by a controlled group and the proper amount of mechanical lifting equipment, and its mandated use, work to reduce injury rates, lost-day rates, and modified duty rates from lifting patients. A weakness of the study is the small cohort.

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Acknowledgment

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References

6. Ibid.