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Do Assistive Devices, Training, and Workload Affect Injury Incidence? Prevention Efforts by Nursing Homes and Back Injuries among Nursing Assistants

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Abstract

Aims—This paper is a report of a study of association between workplace injuries experienced by nursing assistants in nursing homes in the United States and four factors that may affect injury rates: initial nursing assistant training, training at the current facility, lifting devices, and time to execute daily duties.

Background—High injury rates among nursing personnel have been reported in multiple settings across countries. The existing literature is divided on the effectiveness of training and assistive devices in reducing injury rates among nursing assistants.

Methods—We examined associations between whether the nursing assistant has experienced an injury and four key factors: quality of initial injury prevention training, injury prevention training at current facility, lift availability, and whether the nursing assistant has sufficient time to complete resident activities of daily living. We estimated a survey-weighted logit model using 2004 National Nursing Assistant Survey data.

Results/Findings—The odds of an injury in the past year were lower among nursing assistants who reported always having a lift available when needed (41% lower odds), available facility training to reduce workplace injuries (39%), and sufficient time to complete resident activities of daily living (35%). Quality of initial training to prevent work injuries was not significantly associated with injury status.

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No conflict of interest has been declared by the authors.

Author Contributions:
LD, SS & YS were responsible for the study conception and design
LD, SS & YS performed the data analysis.
LD was responsible for the drafting of the manuscript.
SS made critical revisions to the paper for important intellectual content.
LD & SS provided statistical expertise.
SS supervised the study

Conclusion—Regions without widespread access to lifting devices may be able to reduce injury rates by increasing the availability of lifting devices. The potential for reductions in injury rates in the United States is greatest from improving training and ensuring adequate time for resident care, as most facilities currently have lifts available.

Keywords

nursing home care; workforce issues; ergonomics; musculoskeletal; health services research

INTRODUCTION

Injuries among nursing assistants (NAs) and other direct care workers are common and costly to both workers and employers in the United States and elsewhere. In addition to the costs associated with lost productivity and lost workdays, medical treatment and medications cost between $9,000 and $30,000 per injury (Garg et al. 2007). The 2008 Survey of Occupational Injuries and Illnesses reported 8.4 nonfatal injuries or illnesses per 100 full-time nursing home workers based on employer logs; approximately 60% of these incidents resulted in lost days from work or a job transfer or restriction (Bureau of Labor Statistics 2009). In the US, only air transportation workers and couriers experience a higher rate of injuries and illnesses than nursing home workers. Injury rates calculated from self-reported data are considerably higher than those based on employer-reported data. Using data from a single nursing home, Myers, Silverstein, and Nelson (2002) found a combined annual injury incidence rate of 45.8 self-reported back and shoulder injuries per 100 full-time equivalent NAs. Injuries among nursing personnel are not limited to workers in nursing homes; the injury rate among hospital workers in the US is nearly as high as among nursing home workers (7.6 nonfatal injuries or illnesses per 100 full-time workers) (Bureau of Labor Statistics 2009).

Evidence indicates that pain and injuries among nursing personnel are problematic in many other countries and regions, including the Philippines (de Castro et al. 2009), France (Estryn-Behar et al. 1990), Turkey (Karahan et al. 2009), and Sweden (Engkvist et al. 2000). In some case, injury rates in other countries may be higher than injury rates in the US. According to the Occupational Health and Safety Agency for Healthcare in British Columbia, female long-term care personnel working in British Columbia, Canada experience 15.8 injuries per 100 person-years; of these, 12.8 are musculoskeletal injuries (Alamgir et al. 2009). A study of nursing home staff in Australia, Japan, South Korea, and Taiwan reported the prevalence of lower back pain to range from 12.0% in Taiwan to 57.8% in Japan; NAs were almost three times as likely to report any musculoskeletal disorder as registered nurses (Smith 2003).

As discussed in the following section, the literature is divided on the effect of training and assistive devices on injury rates. NA workload has not previously been examined as a potential predictor of injuries. This study improves on previous estimates of the effect of lift availability and training to prevent injuries by using a nationally representative NA-level survey. We examine the associations between whether the NA has experienced an injury related to patient handling and four key factors: quality of initial training to prevent workplace injuries, provision of training to prevent workplace injuries at present facility, lift availability, and whether the NA has enough time to complete resident activities of daily living (ADLs).

