

Repositioning Patients in Chairs—An Improved Method

by Guy Fragala, PhD, PE, CSP, CSPHP, and Maren Fragala, PhD, CSCSD

Proper seated posture is important in health care settings because immobilized patients may be sitting for extended periods. In many situations, a caregiver is required to assist a slouching patient to a proper, more comfortable upright posture. The caregiver is at risk from exposure to the physical demands of this task. This study evaluated exertion and risk to the caregiver using three methods of repositioning patients in chairs in the health care setting. Through application of a new method employing an ergonomically designed device, exertion and risk were reduced. Results from this study indicate that the high-risk occupational activity of repositioning a slouching patient in a chair can be made safer for caregivers. [*Workplace Health Saf* 2013;61(4):141-144.]

Maintaining proper sitting posture is important in health care settings because immobilized patients may be sitting for extended periods. The seated position is often more desirable than lying in bed because it can enhance healing and rehabilitation processes (Kleinpell, Fletcher, & Jennings, 2008; Powers, 2011). However, poor seated posture can not only lead to discomfort and pain but also result in digestive and respiratory problems

(Bauman et al., 2011; Markus, 2009; Sherwood, 2011; Watanabe, Eguchi, Kobara, & Ishida, 2008). Often, when seated, a patient may slide down in the seat of a chair to a slouching position because of chair design and the patient's compromised physical condition.

The seated position places pressure on the ischial tuberosities from the patient's body weight. Because this area of the body is relatively small and the amount of pressure can increase with poor posture, a pressure ulcer can develop. Poor seated posture also makes the sacral region more prone to pressure ulcers (Katz & Kirr, 2012; Melter, 2011). For patients with existing pressure ulcers on the ischial or sacral areas, proper posture while sitting in a chair is essential to prevent further skin breakdown. Patients must be closely monitored so they maintain appropriate posture that will not aggravate existing pressure wounds (Wound,

Ostomy, and Continence Nurses Society, 2010).

Self-repositioning from a slouching posture to a proper upright seated position may not be possible for a physically limited patient. Hence, chair-bound patients must be repositioned with the assistance of a caregiver if they fall into a slouching posture to maintain comfort and avoid health risks such as pressure ulcers. However, when a caregiver is required to assist a slouching patient to a proper, more comfortable upright posture, the caregiver is at risk due to the physical demands of this task. Because of the weight of the patient and the posture the caregiver must assume to pull the patient up in the chair, forces on the musculoskeletal structure of the caregiver are beyond body tolerance; strain and sprain type injuries can result. Direct care providers continue to be one of the occupational groups most at risk for musculoskeletal injuries (Engkvist, Hagberg, Lindén, & Malker, 1992; Harber et al., 1985; Hedge, 2009; Hignett, 1996; Jensen, Nestor, Myers, & Rattiner, 1988; Khuder, Schaub, Bisesi, & Krabill, 1999; Ljungberg, Kilbom, & Hägg, 1989; Nelson, Fragala, & Menzel, 2003; Pheasant & Stubbs, 1992). The task of pulling a patient from a slouching position to a more desirable posture is one of the activities contributing to this high risk for occupational injuries.

To date, repositioning solutions have been sparse. However, the field

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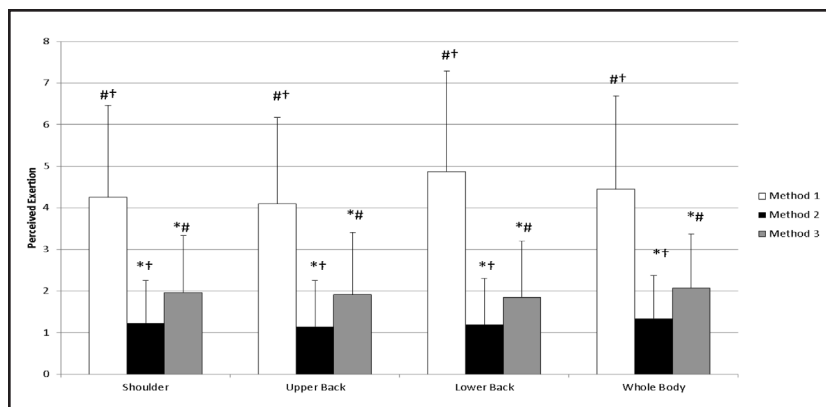


