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Implementation and Adoption of Mechanical Patient Lift Equipment in the Hospital Setting: The Importance of Organizational and Cultural Factors

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Background *Work focused on understanding implementation and adoption of interventions designed to prevent patient-handling injuries in the hospital setting is lacking in the injury literature and may be more insightful than more traditional evaluation measures.*

Methods *Data from focus groups with health care workers were used to describe barriers and promoters of the adoption of patient lift equipment and a shift to a "minimal-manual lift environment" at two affiliated hospitals.*

Results *Several factors influencing the adoption of the lift equipment and patient-handling policy were noted: time, knowledge/ability, staffing, patient characteristics, and organizational and cultural aspects of work. The adoption process was complex, and considerable variability by hospital and across units was observed.*

Conclusions *The use of qualitative data can enhance the understanding of factors that influence implementation and adoption of interventions designed to prevent patient-handling injuries among health care workers.* Am. J. Ind. Med. 54:946–954, 2011. *© 2011 Wiley Periodicals, Inc.*

KEY WORDS: mechanical lift equipment; patient-handling; occupational injury prevention; intervention adoption; nursing culture

BACKGROUND

Research in the health care setting suggests that implementation of mechanical lift equipment can prevent work-related musculoskeletal injuries and reduce associated costs; this evidence comes largely from studies conducted in the long term care setting [Brophy et al., 2001; Evanoff et al., 2003; Collins et al., 2004; Chhokar et al., 2005; Engst et al., 2005; Miller et al., 2006; Alamgir et al., 2008; Park et al., 2009]. The acute care hospital setting is different in several ways that could influence the integration of lift equipment into patient care.

Although the long-term goal of implementing lift equipment is to prevent injuries among patient care staff, the more immediate goal is to reduce physical demands of patient-handling tasks via the integrated use of the lifting devices, particularly on units with high patient acuity. Several studies have captured and reported data suggesting mechanical patient lifts are not regularly used in patient care tasks, [Evanoff et al., 2003; Byrns et al., 2004; Li et al., 2004; Engkvist, 2005, 2007; Wardell, 2007], and

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there is a clear need for an understanding of such barriers and promoters of intervention implementation and adoption [Roen et al., 2006; Koppelaar et al., 2009] that ultimately impact the more distal outcome measures of effectiveness such as work-related injuries and their consequences. In particular, understanding factors related to intervention implementation in the context of patient care in the acute care hospital setting is needed.

In a companion paper [Schoenfisch et al., in preparation], we highlighted objective approaches to measuring aspects of the adoption of patient lift equipment and a ''minimal-manual lift environment'' (MMLE) policy on patient care units at a large tertiary-care medical center and smaller community hospital over a five-year period. These data are needed to strengthen the evidence base through which effectiveness of interventions designed to reduce patient-handling injuries is evaluated. However, such measures only capture specific aspects of adoption and should be coupled with the recognition of the cultural and organizational factors influencing adoption. Using data gathered through qualitative methods, the purpose of this report is to more-fully describe barriers and promoters influencing implementation and adoption of the lift equipment and MMLE policy at these two hospitals.

METHODS

Intervention

The setting, intervention, implementation process, and promotional efforts have been described in detail in our companion piece [Schoenfisch et al., in preparation]. Briefly, the medical center and community hospital of focus in this study implemented a ''minimal-manual lift environment'' policy on inpatient nursing units in October 2004 and January 2005, respectively. Lift equipment and transfer devices were purchased for inpatient units. A train-the-trainer approach was used to support the instruction of nursing staff; unit ''coaches'' taught staff about safe use of the equipment and the MMLE policy. Despite modeling their implementation process on that at the medical center, the community hospital carried out such effort with less support in terms of number of coaches trained and organized groups aimed at addressing patient-handling concerns.

Understanding Adoption

A series of focus groups were conducted between May 2006 and December 2009 providing a forum to solicit qualitative information about experiences with the lift equipment, feelings about the policy shift, barriers to implementation, adequacy of training and ongoing support. Focus groups also provided an opportunity for the research team to solicit feedback about our impressions of adoption.