Background

NAs provide the majority of direct care to residents in nursing homes in the US, including assistance with ADLs (eating, bathing, toileting, transferring, and dressing). Evidence of a

broad relationship between manual handling and back disorders (Kuiper et al. 1999) suggest that patient handling is a leading cause of injuries among nursing home workers in the US. Since lifting nursing home patients is an inevitable aspect of care, it is important to understand whether interventions such as assistive devices and worker training lessen injury frequency and severity. The literature suggests mixed results of the effectiveness of assistive devices and worker training. A biomechanical evaluation of assistive devices suggests that resident weight and method of transfer affect the impact of the transfer on the NA's lower back (Zhuang et al. 1999). Basket-sling, overhead, and stand-up lifts reduced exposure to low-back stress by about two-thirds compared to manual lifting (Zhuang et al. 1999). A zero-lift program in seven nursing homes and one hospital which replaced manual lifting and transferring with assistive devices was associated with decreases in the number of injuries from patient transfers (62%), workers compensation costs (84%), lost workdays (86%), and restricted workdays (64%) (Garg 1999). A study of Swedish hospital nursing personnel in Stockholm county by Engkvist, Hjelm, Hagberg, Menckel, and Ekenvall (2000) suggests that training in the use of assistive devices and regular use of assistive devices is associated with a reduction in the relative risk of sustaining a back injury from patient transfer. In an international systematic review of 32 studies, Hignett (2003) states that evidence supports having patient hoists, stand-aids, sliding sheets, lateral transfer boards, walking belts, and height adjustable beds and baths in all clinical environments where patient handling occurs regularly.

In contrast, other evidence questions the role of assistive devices in reducing low-back stress and pain. A study by Kothiyal and Yuen (2004) suggests that without ergonomic evaluations of a device and the postures used by the workers while transferring the patient, injury rates may be higher with the device than in its absence. An international systematic review of the effectiveness of interventions that seek to prevent back pain and back injury in nurses found conflicting evidence on the effect of assistive devices and training (Dawson et al. 2007). This review examined sixteen studies; Dawson and colleagues reported that only one of these sixteen studies were of high quality. A systematic review by Martimo et al. (2008) assessed eleven studies, seven of which were not US-based; this review suggests that evidence does not support the use of training with or without lifting equipment for preventing back pain.

Existing studies do not provide strong evidence that worker training effects injury incidence. An examination of the international literature by Garg et al. (2007) suggests that education and training do not reduce the frequency or severity of low-back pain when unaccompanied by work modifications. Hignett et al. (2003) review interventions focusing on training and education, concluding that little evidence exists in support of effects on working practices or injury rates. The authors find that four high quality studies and eight moderate quality studies provide strong evidence that training interventions have no impact on working practices or injury rates, while evidence from two moderate quality studies suggests that training interventions have mixed results. In contrast, eight studies offer only moderate or limited evidence that training interventions have positive short-term results.

Conflicting results from existing studies on the effects of assistive devices and training on injury rates may be due to study limitations. Small sample sizes are common; studies are often limited to particular facilities, counties, or states (Garg et al. 1992, Garg 1999, Myers et al. 2002, Engkvist et al. 2000, Hignett et al. 2003) Poor study quality is also a problem. Martimo et al. (2008) assess four of the eleven studies they consider as low quality, and Hignett et al. (2003) label thirty of thirty-five studies as low quality.

We located no studies that assess the effect of having adequate time to complete duties on injury rates, although some studies have considered whether staffing measures are

associated with injuries. NA staffing has been shown to be inversely associated with the likelihood of a nursing home having a high injury rate (Castle et al. 2009). Among nurses, time constraints may lead to decisions to take shortcuts (e.g., failing to adhere to safe needle precautions) (Ferguson et al. 2004). To the extent that higher staffing is indicative of workers having adequate time to complete their duties, these staffing-injury associations suggest that time to complete work may be negatively related to the likelihood of incurring an injury.

