LiftSeat®
Powered toilet lifts

White Paper

Establishing the Link Between Musculoskeletal Injuries to Healthcare Staff when Performing Patient Toilet Transfers and the Associated Cost

While the physical impact of manually lifting and transferring a patient or resident by nursing staff has long been acknowledged,[1-3] little work has been conducted on the injuries incurred by caregivers when assisting patients with toilet transfers, whether at the bedside using a portable commode or in the bathroom using a regular toilet. In 2004, Nelson et al[4] identified the performance of a vertical transfer of a patient from chair to toilet, or commode, as one of the most common patient transfer tasks across multiple clinical settings. This finding was also supported by clinical staff when thirty-eight nursing assistants, asked to rank and rate 16 different patient handling tasks in long-term care for perceived stresses to the low back, identified transferring a patient from the toilet to a wheelchair as the most stressful.[5] When Garg and Owen conducted a biomechanical evaluation of this activity, they found the mean compressive force on L5/S1 of the spine during the transfer exceeded NIOSH-recommended tolerances.[6] Likewise, a later study by Marras et al,[7] which included transfers from commode to hospital chair, indicated the compression, lateral shear, and anterior-posterior forces associated with this task were well below optimum and were likely to result in lower back pain and injury.

In 2008, Lloyd sought to quantify the biomechanical demands on caregivers during the toilet transfer of a partially dependent patient by comparing the use of a powered toilet transfer technology (LiftSeat®) against the manual technique of assisting patients on and off the toilet. Results of the lab testing showed that, on average, a caregiver applies approximately 46 lb of force when manually assisting patients on and off a standard toilet, compared to 34 lb of force when assisting patients on and off the LiftSeat, thus demonstrating a considerable biomechanical benefit to caregivers.[8]

Determining the actual and potential risk of toilet transfer injuries

Toilet transfer injuries may affect any member of clinical staff from any professional group. Because of the way nursing work is organized in acute and long-term care environments, however, it is the clinical nursing assistants (CNAs) who incur the most injuries when performing a patient/resident toilet transfer, with many long-term care facilities already experiencing up to 100% annual turnover in this group of employees.[9] Among female workers in the United States, nursing aids and orderlies suffer the highest prevalence (18.8%) and report the most annual cases of work-related back pain (n=26900).[10]

The potential for risk of injury to caregivers from toilet transfers in any particular facility can be determined by examining data from three sources (Table 1).

Table 1: Determining the risk of toilet transfers	
1.	Analysis of OSHA 300 logs and incident reports
2.	Conducting a risk hazard assessment in each of the clinical areas
3.	Identifying the needs and goals of each patient group.

1. Analysis of OSHA 300 logs and incident reports

The first source of data is the analysis of a healthcare facility's OSHA 300 logs, which record injuries that result in medical expenses, lost days, and light duty. In addition, the facility's own incident reporting system usually provides data on what activity the staff member was actually performing at the time the injury occurred, where the injury took place, the time of day, and other noted factors. This can assist with identifying the priority areas for the purchase of equipment to reduce the risk of staff injury during toilet transfer tasks and determine the extent of the problem.

Data collected from 4 actual patient handling risk assessments in healthcare facilities across the United States clearly demonstrate the extent of injuries that occur to caregivers during toilet transfers (Table 2). It is perhaps surprising that the highest incidence of injury occurred in a pediatric facility across two of their busiest floors, but this data represents the lack of alternative equipment available to perform toilet transfers, the type of children they cared for, many of whom were orthopedic, and the larger size of the children.

Table 2: Toilet Assisted Transfers Injuries as a Percentage of Total Patient Handling Injuries

Hospital	Hospital Type	%
Hospital 1	general acute care hospital	6%
Hospital 2	acute care hospital	6%
Hospital 3	geriatric-focused general hospital	5.5%
Hospital 4	children's hospital	18.5%

The raw data from the risk assessments also highlighted a number of injuries related to the mobilization of patients to and from the bathroom, which have not been included in the table, particularly in Hospital 3, reflecting the age group of the majority of its patients and the strong association with falls and bathroom activities.[11] In fact, one nursing aid incurred an injury during the transfer of a patient to the bathroom that resulted in one day off sick, 75 days on light duty (many of which were likely covered by other staff), and $1365 in medical costs to the aid's employer. In addition, many injuries cited as "transferring" in the data were not attributed to any particular activity, although it can be presumed that some would be related to toilet transfers. It should be noted that these figures are conservative at best, as it has been well researched that nurses and therapists do not report the majority of the injuries they suffer through manually lifting and transferring patients.[12]

2. Conducting a risk hazard assessment in each of the clinical areas

Many toilet transfers are performed in small resident bathrooms that may be awkwardly shaped, sandwiched at the end of a patient's room, or cluttered with medical equipment.