Individuals were recruited who were willing to talk about their experiences and their perceptions of the experiences of co-workers. Participants were compensated $25 for their time. A semi-structured guide, not a questionnaire, was used to begin discussion and probe for details; group members discussed topics in the order they were raised, and participants were encouraged to raise issues as well. After informed consent, the focus groups were audio-recorded. Names were not used throughout the process. After the tapes were transcribed, the text was coded using N6 software [QSR International, 1991–2002], a product designed for analyses of qualitative data. Initial coding followed the interview guide; other relevant constructs that arose in the review were coded and catalogued as well. This ''prestructured case'' approach is often used when researchers have a conceptual framework and the questions are reasonably well-defined [Miles and Huberman, 1994].

In addition to focus groups, we gained insight into the implementation and adoption processes through monthly project meetings with hospital ergonomists involved with addressing patient-handling concerns at the study hospitals and the implementation of the lift equipment.

All procedures were approved by the Institutional Review Board at Duke University Medical Center.

RESULTS

Thirteen (13) focus groups were conducted with a total of 80 participants. Groups were segregated by hospital. Some groups consisted only of nurse aides or only of nurses, while other groups were of mixed job titles. Additional groups were conducted with physical and occupational therapy (PT/OT) staff. Several common themes arose from the focus groups regarding factors that participants felt influenced use of the lift and transfer equipment and reaching a ''minimal-manual lift environment'' (Table I).

Time

A very common barrier to adoption raised in all the early focus groups was ''time.'' Participants often referred to time as minutes taken to go to the storage area, retrieve the equipment and supplies, bring them back to the patient's room, set up the equipment (which often included moving furniture), perform the lift or transfer, and then return the equipment to the storage area. One nurse from a unit she described as ''enjoying the equipment'' said use of the equipment was still ''a lot of work, because it takes time to go get [the equipment], it takes time to set the

TABLE I. Staff-Perceived Factors Involved With Meeting a "Minimal-Manual Lift Environment" (MMLE) Status

Knowledge/ability	Awareness of the policy and/or lift and transfer equipment; training in use of the equipment; knowledge of when to use the equipment; knowledge of how to use the equipment; experience using the equipment
Availability/accessibility	Availability and accessibility of equipment and/or supplies. May reflect availability of equipment/supplies in general, for a specific task or for a particular patient weight
Equipment attributes	Characteristics of the equipment influencing use by staff members (e.g., maneuverability, battery charge, etc.)
Physical environment	Characteristics of storage areas, patient rooms, patient bathrooms and other unit-level factors perceived to discourage or prevent lift equipment use
Patient-related factors	Patient characteristics that are perceived to influence use of the lift equipment
Staffing	(Un)availability of staff to assist with use of the equipment; staff-to-patient ratio
Time	Time in general (e.g., time, time constraints, lack of time) or more specifically (time to find the equipment, time to get equipment, time to set up equipment); time in minutes involved in equipment use; time related to training, being efficient, social pressures to complete tasks immediately, the time of alternate methods, work in a fast-paced environment, unit-level goals
Work environment	Unit culture, unit pace (fast-paced environment), influence of change-agents, receptiveness to change
Institutional environment	Competing initiatives, resource availability, management support

patient on [the equipment]. . ." Another nurse indicated that difficulty finding the equipment discouraged her use of it: "They are wonderful things, but. . .they are one of those things that I won't take the time to go look for." Even when equipment was accessible, staff described time barriers to use. For example, staff on one unit with easily-accessible friction-reducing plastic liners noted use of the liners "became a time issue to turn and turn" the patient, particularly when "you've got all these lines [hooked up to the patient]" that make turning challenging.

The time involved in equipment retrieval, set up, use and return certainly influenced whether equipment was used in patient lifts/transfers; however, it became obvious that, as a factor influencing adoption, "time" reflected much more than the number of minutes spent on these tasks.

Training

Training in lift equipment use was viewed as a time-intensive process, typically taking at least one hour. One coach described taking up to four hours to train a unit staff member on equipment use. Training involved an overview of the MMLE policy, equipment specifications, how to use each piece of equipment, and patient-/scenario-based situations in which equipment should be used or not used. Staff were required to demonstrate competence in hands-on use of the equipment. Most units had several different pieces of lift equipment, all of which had to be reviewed with staff on that unit.