Figure 1. Perceived exertion using three methods of repositioning. *Significantly different from method 1 ($p < .05$). #Significantly different from method 2 ($p < .05$). †Significantly different from method 3 ($p < .05$).

of ergonomics, the science or discipline that attempts to design jobs to fit the capabilities of the work force rather than expect workers to tolerate poorly designed jobs, has begun to effectively apply safe patient handling techniques in today's health care environment. The ergonomically designed seated positioning system (SPS) offers a potential solution to facilitate pulling a patient up in a chair by attempting to mitigate the primary ergonomic risk factors of force, repetition, and posture. However, the efficacy of the SPS to improve the task of repositioning patients is not known. Hence, this study was conducted to evaluate caregiver exertion for three methods of repositioning a patient from slouching in a chair to proper posture.

The authors hypothesized that the task of repositioning a slouching patient in a chair would require less perceived physical exertion on the part of the caregiver using the SPS.

METHODS

To investigate the exertion required for three methods of repositioning a patient in a health care setting from slouching in a chair to proper posture, a pilot study was conducted in a controlled clinical setting. Thirty-one experienced caregiver-volunteers participated in the study. Prior to data collection, caregivers were familiarized with each method of repositioning and instructed to practice each method to ensure comfort. A reference individual was

selected to represent a typical patient for all trials. Each caregiver performed one trial of all three repositioning methods. Method 1 required two caregivers, one on each side of the chair, using a standard draw sheet to reposition the patient from a slouching to an upright posture in the chair. Method 2 required two caregivers to reposition the patient from a slouching to an upright posture in the chair using the SPS. Method 3 required one caregiver to reposition the patient from a slouching to an upright posture in the chair using the SPS. Immediately after performing each repositioning method, caregivers reported perceived exertion for their whole body, shoulders, upper back, and lower back using a validated exertion scale.

Data Collection Instrument

The validated Borg Scale for perceived exertion was used to evaluate caregiver subjective physical exertion required to complete the task of pulling a patient up in a chair. This instrument uses a 10-point scale ranging from 0 (no exertion) to 10 (extremely hard exertion) (Borg, 1978, 1982). Reliability and validity of the Borg Scale have been previously published (Borg, 1978, 1982). Additionally, subjective ratings were deemed appropriate for this study because Owen, Garg, and Jensen (1992) and Winkelmolen, Landeweerd, and Drost (1994) detected no significant differences in findings using the Borg Scale for perceived exertion and the

more complicated, time-consuming, and labor-intensive biomechanical model methods. In addition, many of the biomechanical models are difficult, if not impossible, to use in actual clinical settings, where the primary objective is to provide care to patients (Owen & Fragala, 1999).

Data Analysis

A two-way (method \times body part) repeated measures analysis of variance was used to evaluate mean differences in methods of repositioning. Analyses were run using SPSS, version 19, and the level of significance was set at .05 or less.

RESULTS

Overall, exertion differed significantly between each method of repositioning ($p < .01$). Method 1 (two caregivers using an old method to reposition) required 246% and 127% greater exertion than method 2 (two caregivers using the new SPS) and method 3 (one caregiver using the new SPS), respectively, and method 3 required 52% greater perceived exertion than method 2 ($p = .009$).

Shoulder exertion differed significantly between each method of repositioning ($p < .05$). Method 1 (two caregivers using an old method to reposition) required 234% and 122% greater exertion than method 2 (two caregivers using the new SPS) and method 3 (one caregiver using the new SPS), respectively, and method 3 required 51% greater perceived exertion than method 2 ($p = .013$).

Upper back exertion differed significantly between each method of repositioning ($p < .05$). Method 1 (two caregivers using an old method to reposition) required 243% and 115% greater exertion than method 2 (two caregivers using the new SPS) and method 3 (one caregiver using the new SPS), respectively, and method 3 required 60% greater perceived exertion than method 2 ($p = .006$).