The conceptual model for this study was developed by Engkvist, Hagberg, Hjelm, Menckel, and Ekenvall (1998) and was further discussed by Engkvist (2008). In their model of accident processes, injuries among nursing personnel are the result of interactions among factors that can be divided into four groups: organization, workplace, nurse, and patient. Organization factors include items such as the type of task performed, information known by the worker, and staffing levels. In the present analysis, quality of initial NA training for workplace injury prevention, workplace injury prevention training at the current facility, and whether NAs have sufficient time to perform daily resident care tasks are organization factors. Workplace refers to the location and deficiencies in the physical environment (e.g., availability of assistive devices). Nurse-level factors include demographic characteristics such as education. For example, an NA's education level may affect how well she can understand and implement injury prevention training. Finally, the patient may also contribute to the likelihood of an injury, for instance by being overweight or uncooperative.

THE STUDY

Aims

The aim of this study was to analyze the relationships between workplace injuries related to lifting and four characteristics reported by the nursing assistants: (1) quality of initial NA training for workplace injury prevention; (2) whether the NA had workplace injury prevention training at the current facility; (3) whether a lift was always available when needed at the current facility; and (4) whether the NA reported having enough or more than enough time to complete resident ADLs. We hypothesized that excellent initial NA training for workplace injury prevention, workplace injury prevention training at the current facility, lift availability, and having enough time or more than enough time to complete resident ADLs were all negatively associated with workplace injuries related to lifting by NAs.

Design

This analysis was a quasi-experimental study using cross-sectional data with multiple NA observations per facility.

Ethical considerations

Because the data used for this study were publicly available, no formal ethical scrutiny was required or undertaken for this study. The survey was administered by the US National Center for Health Statistics when NAs were not at work to minimize fears of job loss or other reprisals resulting from answers to potentially sensitive work-related questions.

Data

We used data from the 2004 National Nursing Assistant Survey (NNAS) to model injuries as a function of two measures of training, lift availability, time to execute patient care duties, and other facility and personal characteristics. The public-use version of the NNAS used in this analysis did not allow us to explicitly control for resident characteristics (as discussed later, we explored but did not ultimately choose to estimate a facility fixed effects model

which would have controlled for all resident characteristics). The survey data were collected between September 2004 and February 2005.

Initially, 790 nursing homes were selected to participate in the NNAS from the original 2004 National Nursing Home Survey (NNHS) sample of 1500 facilities. Seventy-six percent (582 facilities) provided contact information for NAs. The NNAS excluded NAs not already certified or in training for certification unless they were trained prior to 1987, contract NAs, and those working fewer than 16 hours per week. A total of 3,017 (71%) of 4,542 eligible NAs completed an interview, resulting in a combined facility and person response rate of 53%. The NNAS was the first (and so far only) national survey of NAs in the US (Squillace et al. 2009).

These data were novel, because NA-level data allow for more information and precision than facility observations when analyzing factors that affect injury incidence. Further, the availability of multiple respondents per facility strengthened the ability to identify individual and facility factors associated with injuries.

Sample

Of the 3,017 respondents to the NNAS, 120 left their facilities before the survey was administered and were given a different survey that did not include many of the measures used in this analysis. We excluded nineteen respondents who were under age eighteen. We lost 186 observations to missing data (6.5% of the eligible sample of 2,878), resulting in a final sample size of 2,692. Missing data on the length of time employed as an NA at the current facility accounted for the largest share of the excluded observations (66 observations).

Measures

The questions in the NNAS about injuries asked about times that the respondent was "hurt or injured while working at your job as a nursing assistant". The dependent variable in this analysis (referred to broadly as "injury") was a dichotomous measure based on three characteristics: the site of the injury on NA's body, how the injury occurred, and severity. We categorized an NA as having an injury if they had an affirmative answer to *all* of the following three questions: (1) did the NA have one or more back injuries or other muscle strains or pulled muscles; (2) did the NA have one or more injuries while lifting, repositioning, bathing, or handling residents; and (3) did the NA have an injury that required the NA to have other duties and/or lose at least one day of work?

We combined the three questions in order to focus on injuries that were most likely to be prevented by using a lift or having injury prevention training as well as those that were severe enough to impact job performance. The three questions did not necessarily refer to the same injury. Forty percent of the NAs in the sample reported having two or more injuries, and it is not possible to tell whether, for example, the back or other muscle strain injury was the injury that the NA incurred while lifting or otherwise handling residents. However, by characterizing NAs as having had an injury only if they answered all three of the questions affirmatively, we used a conservative measure of injury incidence. The conservativeness of this measure provided more confidence in the study results than would a measure that required only one or two of these characteristics (e.g., ignoring severity). Combining the injury site and occurrence questions allowed us to abstract from instances where, for example, an NA strained their back by reaching for a heavy item in a supply closet. Requiring a report that an injury affected job performance decreased the uncertainty of self-report of an injury, since change in duties or time off work suggested that the NA may have informed their supervisor about the injury.