Training staff on the units was complicated by a lack of coaches and coaches' own patient loads and schedules: "There are only one or two people usually on some of these floors that know how to use [the lift equipment]. Some of the nurses are so busy they don't have time to show everyone, and they are not on the same shifts." Another nurse noted difficulty in "finding the time, because you have a patient load. . .or setting aside a day [to train] and then people aren't there on that day you picked to come in." Staff noted particular challenges in finding a time to train staff on the ceiling lifts; these lifts are only located in up to four patient rooms on a given 31-room unit, and rarely un-occupied for a training session.

Efficiency

"The more frequently you use it, then the more familiar you become with it and the quicker you're going to be able to use it" a nurse told us. PT/OT staff also commented on efficiency among nursing personnel: "[Nursing staff] think it takes too much time. They don't realize it's more efficient, and it wouldn't take them any more time than it currently takes them to drag [another staff member] over." But from many nursing staff members, time required to re-learn how to use the equipment in the patient care setting was clearly a barrier to use: "It takes a while for me to get that thing, because when you don't use it for a long time, you tend to forget how to use it."

Social pressure to perform tasks immediately

Time-sensitive demands from co-workers influenced lift use decisions. One nurse described interactions with an ER nurse who brought a patient to the nursing unit: "You're [going to get the equipment and] saying 'I'll be right back' while everybody is waiting. . .and the ER nurse is waiting to go back. . .so everybody is like stand-still. . .you have six people in that unit saying 'Let's do it.'

They say 'Hee-hi-ho, over we go' and the patient is in the bed.''

The time of alternative methods

Time to perform a patient-handling task with the lift equipment was sometimes described relative to the time it would take to recruit co-workers to assist with the lift. An aide said, ''By the time I go to the store room and pull it out, I'd just rather [say] 'Come on you all. Let's just do [the task].''' Contrasting remarks were heard by other staff, including a nurse who noted ''it's very time consuming to recruit people. . .to coordinate that. I'm just sort of flabbergasted at my own colleagues on nights that don't utilize that [lift], and it's right there.''

Task completion in a fast-paced environment

Staff sometimes spoke of time in the context of work in the fast-paced patient care environment. ''I need to do this and this. They are pushing me to clock out on time.'' A nurse highlighted work demands not only of herself but of her co-workers: ''We are under a time crunch so many times. You're lucky to get somebody to come into the room to help you. You don't want to take up more of their time [with use of the patient-handling equipment].'' Another example came from the radiology department, where resistance to lift equipment use was explicitly described as stemming from a need to be ''productive.'' One radiology technologist stated ''It depends on how fast you want your patient done and out. . . By the time you wait for somebody to go get [the lift equipment], the patient could already be in the chair if three to four people are there to help lift.''

Several examples were given of the difficulty of integrating lift equipment into nurse aides' job tasks. One nurse said, ''To load a patient into the [powered-portable total-assist lift] is a good 10 min. . .You have a [nurse aide] that's supposed to be doing vital signs, weights, blood sugars, but they're trying to do those three items before eight o'clock.'' An aide highlighted that the competing demands are ones embedded at the level of the organization: ''Our nurse manager and other people above them expect our vitals to get done within an hour. Well, when you get here at seven o'clock [and] we're not supposed to be clocking in before a certain time, then, you know, inevitably it runs after eight a little bit because of isolation gowns and washing your hands and patients talking. . .Nurses call us quite frequently during vitals so the vitals will run way over. . .'' Facing these time pressures, even more low-tech efforts to reduce the physical demand of patient care tasks were not used due to the time required to operate them. One injured aide said, ''I told the nurse 'I cannot stand lifting [the bed]. . . I know I should do it, but it just takes so much time to raise that bed up and lower that bed back down.'''

Knowledge and Ability

Comments were made during focus groups related to knowledge of the MMLE policy as well as knowledge of and ability to use the lift equipment. Many of these comments centered on training. It was clear that knowledge of the policy and training in use of the lift equipment was not sufficient for equipment use.