Lower back exertion differed significantly between each method of repositioning ($p < .05$). Method 1

(two caregivers using an old method to reposition) required 303% and 166% greater exertion than method 2 (two caregivers using the new SPS) and method 3 (one caregiver using the new SPS), respectively, and method 3 required 51% greater perceived exertion than method 2 ($p = .014$).

Whole body exertion differed significantly between each method of repositioning ($p < .05$). Method 1 (two caregivers using an old method to reposition) required 213% and 110% greater exertion than method 2 (two caregivers using the new SPS) and method 3 (one caregiver using the new SPS), respectively, and method 3 required 49% greater perceived exertion than method 2 ($p = .008$).

Figure 1 summarizes the perceived exertion results for the three repositioning methods investigated, by body part considered.

DISCUSSION

Application of the SPS significantly reduced exertion reported by caregivers while repositioning a slouching patient in a chair. Method 1, which was a traditional method performed by two caregivers, required, overall, 246% more exertion than method 2, which was the new SPS performed by two caregivers. Comparing method 1 to method 3, which was only one caregiver using the SPS, the overall exertion reported for method 1 was still 127% greater. Examining reported whole body exertion, method 1 was 213% greater than method 2 and 110% greater than method 3. Considering shoulders, method 1 was 234% greater than method 2 and 122% greater than method 3. For upper back and lower back, method 1 was 243% and 303% greater, respectively, than method 2 and 115% and 166% greater, respectively, than method 3. Greater physical exertion by caregivers equals greater stress on their musculoskeletal structure and increased risk for injury (Owen et al., 1992; Winkel-molen et al., 1994). This reduction in perceived physical exertion translates to less force exerted on the musculo-



Figure 2. Method 3, one caregiver repositioning a patient in a chair using the seated positioning system.

skeletal structure and a lower risk of injury to the caregiver.

The current study did not evaluate a single caregiver repositioning a slouching patient without the aid of the SPS. In practice, it is common for one caregiver to reposition a slouching patient in a chair. The researchers considered evaluating the perceived exertion for one caregiver repositioning a patient using a traditional method; however, it was determined to be unsafe for a single caregiver to perform this task. Although not examined in the current study for safety, reported perceived exertion is expected to far exceed that reported for method 1.

The design of the SPS may reduce caregiver physical exertion during the task of repositioning through several mechanisms. Through the simple yet effective design of the SPS, risk is reduced when considering each of the primary ergonomic risk factors of force, repetition, and posture. First, force required to move the patient is reduced by the friction-reducing properties of the SPS surfaces. Under the seated patient, two surfaces contact and slide over each other, facilitating the action of the patient moving back in the chair seat. Next, regarding repetition, if

patients stay properly positioned in chairs, the frequency of pulling them up will be reduced. Again, because of the surface characteristics of the SPS, the action of sliding only goes one way and a holding action occurs for the other direction. Finally, considering posture, if lifting can be eliminated and reaching minimized, caregiver posture can be optimized while performing the repositioning task. The handle straps incorporated into the design of the SPS convert the need to lift into a pulling action; because of the length of the handles, the caregiver is in a more neutral posture with reaching minimized while performing the pulling action. Figure 2 illustrates method 3, which involves one caregiver repositioning a patient in a chair.

In addition to reducing occupational risks to caregivers, the SPS may also benefit patients. Because the SPS reduces caregiver exertion, it facilitates moving patients into proper postures for comfort and maintains postures over time. Improvements in seated posture may translate to reduced risk of falling out of the chair. Additionally, the design of the SPS also positively impacts seat surface pressure. The strategically placed air bladders effectively redistribute pres-

sure, relieving excessive pressure over bony prominences.

CONCLUSION

Results from this study indicate that through application of the SPS, the high-risk occupational activity of repositioning a slouching patient in a chair can be made safer for caregivers. Caregivers reported much less physical exertion was required to reposition patients when using the SPS.

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