Measurement of injuries referred to injuries experienced during employment at the current facility in the year prior to the survey date. For the nearly 40% of respondents employed at the current facility for less than one year at the time of the NNAS, the dependent variable measured whether the NA has suffered an injury during the length of their employment. We accounted for varied exposure time by including measures of the length of time employed at the current facility. The time employed at the facility reflected not only exposure time but also experience. We controlled for the possibility that injury rates may be lower for people who have more experience as an NA by including a categorical measure of the number of years as an NA.

The measure of injury prevention training during the initial NA training was drawn from a question where the respondent was asked to rate her initial NA training to prevent injuries at work. We compared NAs who said their initial injury prevention training was excellent to all other responses (good, fair, or poor). Using a measure of injury prevention training that relied on retrospective perception of the quality of the training assumed that assessments by NAs of their initial training to prevent work injuries were not affected by their subsequent injury experience. In contrast, the measure of injury prevention training at the current workplace was an objective measure of whether this type of training was available.

Nearly all (98.9%) of NAs in the sample reported having been taught to use lifts to move residents who could not move on their own, so we did not separately control for lift training. The measure of lift availability was drawn from a question asking the respondents, "How often is a lifting device *available* when you actually need to use one?" We compared NAs who said a lifting device was always available when needed to all other responses (sometimes, almost never, or never). Although the NNAS had a question pertaining to whether the NA always *uses* a lifting device when necessary, we did not control for this measure. We believed that lift use may have been jointly determined with injury history, which was the dependent variable. NAs that had experienced an injury associated with lifting a patient may have been more likely to use lifts in the future than NAs without a history of injury; if this were the case, then the estimated effect of the use of lifting devices on injury incidence would be biased. In contrast to lift use, lift availability was determined by nursing home management and was less likely to be jointly determined with injury history.

The final explanatory variable of interest was whether the NA reported having enough time to provide ADLs (eating, bathing, toileting, transferring, and dressing) to residents in a typical work week. We compared NAs who reported having enough or more than enough time to those who reported having not enough time.

Personal characteristics in the model included education, age, gender, race, and ethnicity. Although public use versions of the NNHS and NNAS could not be merged due to confidentiality restrictions, the NNAS included a limited number of facility-level variables that we used: ownership status, a categorical measure of bed size, and metropolitan status.

Data analysis

Stata version 10.1 was used to analyze the data (StataCorp 2007). Although the dichotomous nature of the dependent variable suggested that a logit model was preferred to ordinary least squares (OLS) regression, we initially estimated linear models so that we could easily explore fixed effects (FE) and random effects (RE) models. A FE model controlled for unobserved facility variables that may affect injury rates such as the workplace environment, types of available lift equipment, and resident case mix. Although the facility FE jointly explained some variation in the dependent variable ($p=0.06$ for the F test of joint significance), we chose not to use a FE model for two reasons: (1) a Hausman test for linear

models showed that omitting the FE did not bias the other estimates; and (2) approximately 1000 observations from facilities whose NAs did not report any injuries (240 of 577 facilities) could not be included in a FE logit model due to a problem of perfect prediction. The data did not suggest standard errors were correlated across NAs within each facility in linear models based on the Breusch-Pagan test of OLS versus RE (p=0.20). Therefore, we presented odds ratios and marginal effects from a survey-adjusted logit model. The model included a sampling weight which represented each respondent's contribution in the estimation of the current NA population as well as strata, primary sampling unit, and finite population correction factors; all of these factors were calculated by the National Center for Health Statistics.

RESULTS

Injured body part and activity while injured are highly correlated: 65.5% (525/802) of those who reported an injury while lifting, repositioning, bathing, or handing residents also reported a back injury or other strain, while 78.9% (525/665) of those who reported a back injury also reported an injury while lifting residents (see Table 1). Among the 525 NAs who reported a lifting/handing injury and who also reported a back injury or other strain, more than half (55.6%) reported lost workdays or a change in duties because of an injury (see Table 2). In contrast, only 10.9% of NAs who reported one or more injury but did not report both a lifting/handling injury and a back injury or other strain reported lost workdays or a change in duties. These data provide a high degree of confidence that our composite measure of injury reflects injuries that were most likely to be prevented by using a lift or having injury prevention training as well as those that were severe enough to impact job performance.