Coach and nursing staff training

There was much variability in discussions among focus groups participants, including coaches, about the type of training provided to nurses and aides during the orientation process. Nursing unit staff trained as coaches were to provide hands-on training for current and incoming staff on the use of the lift equipment. From coaches, we learned about differences in their own training experiences and the importance of being taught how to teach their staff about the lift equipment, as opposed to just what to teach. One coach was confident in her training experience: ''[The training session] did go into 'here is how to be a coach.' I thought it was a very good class. We just got information on how to teach staff, kind of how to energize with it, how to use the equipment...'' In contrast, another coach said, ''They had everything sort of left out. 'This is how you do it. This is the lift. Lift somebody off the floor with it.' You know it wasn't really much more than that. It wasn't 'These are some of the teaching techniques you may want to use in showing somebody else how to use it.''' In giving suggestions in how coach training could be best implemented in other hospitals, coaches expressed the need to provide training on the role of the coach in that particular hospital setting. They also indicated it would have been helpful to have more scenario-based training. Refresher courses for coaches on how to properly use each piece of equipment were suggested as well, as coaches indicated they did not use all pieces of equipment frequently.

Hands-on training of staff by unit coaches was carried out in a variety of ways. ''When we first started out, when we had to train everybody, it was nice because I had two or three whole days to do nothing but that. But now, I try to with the new people. . .it takes a while.'' One nurse said, ''We try to do teaching in-service with [the equipment], but it's hard to get people; nobody wants to drive in just to do that. . .and then if you try to do it when we do a meeting, most people [who] come to the meetings are the people that are working, so they're already taking 45 minutes just to go to the meeting.'' Some units

incorporated training of staff in their mandatory ''skills days.'' Another staff member noted, ''we don't train [staff] unless we have to use [the equipment].''

One coach described the training process as one that could impact the quality of patient care: ''If I didn't have the heavy load of patient care, I could do [training] really effectively – not so rapid, crash course. Maybe come in an hour early or stay over an hour, at least one hour, so we would not be so concerned about . . .delivering good patient care and not letting patients wait for pain medicine or different things. So, I think that's a safety issue also.''

Auxiliary staff training

Unit nursing staff described their interaction with other patient care staff at the hospital, such as transporters, EMS, float pool staff and doctors, who generally were not trained in the use of the lift and transfer equipment. Sometimes these interactions led to training opportunities. One lift coach who worked nights described training aides from the emergency department: ''They didn't have the equipment. They came up to the [unit] to borrow it, so I did a little seminar of what to do and they brought it back within a couple of hours. They said, 'Oh, thank you so much, it saved our backs.''' Other times, interactions with non-trained staff pointed to clear areas in which adoption of the intervention was not taking place. One nurse said, ''We were told that we are not supposed to send the [friction-reducing plastic liners] with the patient going to radiology, because [radiology staff] were not trained.'' With regard to float pool staff, an aide commented, ''It really doesn't do you any good to have [float pool staff] there because you have to train them. It's useless to train them if they're not going to be there but a day.''

Ability to use the equipment

Training on the lift equipment, while providing knowledge about how to use the equipment, was described as an insufficient means to making staff feel skilled in the safe and effective use of the lift equipment. Staff noted the need to use the equipment regularly and/or have regular refresher training courses. In addition to comments reflecting concerns about using lift equipment safely and effectively, staff members also described not wanting to look incompetent in front of other staff, patients or families.

Staffing Issues

Participants discussed increasing responsibilities with fewer staff, including being required to ''float'' off the regular work unit to cover other patient care areas, including intensive care units (ICUs). They reported that the hospital considers the units to be fully staffed, although the nurses felt there were not enough nurses or aides to do what needed to be done. They described little consideration for acuity of patients when overall staffing decisions were made and a general ''lack of any slack in the system.'' With respect to use of the lift equipment, such conditions can be a barrier to lift use as it relates to task performance under social pressure, training of staff (e.g., float pool workers on units), and work in a fast-paced environment, mentioned earlier. In contrast, some night nurses reported using the lift equipment more when short-staffed, because they could not physically do some patient care tasks otherwise.

Concerns were also expressed related to current staffing practices in which many nurses and other care staff are assigned to a patient over the course of a patient's stay. This may complicate the use of the lift equipment because, as PT/OT staff noted, ''the contract nurse, the staff nurse, whoever has that patient'' changes frequently by day and by shift, making communication of lift equipment needs to nursing staff involved in the patient's care challenging.