Figure 1: Toilet Transfer Challenges of a Small Bathroom

When considering bathroom space, a minimum of 24 inches on either side of the toilet is recommended for the caregiver to assist the patient with a toilet transfer. Other recommendations include a wall movable handrail on either side of the toilet, space for a pivot transfer, space to move the equipment in front of the toilet, a door width of at least 32 inches, and a working space of 48 square feet for regular and 53 square feet for bariatric patients.[13] In addition, many bathrooms have, as demonstrated in Figure 1,

- toilets that are of a low height, making it difficult for the patient to stand and requiring the caregiver to "lift" the patient;
- fewer than the optimal number of handrails, therefore making it difficult for patients to assist themselves from the toilet, particularly if they have a unilateral weakness in one side of their body, such as a stroke patient, and are unable to use the installed handrail;
- toilets that are wall hung, do not cater for the patient above 350 lb, and are low; and
- doors that are not wide enough to take a floor-based or sit-to-stand lift through, resulting in staff having to manually assist the patient on and off the toilet.

Bathrooms can also have thresholds that make pushing a patient on a lift difficult and risky for the caregiver.

Unfortunately, many facilities do not have the ability due to structural restrictions and budgetary constraints to make the changes required to provide an optimal safe environment during toilet transfers for both staff and patients.

3. Identifying the needs and goals of each patient group

Finally, the needs and goals of a particular patient group play a large role in identifying the risks to caregivers in performing toilet transfers. While the risk may occur in any clinical area, specific areas exist that tend to have a higher risk of injuries

associated with toilet transfers than others:

- *Medical surgical units* - whose patients' cognitive and physical abilities are often compromised by anesthetic and pain medications. In fact, 33% to 45% of all falls in med/surg units are associated with toileting activities.[12,14]
- *Labor and delivery* - following the postpartum risk associated with residual weakness from epidurals, resulting in potentially poor standing and transfer ability.
- *Long-term care* - where transferring residents to and from the toilet is one of the most physically demanding tasks caregivers carry out,[10] with even the use of the two-person gait belt transfer technique providing an 80% risk for a lower back disorder.[7]
- *Orthopedics* - where vertical transfers of patients with hip replacements, casts, or splints of the upper or lower extremity are regarded as high-risk tasks,[4] with a requirement for the former to have no more than 90 degrees of flexion when standing up or sitting down.
- *ICU* - where the importance of dignity in assisting a patient to the bedside commode is challenged often by the lack of staff to assist with the patient, the lines attached to the patient, and the time it takes to conduct the transfer.
- *Pediatrics* - who share the challenges of their patients becoming heavier and many requiring assistance following orthopedic surgeries.
- *Rehabilitation* - where caregivers are exposed to high mechanical loads on the spinal tissues for a longer period of time, as they assist their patients' return to function and independence in therapeutic tasks and assist with the more traditional tasks such as chair to toilet transfers.[15]
- Emergency department- who receives an estimated 234 094 unintentional, nonfatal bathroom injuries among persons aged > 15 years each year.[16] Of the 3339 cases the CDC examined in their study, they determined that 14.1% of those injured had been standing up from, sitting down on, or using the toilet, including 64% of those injured as recorded over the age of 65.[16]

As healthcare facilities receive more bariatric patients, the risk of injury to caregivers is subsequently increasing.[17] Furthermore, as the practice of hourly rounding[18] to reduce falls and increase patient satisfaction is introduced, licensed and unlicensed nurses are being exposed more frequently to the risks associated with repetitive manual toilet transfers and potentially physically unstable and tired patients.

Toilet transfer technology solutions

A variety of technologies are available to prevent caregiver injuries during toilet transfers. Ceiling lifts are very effective for use with a patient requiring total assistance with a transfer to a bedside commode. The majority of hospitals, however, do not install the tracking into the patient's bathroom, thus leading to the need for other equipment to be used when taking the patient to the bathroom, such as a floor-based lift. One of the biggest challenges when using a floor-based lift is the requirement for space, either to turn it in the bathroom or to have a door wide enough for it to go through. In fact, it should be noted that a floor-based lift is not designed to be a mobility device.