Table 3 presents summary statistics for both the sample (unweighted) and the population (weighted). The study population was mostly female, white, and non-Hispanic. NAs represented by the sample ranged from 18 to 65 and older (survey data do not permit identification of ages for survey respondents older than 64). Thirty-nine percent of the respondents have been employed as an NA at the current facility for less than a year, so their reference period for recalling an injury is shorter than the 61% who have been employed as an NA at the current facility for a year or more. Eleven percent of NAs in the sample reported one or more injuries while lifting, repositioning, bathing, or handling residents *and* one or more back injuries or other muscle strains *and* one or more days of lost work or other duties at work because of an injury at the current facility in the last year.

The majority of respondents (87%) say that a lifting device is always available when needed, although the notion of availability is not clearly defined. Some NAs may interpret availability strictly, focusing only on the existence of a lift, while others may consider how convenient it is to use the lift. Half of the respondents believe that their initial training to prevent work injuries was excellent. Most (92%) work in facilities that provide training to reduce workplace injuries. A majority of NAs in the sample have a high school diploma (63%) or equivalent, are white (61%), and have been an NA for at least six years (50%).

The regression results (Table 3, columns 4 and 5) show the availability of facility training to reduce workplace injuries is negatively associated with having one or more injuries. The odds of injury for an NA who works in a facility where injury prevention training is available is approximately 39% lower than the odds of injury for an NA working in a facility where such training is unavailable. The quality of training to prevent workplace injuries during initial NA training is not statistically significant, although the sign of the effect also indicates an inverse relationship. The effect of having a lifting device always available when necessary also significant: lift availability is associated with a decrease in the odds of injury

of about 41%. Additionally, NAs who report having enough or more than enough time to provide ADLs to residents are substantially less likely to report an injury (reduction of 35% of the odds of injury). We tried several types of interactions between the key variables, but they provided no additional information.

Having worked at the current facility for four months or less has a large, negative association with being injured (nearly 80% decrease in the odds of an injury) relative to NAs who have been employed at the facility for a year or more. Five to eight months of tenure has a smaller but still negative and significant effect (57% decrease). Ceteris paribus, the longer one's career as an NA, the less likely one is to have been injured in the last year. NAs with less than one year of experience have nearly double the odds (87% increase) of reporting an injury in the past year than those with six or more years of experience. Other personal and facility characteristics do not play an important role in explaining the incidence of injuries.

DISCUSSION

The data and in turn the results are subject to a few important limitations. The measures of training, lift availability and time to complete ADLs are all self-reported by NAs. The NNAS does not have data on the facility's residents, workplace environment, type of lifting devices available at the facility, whether the lifts are conveniently located, frequency and type of lifts performed, or details about lift or injury prevention training. Preliminary estimations using facility FE showed that omitting unobserved facility measures did not bias the estimated regression coefficients in a linear model; the marginal effects from a linear probability model with RE are also very similar to those presented here. Still, adding more detailed questions about lifting equipment, practices, training, and frequency to the next round of the NNAS would be an important step toward improving the evidence base for the effectiveness of training and lifting equipment. Asking questions written with more details may help to minimize subjectivity in responses. For example, instead of asking a single question about whether the NA always uses a lifting device "when necessary", ask a series of questions based on circumstances according to patient mobility and whether the NA is working alone or with a team. One particularly relevant area of research that cannot be addressed with the NNAS is the difference between the causes of one-time injuries versus repetitive motion injuries as well as the effect of specific types of training and assistive devices on these two types of injuries.

The results suggest that always having a lifting device available when needed is associated with a substantial decrease in the probability of suffering an injury while lifting a patient and a back injury or other muscle strain. Simulations using the regression estimates predict that if all NAs had access to a lifting device when necessary, 10.3% of them would still experience at least one injury annually. In contrast, if all NAs did not have access when necessary, 16.0% would be injured (the 5.7 percentage point difference represents a decrease of 34% in the injury rate). This finding is consistent with the literature that suggests that use of assistive devices is protective against injuries (Zhuang et al. 1999, Garg 1999, Engkvist et al. 2000). The positive effect of lift availability combined with the fact that NAs at most facilities (87%) already report having a lifting device available when necessary has important policy implications. The extent of future reductions in injuries experienced by NAs in the United States from policies to increase lift availability may be limited to the estimated 13% of NAs who do not report such availability. Facilities in the US or other countries that have lower levels of lift availability may be able to substantially reduce injuries incidence by increasing access to lifting devices.