Patient Status

Participants described equipment use (or non-use) being driven, in part, by patient condition. Specific issues were raised by staff on the orthopedic units; hip rotation and knee angle concerns often precluded nurses' lift equipment use with some surgical patients. Concerns were raised by ICU nursing staff about the difficulty of using lift equipment with all of the lines, cords and other equipment surrounding the patient.

The lift equipment increased staff ability to perform care tasks with specific patient populations, particularly bariatric patients who could not have been moved without the (bariatric) equipment and rehabilitation patients for whom the equipment offered PT/OTs, in some circumstances, a means to provide therapeutic care. Staff did not always have information on patient weight, however, and not knowing whether the patient exceeded the maximum tolerable weight of particular pieces of lift equipment was described as a barrier to use.

Institutional Environment

Several participants spoke about the need to have ''a mind-set change of the whole health system,'' support from management, ''communication and continuity'' for successful implementation/support of the intervention. Some staff spoke about inconsistencies by hospital

management noting ''rules and regulations are not the same throughout the hospital.'' ''[Nursing administration officials] put money in that budget to purchase equipment'' and are ''saying [they're] behind it. . .but it's sporadic.'' One coach noted that ''as long as management has not been held accountable, [adoption of the lift equipment] is not going to work throughout the hospital. . .we are always expected and held accountable for everything we do, but it just doesn't seem to be the same when you flip over to that management side.''

Participants also spoke about the (perhaps stronger) influence of unit-level managers on use of the lift equipment by staff. Several comments were made regarding the need for ''reinforcement'' of the need to get and use lift equipment. ''We have some [nurse managers] who are very pro-lift and very adamant, and they remind their workers. And we've got others that say 'oh well, we don't have [the lift equipment] on the floor' and 'it's just too much hassle.' That really influences how you do it.'' One nurse described how the unit manager ''is out on the floor with us a lot. . . Whenever we call for lifting assistance, [the nurse manager] comes by and encourages us to use it.'' Oftentimes, however, participants described the nurse manager as supportive of the MMLE policy and lift equipment use but not in a visible or enforcing way. One nurse described how the coach was more influential in this regard: ''On our unit, that's what kind of turns the light bulb on. . .[a coach] actually saying 'Let's get the equipment.'''

In these hospital environments, like most, concurrent initiatives (e.g., skin care program, application for Magnet Status, Joint Commission visits) were common, anticipated and varied in the level of attention they received by both management and staff. ''There is something new all the time to try to keep up with'' one nurse said. Such initiatives influenced the intervention implementation process (e.g., training delays), and the intervention itself was recognized as a change you could just ''ride out and revert back to previous behaviors.'' There was a perception that the lift equipment was introduced as a means for the hospital to ''keep its name on the map.''

Social Dynamics

Many participants described staff on their units who were resistant to using the lift equipment, and they highlighted difficulty in changing the mentality of nursing staff toward this aspect of patient care. Staff also described feeling pressured to not use the equipment. For example, nurses described neglecting to get the lift equipment when they were asked by physicians to quickly perform tasks. One coach described ''feeling bad'' about asking nurses to use equipment on top of taking them away from their workload to help her with a lift; she described assisting in lifts without equipment to quell coworkers' frustration.

Staff members were clear about their role of caring for the patient, even at the expense of their safety; we heard several times that injury is just ''part of the job.''

Additional Factors

Project meetings with hospital ergonomists involved with implementation of the lift equipment highlighted some specific factors influencing lift equipment use. For example, a 2008 recall on the powered-portable full-body assist lift affected five recently-purchased in-house lifts. Also in 2008, the hospital purchased new recliner chairs for patient rooms. The legs of the lift equipment were not able to maneuver under the chair, limiting use of the lift equipment to transfer patients to or from the chair. The chairs' footrests had to be raised in order to accommodate the equipment. On some units at the medical center, a rectangular lip at the base of the storage room door frame has hampered removal of the portable mechanical lifts from the storage room. Resolution of this problem has become timely, sometimes taking years to correct.

DISCUSSION

Health and safety interventions are often implemented to prevent occupational injuries associated with the physical burden of patient handling in the hospital setting. Focusing solely on the end outcome of interest (i.e., injury rates) fails to recognize the implementation and adoption processes – processes which must be understood before any decline in injury rates can be attributed to it. In this report, we provided evidence not only for whether the intervention was being adopted, but how, when and why it was (or was not) adopted.