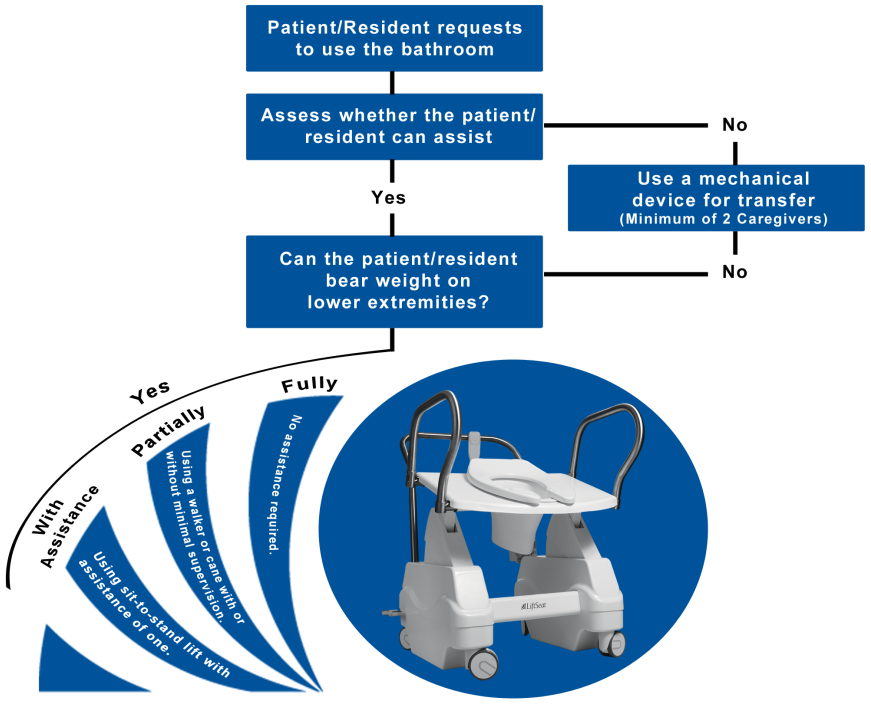
Figure 2: LiftSeat Powered Toilet Lift

Many of the toilet transfer injuries do not occur on patients who require total assistance but who are unpredictable in their ability to stand, ambulate, and transfer safely or who have poor arm strength. For this category of patient or resident, a sit-to-stand lift can be used. Once again, not all bathrooms will allow the use of this equipment, due to its size, and both the floor-based lift and sit-to-stand present storage issues when purchased in quantities enough to fulfill the patient's needs in the previously identified high-risk areas.

Many patients, however, are able to walk to the bathroom on their own or with standby assist, using a walking aid and under the supervision of one caregiver. While a regular raised toilet seat can help with comfort, it does not assist the patient who requires help to stand. A powered toilet transfer solution such as the LiftSeat (Figure 2) reduces the risk associated with staff manually lifting patients to a standing position from the toilet while assisting with their hygiene needs. It also affords the patient more independence and dignity during the process, while avoiding the need for the care staff to use a

gait belt to stand the patient or bend and twist to hold the patient up, exposing themselves to a high risk of injury. The hand-held controls of the powered toilet solution are an ideal aid to a caregiver who is assisting a patient in a very small bathroom and where there is no room for a second nurse. This technology is particularly useful for bariatric patients as it is available in a 400 lb and a 600 lb capacity and can be used at the bedside, placed over an exiting toilet seat, or transferred from one place to another. This latter feature alleviates storage issues, as the LiftSeat can be stored over the toilet for use during the day and, if the patient is assessed as suitable, left by the bedside at night.

Figure 3: Algorithm for Using the LiftSeat® for Toilet Transers



Matching the correct technology to the patient's ability to transfer on and off the toilet is crucial to ensure the safety of the patient and caregiver. One tool to assist with this is the use of an algorithm (Figure 3) that guides the caregiver through the options based upon the patient's ability and the equipment's compatibility. Likewise, it is important to consider that the patient may require the use of more than one type of equipment, for instance a small nonpowered sit-to-stand to take them to the bathroom, which has a powered toilet lift present. Continuity of care is crucial to the determination of the most appropriate equipment solution for safe toilet transfers, and all equipment purchases need to be considered for the different patient group's ability, rehabilitation goals, and patient and staff safety.

Determining a return on investment

As with all patient transfer equipment, making the case for purchase is based upon presenting a clear financial return on investment. The impact of some of the toilet transfer injuries from the previously mentioned 4 hospitals can clearly be seen in Table 3.