Excellent training to prevent work injuries was not shown to be predictive of injury incidence. The lack of significance on the estimated effect of the quality of initial NA training may suggest that injury history influences NAs' perceptions of quality. Whether the facility provides training to reduce workplace injuries is negatively associated with injuries. This measure does not reflect whether the respondent took the training to reduce workplace injuries, and therefore may be indicative of a broader safety climate in the facility. Simulations indicate that injury rates would fall from 15.9% to 10.5% if all NAs were in facilities that offered injury prevention training (4.4 percentage point difference represents a decrease of 34.0% in the injury rate).

Finally, if all NAs reported enough time available to provide ADLs to residents, the injury rate would be 9.2%; in contrast, the injury rate would be 13.3% if all NAs reported not having enough time to provide assistance (4.1 percentage point difference represents a decrease of 30.8% in the injury rate). Although the gains from NAs having enough time to provide ADLs are relatively smaller than the gains from increasing lift availability or offering injury prevention training at the facility, the share of those who report having enough time to provide ADLs is lower (57% of NAs report having enough time to provide ADLs, while 87% reported a lift was always available when needed and 91% reported that their facility provides training to workplace injuries). Therefore, from a policy perspective, greater reductions in absolute rates of injury among NAs in the US may be possible with increased focus by either nursing home administrators or policy makers on the time available to provide help with ADLs.

The protective effect of time as an NA may be due to experience; alternatively, self-selection may play a role if NAs who are prone to injury are less likely to remain in the profession. From a policy perspective, reducing turnover among NAs could result in fewer injuries. A study using NNAS data found that improving lift availability may reduce reported intent to leave by NAs (Stearns and D'Arcy 2008).

CONCLUSION

Injuries among NAs are costly not only to employers and employees but may also negatively impact the quality of care that nursing home residents receive. The effectiveness of training, assistive devices, and sufficient time for patient care duties in reducing the frequency and severity of injuries among NAs is particularly important in light of increasing obesity among both nursing home residents and nursing personnel (Humphreys 2007). A biomechanical evaluation of assistive devices by Zhuang et al. (1999) suggested that resident weight affects the impact of the transfer on the NA's low-back. Injuries from lifting or otherwise handling patients may also affect residents' health outcomes. If NAs who have been injured or whose colleagues have been injured are reluctant to lift or move residents, the prevalence of pressure ulcers may increase.

In this study, we found that lift availability and workplace injury prevention training were associated with substantial decreases in the likelihood of a nursing assistant in a nursing home experiencing a lifting-related injury. Adequate time for resident care also played a key role in injury prevention. Quality of initial training to prevent work injuries was not significantly associated with injury status. The policy implications of these results apply primarily to facility decisions regarding the number and types of lifts available to their employees, whether to offer injury prevention training, and staffing levels and other factors that affect whether NAs have enough time to complete ADLs. Since the majority of NAs (55%) in the sample received their initial training at a nursing facility and most NAs who report having had continuing education in the past two years received this training at a nursing facility (93%), facilities in the US are able to directly influence the quality of injury

prevention and lifting device training. In countries or regions where nursing homes are not directly involved in training NAs, facilities may need to focus on lift availability and ensuring sufficient time for NAs to assist residents with ADLs. More detailed data on the number and types of lifts in facilities as well as the format of and material covered in injury prevention and lifting device training would be useful to conduct analyses whose results could enable facility administrators to take more specific actions. Yet the results of this study indicate that ensuring lift availability, broad investments in training, and ensuring that NAs have adequate time to complete resident care duties can reduce injury incidence, save money and perhaps also improve quality of care.

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SUMMARY STATEMENT

What is already known about this topic

- Injuries among nursing assistants are common and costly to both workers and employers.
- The existing literature is divided on the effectiveness of assistive devices and training in reducing injury rates.

What this paper adds

- Lift availability and workplace injury prevention training are associated with substantial decreases in the odds of a nursing assistant in a nursing home experiencing a lifting-related injury.
- Adequate time for resident care also plays a key role in injury prevention.