We do not believe a MMLE has been adopted completely at either of these institutions, although progress has clearly been made. We observed considerable variability in adoption between hospitals, among hospital units within the same hospital and by groups of patient care staff. On some units staff have clearly incorporated lift equipment into regular patient care, and we saw evidence that these staff often perceived equipment use as a means to provide safety for the staff and also for the patient. In other areas, it is clear that the staff have not incorporated equipment into their normal work routines, using equipment only as a ''last resort,'' under very particular circumstances, or not at all. Many staff members on such units would not mind at all if the equipment were removed so they could continue ''business as usual.''

In this study, several factors influenced adoption of the lift equipment. These factors were not independent, and they varied over time. Consistent with other reports

[Trinkoff et al., 2003; Byrns et al., 2004], time was a common concern regarding use of equipment throughout the 3.5 years focus groups were conducted. Time was a complex issue, encompassing training, comfort, feelings of competence, equipment access, room configurations, patient conditions, a lack of support from others to take time to use the equipment, and staffing levels.

A lack of equipment availability or accessibility also hindered progression toward a MMLE; however, even when equipment was available and accessible, we observed considerable variability in the integration of the equipment as a standard of care. A number of nursing advocates and researchers [Evanoff et al., 2003; Collins et al., 2004; Nelson and Fragala, 2004; Lee et al., 2010] promote readily-accessible equipment, and we do not disagree – patient care staff clearly need mechanical alternatives to brute force that must be facilitated by the organization. However, it is clear that provision of equipment is not enough to generate use.

Institutional-level issues were also of importance in the process of adoption. The MMLE policy, developed and implemented in 2004, was a directive from the office of nursing to nursing staff; it did not address radiology staff, patient transporters, or physical or occupational therapists who all have significant patient-handling duties, a substantial proportion of which are carried out on the nursing units. Furthermore, the policy allowed unit managers (not unit staff) to decide which pieces of equipment to purchase based on what was most appropriate for their unit. It also gave nursing staff decision-making authority in assessing patient needs and choosing (or not choosing) to use particular pieces of available equipment. Such openness, while allowing the intervention to be tailored to each unit, has resulted in a weak policy that after 5 years is not consistently practiced or enforced.

Variability was observed in the implementation process and early support initiatives (e.g., coach training, trouble-shooting support visits) between the two hospitals. Notably, within each hospital considerable variability was observed across units. Acute care hospitals are made up of distinct patient care units that deliver different kinds and levels of care, treatments, and diagnostic procedures required to address varied levels of patient acuity. Perceived needs and readiness to change, described as important by others [Evanoff et al., 2003; Morse et al., 2008], can vary markedly between units in the same institution. As such, the units themselves can be thought of as sub-organizations within the broader confines of the institution, and each unit can have its own contexts that may affect the likelihood of unit members adopting the lift equipment.

Consistent with conclusions of a recent review of complex social workplace interventions [Egan et al., 2009], our experiences highlight the importance of knowledge of organizational context and broad culture of the workgroup and workplace when understanding the adoption process. For example, focus groups provided insight into rewards from ''working together,'' consistent with the apt description of nursing as a ''team sport'' [Brown, 2010]; therefore, equipment that may depersonalize (or be perceived as depersonalizing) care and allow or encourage staff to work alone more may face cultural obstacles that are as important as logistical ones. Also, in each of the two hospitals we studied, the overall ''culture of caring'' was demonstrated very differently in physical and occupational therapy units compared to nursing units [Myers et al., in preparation]; as such, the lift equipment was incorporated into patient care practices in PT/OT and some nursing units, such as neurology and rehabilitation where use of equipment was viewed as improving care of patients regardless of its utility in protecting staff from injury. Conversely, equipment was not viewed as a way to improve patient care on the orthopedic nursing units, where nursing concerns regarding safe positioning following surgery (specifically, regarding joint angles) has clearly hampered use.

CONCLUSIONS

Understanding implementation and adoption of interventions designed to prevent patient-handling injuries in the acute-care hospital setting provides more insightful information than traditional quantitative long-term evaluation measures alone. Unfortunately, work focused on implementation of interventions as part of effectiveness evaluation is still largely lacking in the injury literature [Roen et al., 2006; Koppelaar et al., 2009]. Quantitative data related to adoption, while informative and needed, may be limiting in terms of the information that can be collected. The use of qualitative data may enrich the understanding of the implementation and adoption processes.