Table 3: Lost Days, Light Duty, and Associated Costs of Toilet Transfer Injuries

Hospital	Lost Days (Sick)	Light Duty	Medical Costs	Staff Member
Hospital 1	0	0	$311	Patient Care Technician
Hospital 1	10	28	$1674	Nursing Assistant
Hospital 2	7	7	$127.16	Registered Nurse
Hospital 3	0	18	$3100	Nursing Assistant
Hospital 3	2	11	$178	Nursing Assistant
Hospital 3	9	0	$616	Registered Nurse
Hospital 4	Not Stated	Not Stated	$1421.89	Registered Nurse

On initial review, the financial costs seem low; however, one of the biggest costs associated with the injuries is not present on this data: staff replacement for lost days and light duty. Hospital 1 had a nursing assistant who took 10 days off sick after an injury and was on light duty for 28 additional days. It is likely that many of those shifts were covered by colleagues who were possibly paid overtime rates. In its May 2011 figures, the Bureau of Labor Statistics reported an average hourly wage of $12.22 for nursing assistants and related staff,[19] making the actual cost of the assistant's injury to be $8000 to $10 000 when taking into account an employer's costs, coverage for 8 hour shifts, and reported medical expenses. Furthermore, it should be noted that nursing aids have one of the top two highest workers' compensation rates resulting from musculoskeletal injuries.[20]

Hospital 3 had an RN off work for 9 days after her injury. With nursing shortages still being seen across many parts of the

country, it is almost certain that all of the shifts will have been covered by another licensed nurse, probably from the hospital pool. With the average salary of an RN being $33.56 per hour,[21] the cost of this injury could have been $10 000 or more based upon a 12-hour shift, including employer's costs and the listed medical costs.

What is undetermined from this data is whether both members of staff will recover completely from their injuries or suffer from recurring problems. With the cost of replacing a registered nurse as much as $92 442,[22] the case for the purchase of technology to reduce caregiver injuries related to toilet transfers is not difficult to make.

It is important to appreciate that maximizing a return on investment (ROI) with the purchase of a toilet transfer technology such as a powered toilet lift is not just seen in terms of dollars or even solely as a solution to the ever-spiraling cost of musculoskeletal injuries to clinical staff during the transfer process. To really understand the ROI of this technology on patient outcomes, such as the prevention of falls,[23] the promotion of patient dignity and satisfaction, and its place within a bariatric patient handling program all need to be considered. Also, when the potential costs of a toilet transfer injury to the caregiver and the patient/resident are combined (Table 4), the financial impact to any organization can be significant.

Table 4: Potential Cost of a Toilet Transfer Fall to Caregiver and Patient
$16,090 average claim cost for Registered Nurse injuries[24]
$9,062 nursing aid injuries[24]
$35,000 average cost of hip replacement surgery[25]
$19,440 (includes ER, nursing home, hospital, and home health care but not the physician)[26]
Cost of the LiftSeat - $3,600-$5,900

Assisting a patient or resident with transferring to a toilet or bedside commode is one of the most common tasks a caregiver performs during his or her working day and one which continually exposes them to the risk of back, shoulder, or other musculoskeletal injury. In addition, it is an activity that requires a respect for the dignity of patients and, as such, the promotion of their independence as much as possible. A variety of technology solutions exist to assist the caregiver with this activity, including the powered toilet lift, which can be placed in the patient's bathroom to maximize his or her privacy, dignity, and independence, used at the bedside to assist patients who find it difficult to stand from a sitting position, or easily transferred between the two. It is important to consider when purchasing an equipment solution to reduce the risk to staff and patients from toilet transfers that products such as the powered toilet lift should be considered as a viable **adjunct** to other equipment rather than a niche product required **after** other equipment has been purchased and installed.

References

1. Nelson A, Baptiste AS. Evidence-based practices for safe patient handling and movement. *Online Journal of Issues in Nursing*. 2004;9(3)(manuscript 3).
2. Feletto M, Graze W. *A Back Injury Prevention Guide for Health Care Providers*. Sacramento, CA: CalOSHA; date unknown. http://www.dir.ca.gov/dosh/dosh_publications/backinj.pdf. Accessed April 14, 2013.
3. Bureau of Labor Statistics. Table 20. Number, Incidence rate, and median days away from work for nonfatal occupational injuries and illnesses involving days away from work by selected details occupation and musculoskeletal disorders in the private industry, state government and local government, 2009. Washington, DC: US Dept of Labor, Bureau of Labor Statistics; 2010. http://www.bls.gov/news.release/osh2.t20.htm. Accessed April 14, 2013.
4. Nelson AL, Motacki K, Menzel N. *The Illustrated Guide to Safe Patient Handling and Movement*. New York, NY: Springer Publishing Co; 2009.
5. Garg A, Owen BD, Carlson B. An ergonomic evaluation of nursing assistant's job in a nursing home. *Ergonomics*. 1992;35(9):979-995.
6. Garg A, Owen B. Reducing back stress to nursing personnel: an ergonomic intervention in a nursing home. *Ergonomics*. 1992;35(11):1353-1375.
7. Marras WS, Davis KG, Kirking BC, Bertsche PK. A comprehensive analysis of low-back disorder risk and spinal loading during the transferring and repositioning of patients using different techniques. *Ergonomics*. 1999;42(7):904-926.
8. Lloyd J. *Ergonomic Evaluation of the LiftSeat ® Patient Handling Technology to Facilitate Toileting Tasks*. Tampa, FL: VISN 8 Patient Safety Center; 2008.
9. Pillemar K, Meador R, Henderson C Jr, et al. A facility specialist model for improving retention of nursing home staff: results from a randomized, controlled study. *Gerontologist*. 2008;48(Spec No 1):80-89.