Implications for practice and/or policy

- Nursing home administrators should ensure adequate availability of lifting devices in order to reduce lifting-related injuries among nursing assistants.
- Offering injury prevention training and ensuring sufficient time for nursing assistants to complete daily resident care tasks are important factors for injury prevention in nursing homes.

Table 1

Lifting injury: relationship between activity when injury occurred and injured body part

NA had 1+ back injuries or other strains/pulled muscles	NA had 1+ injuries while lifting, repositioning, bathing, or handling residents		
	No	Yes	Total
No	1,755	272	2,027
Yes	140	525	665
Total	1,895	802	2,692

Table 2

Significant lifting injury: relationship between lifting injury and time off work/reassigned duties due to any injury

NA had 1+ days of lost work or other duties at work because of an injury	NA had 1+ injuries while lifting, repositioning, bathing, or handling residents *and* 1+ back injuries or other strains/pulled muscles		
	No	**Yes**	**Total**
No	2,049	233	2,282
Yes	118	**292**	410
Total	2,167	525	2,692

Table 3

Summary statistics and weighted logit results of the effect of training, assistive devices, and workload on injuries among NAs

	Sample mean	Weighted (population) mean	Odds Ratios (S.E.)	Marginal Effects (S.E.)
1+ injuries while lifting, repositioning, bathing, or handling residents ***and*** 1+ back injury or other muscle strain ***and*** 1+ days of lost work or other duties at work because of an injury at the current facility in the last year	0.11	0.12		
Lift availability and training				
Training to prevent workplace injuries during initial NA training was excellent	0.50	0.52	0.813 (0.125)	−0.019 (0.014)
Facility provides training to reduce workplace injuries	0.91	0.92	0.608 (0.155)*	−0.055 (0.032)
Lifting device always available when needed	0.87	0.87	0.591 (0.117)**	−0.057 (0.025)*
Enough time available to provide ADLs to residents in typical work week	0.57	0.57	0.648 (0.105)**	−0.041 (0.016)**
Personal characteristics				
Time at current facility (omitted: 12+ months)				
4 or less months	0.18	0.12	0.203 (0.076)**	−0.095 (0.013)**
5 to 8 months	0.15	0.11	0.430 (0.102)**	−0.061 (0.014)**
9 to 11 months	0.07	0.05	0.608 (0.212)	−0.039 (0.023)
12+ months	0.61	0.72		
Number of years as an NA (omitted: 6 or more years)				
<1 year	0.14	0.11	1.868 (0.549)*	0.070 (0.039)
1 year to <2 years	0.10	0.08	1.842 (0.497)*	0.069 (0.036)
2 to 5 years	0.27	0.26	1.518 (0.296)*	0.042 (0.021)*
6 or more years	0.50	0.55		
Education (omitted: GED or high school diploma)				
Less than high school	0.12	0.13	0.870 (0.240)	−0.012 (0.024)
GED or high school diploma	0.63	0.62		
Some college or more	0.25	0.25	0.948 (0.184)	−0.005 (0.018)
Age (omitted: 31–45 years)				
18–30 years	0.37	0.31	0.907 (0.183)	−0.009 (0.018)
31–45 years	0.36	0.37		
46+ years	0.27	0.32	0.787 (0.163)	−0.022 (0.018)
Male	0.08	0.08	0.729 (0.215)	−0.026 (0.022)
Non-white	0.38	0.47	1.133 (0.198)	0.012 (0.016)
Hispanic or Latino/Latina	0.10	0.09	0.925 (0.284)	−0.007 (0.027)
Facility characteristics				
For-profit	0.58	0.58	0.807 (0.132)	−0.020 (0.016)
100+ beds	0.47	0.67	1.005 (0.167)	0.001 (0.015)
Metropolitan status (omitted: metropolitan)				

	Sample mean	Weighted (population) mean	Odds Ratios (S.E.)	Marginal Effects (S.E.)
Metropolitan	0.54	0.76	0.994 (0.246)	−0.001 (0.023)
Micropolitan	0.24	0.13	0.860 (0.227)	−0.013 (0.023)
Rural	0.23	0.11		
Observations	2692	634,640	2692	2692
Number of facilities			578	578

* significant at 5%;

** significant at 1%