Several systematic reviews have been published focusing on interventions designed to prevent adverse musculoskeletal events among (or including) health care workers [Hignett, 2003; Bos et al., 2006; Dawson et al., 2007; Martimo et al., 2008]. In some of these reviews [Bos et al., 2006; Dawson et al., 2007; Martimo et al., 2008], the approach to including studies of highest methodological quality places emphasis on randomized controlled trials. We do not seek to criticize these reviews; efforts to provide sound evidence for understanding the effectiveness of an intervention are needed. However, we do believe that observational studies and use of qualitative research methods have much to offer and are an attractive alternative to randomized controlled trials which would be difficult to implement and carry out in the acute care hospital setting.

As supported through our experiences, variability exists between institutions and units within an institution with respect to the type of patients for whom they care, involvement of the unit manager, and the manner and level to which the unit interacts with other patient care staff (e.g., PT/OT, radiology). More logistical matters such as unit and patient room layouts, storage space and processes in place to order equipment and supplies vary as well. In addition, many of these factors may not be constant over time. An understanding of the relative importance of various barriers to intervention adoption would need to consider such differences by hospital and unit, as well as changes over time. Furthermore, future research would be strengthened with measures of process evaluation; without information about the fidelity of an organizational intervention, erroneous conclusions can be reached regarding intervention effectiveness, making the assessment of implementation and adoption as important as evaluation methods being used to assess ultimate, but more distal, outcomes.

In the process of studying implementation and adoption, access to contextual information about the organization in which the intervention is being implemented is crucial. Just as others have pointed out, we agree that the way institutions function can impact the peak and cumulative ergonomic loads on nursing staff, through the organization of work, staffing levels and assignments, training and availability of equipment [Garg and Owen, 1994; Myers et al., 2002].

Our work also draws attention to the potentially powerful influence of constructs that are more difficult to measure and understand, including the socio-cultural aspects of work. Among health care workers, understanding the culture of this workforce (who often put patients' needs above their own and who value working together as a team within clear, but varied, expectations about their roles and responsibilities) may provide insight into why behaviors of these workers, in this case, fail to follow some of the more commonly-accepted models for behavioral change.

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REFERENCES

Alamgir H, Yu S, Fast C, Hennessy S, Kidd C, Yassi A. 2008. Efficiency of overhead ceiling lifts in reducing musculoskeletal injury among carers working in long-term care institutions. Injury 39:570–577.

Bos EH, Krol B, Van der Star A, Groothoff JW. 2006. The effects of occupational interventions on reduction of musculoskeletal symptoms in the nursing profession. Ergonomics 49:706–723.

Brophy M, Achimore L, Moore-Dawson J. 2001. Reducing incidence of low-back injuries reduces costs. Am Ind Hyg Assoc J 62:508–511.

Brown T. 2010. When Nursing is a Team Sport. http://well.blogs.nytimes.com/2010/04/14/when-nursing-is-a-team-sport/. Accessed: April 15, 2010.

Byrns G, Reeder G, Jin G, Pachis K. 2004. Risk factors for work-related low back pain in registered nurses, and potential obstacles in using mechanical lifting devices. J Occup Environ Hyg 1:11–21.

Chhokar R, Engst C, Miller A, Robinson D, Tate RB, Yassi A. 2005. The three-year economic benefits of a ceiling lift intervention aimed to reduce healthcare worker injuries. Appl Ergon 36:223–229.

Collins JW, Wolf L, Bell J, Evanoff B. 2004. An evaluation of a ''best practices'' musculoskeletal injury prevention program in nursing homes. Inj Prev 10:206–211.

Dawson AP, McLennan SN, Schiller SD, Jull GA, Hodges PW, Stewart S. 2007. Interventions to prevent back pain and back injury in nurses: A systematic review. Occup Environ Med 64:642–650.

Egan M, Bambra C, Pettigrew M, Whitehead M. 2009. Reviewing evidence on complex social interventions: Appraising implementation in systematic reviews of the health effects of organizational-level workplace interventions. J Epidemiol Community Health 63: 4–11.