10. Collins J, Wolf L, Bell J, Evanoff B. An evaluation of a "best practices" musculoskeletal injury prevention program in nursing homes. *Inj Prev*. 2004;10(4):206-211.
11. Tzeng HM. Understanding the prevalence of in-patient falls associated with toileting in adult care settings. *J Nurs Care Qual*. 2010;25(1):22-30.
12. Menzel N. Underreporting of musculoskeletal disorders among health care workers. *AAOHN J*. 2008;56(12):487-494.
13. Villeneuve J. Physical environment for provision of nursing care: design for patient handling. In: Nelson A, ed. *Safe Patient Handling and Movement: A Practical Guide for Health Care Professionals*. New York, NY: Springer Publishing Co; 2006:187-208.
14. Sherrod MM, Good JA. Crack the code of patient falls. *Nurs Manage.* 2006;37(8): 25-29.
15. Waters TR, Rockefeller K. Safe patient handling for rehabilitation professionals. *Rehabil Nurs*. 2010;35(5):216-222.
16. Center for Disease Control and Prevention (CDC). Nonfatal bathroom injuries among persons aged ≥ 15 years - United States 2008. *Morbidity and Mortality Weekly Report*. 2011;60(22):729-733.
17. Vieira ER, Dyer D, Richardson L, Raso J. Safety in bariatric patient transfers. *The Open Critical Care Medicine Journal*. 2008;1:48-53.
18. Halm MA. Hourly rounds: What does the evidence indicate? *Am J Crit Care*. 2009;18:581-584.
19. Bureau of Labor Statistics. Occupational Employment and Wages, May 2011. Washington, DC: US Dept of Labor, Bureau of Labor Statistics; 2011. http://www.bls.gov/oes/2011/may/oes311012.htm. Accessed April 14, 2013.
20. Lipscomb HJ, Schoenfisch AL, Myers DJ, Pompei LA, Dement JM. Evaluation of direct workers compensation costs for musculoskeletal injuries surrounding interventions to reduce patient lifting. *Occup Environ Med*. December 2011.
21. Bureau of Labor Statistics. Occupational Employment and Wages, May 2011. Washington, DC: US Dept of Labor, Bureau of Labor Statistics; 2011. http://www.bls.gov/oes/2011/may/oes291111.htm. Accessed April 14, 2013.
22. HMS Group Ltd. Acute care hospital survey of RN vacancy and turnover rates in 2000. *J Nurs Admin*. 2002;32(9):437-439.
23. Monaghan HM. *Identifying a Return on Investment (ROI) by Introducing the LiftSeat® Toilet Transfer Solution into a Falls Prevention Program and/or Safe Patient Handling Program*. Lombard, IL: LiftSeat Corporation; 2012 http://www.liftseat.com/sites/default/files/ROI-of-LiftSeat-In-Falls-Prevention-Safe-Patient-Handling-Programs.pdf.
24. Oregon OSHA. Safe patient handling: a worthy investment [Powerpoint]. http://www.orosha.org/ppt/safe_patient_handling.pps. Accessed January 3, 2012.
25. Hellesvig-Gaskell K. The average cost of hip replacement surgery. EHow Website. http://www.ehow.com/about_5383138_average-cost-hip-replacement-surgery.html. Accessed February 9, 2012.
26. Rizzo JA, Friedkin R, Williams CS, et al. Health care utilization and costs in a Medicare population by fall status. *Med Care*. 1998;36(8):1174-1188.

LiftSeat®
Powered toilet lifts

LiftSeat Corporation
158 Eisenhower Lane South
Lombard, Illinois 60148

(877) 665-4381
www.liftseat.com

Written By
Heather M. Monaghan, MHSc, RN
April 2013