Engkvist IL. 2005. Evaluation of an intervention comprising a No Lifting Policy in Australian hospitals. Appl Ergon 37:141–148.

Engkvist IL. 2007. Back injuries among nurses – A comparison of the accident processes after a 10-year follow-up. Saf Sci 46:291–301.

Engst C, Chhokar R, Miller A, Tate RB, Yassi A. 2005. Effectiveness of overhead lifting devices in reducing the risk of injury to care staff in extended care facilities. Ergonomics 48:187–199.

Evanoff B, Wolf L, Aton E, Canos J, Collins J. 2003. Reduction in injury rates in nursing personnel through introduction of mechanical lifts in the workplace. Am J Ind Med 44:451–457.

Garg A, Owen B. 1994. Prevention of back injuries in healthcare workers. Int J Ind Ergon 14:315–331.

Hignett S. 2003. Intervention strategies to reduce musculoskeletal injuries associated with handling patients: A systematic review. Occup Environ Med 60(9):e6 DOI: 10.1136/oem.60.9.e6.

Koppelaar E, Knibbe JJ, Miedema HS, Burdorf A. 2009. Determinants of implementation of primary preventive interventions on patient handling in healthcare: A systematic review. Occup Environ Med 66:353–360.

Lee SJ, Faucett J, Gillen M, Krause N, Landry L. 2010. Factors associated with safe patient handling behaviors among critical care nurses. Am J Ind Med 53(9):886–897.

Li J, Wolf L, Evanoff B. 2004. Use of mechanical patient lifts decreased musculoskeletal symptoms and injuries among health care workers. Inj Prev 10:212–216.

Martimo K-P, Verbeek J, Karppinen J, Furlan AD, Takala E-P, Kuijer PPFM, Jauhiainen M, Viikari-Juntura E. 2008. Effect of training and lifting equipment for preventing back pain in lifting and handling: A systematic review. Br Med J 336:429–431.

Miles MB, Huberman AM. 1994. Qualitative data analysis. 2nd edition Thousand Oaks, CA: SAGE Publications, Inc.

Miller A, Engst C, Tate RB, Yassi A. 2006. Evaluation of the effectiveness of portable ceiling lifts in a new long-term care facility. Appl Ergon 37:377–385.

Morse T, Fekieta R, Rubenstein H, Warren N, Alexander D, Wawzyniecki P. 2008. Doing the heavy lifting: Health care workers take back their backs. New Solut 18:207–219.

Myers D, Silverstein B, Nelson N. 2002. Predictors of shoulder and back injuries in nursing home workers: A prospective study. Am J Ind Med 41:466–476.

Myers DJ, Schoenfisch AL, Lipscomb HJ. 2010. Cultures of caring among healthcare professions: Implications for worker safety. Seventh International Scientific Conference on Prevention of Work-Related Musculoskeletal Disorders. Angers, France. Available at: http://ead.univ-angers.fr/%7Eleest/IMG/pdf/PREMUS_Book_Open_sessions.pdf

Nelson A, Fragala G. 2004. Equipment for safe patient handling and movement. In: Charney W, Hudson A, editors. Back injury among healthcare workers: Causes, solutions, and impacts. Boca Raton, FL: Lewis Publishers. p. 121–135.

Park R, Bushnell T, Bailer A, Collins J, Stayner L. 2009. Impact of publicly sponsored interventions on musculoskeletal injury claims in nursing homes. Am J Ind Med 52:683–697.

QSR International. 1991–2002. BT QSR N6. Melbourne: QSR International Pty Ltd.

Roen K, Arai L, Roberts H, Popay J. 2006. Extending systematic reviews to include evidence on implementation: Methodological work on a review of community-based initiatives to prevent injuries. Soc Sci Med 63:1060–1071.

Schoenfisch AL, Pompeii LA, Myers DJ, Lipscomb HJ. In press. Objective measures of adoption of patient lift and transfer devices to reduce caregivers' injuries in the hospital setting. Am J Ind Med.

Trinkoff AM, Brady B, Nielsen K. 2003. Workplace prevention and musculoskeletal injuries in nurses. J Nurs Adm 33:153–158.

Wardell H. 2007. Reduction of injuries associated with patient handling. AAOHN J 55:407–412.