FEATURE ARTICLE
Research

# Injuries and Assaults in a Long-Term Psychiatric Care Facility

## An Epidemiologic Study

by Douglas Myers, ScD, David Kriebel, ScD, Robert Karasek, PhD, Laura Punnett, ScD, and David Wegman, MD

**ABSTRACT**

**The objectives of this study were to document the high rates of acute injuries and physical assaults among nurses and certified nursing assistants working in long-term psychiatric care facilities and to identify risk factors for assaults and injuries to inform prevention strategies. A mixed-design cohort study was conducted. Acute injury and physical assault data were obtained from administrative records. Using staff rosters and schedule records, incidence rates were calculated by job title, gender, shift, and floor. Rates were also reported by severity, body part, type, and nature. Targeted interviews with staff members provided measures of physical lifting and resident combativeness. Injury rates were calculated by degree of lifting and assault rates were calculated by degree of resident combativeness. Overall rates of injuries (55.6 per 100 person-years) and assaults (67.3 per 100 person-years) were substantially higher than expected. Predictably, injuries were associated with resident lifting and assaults were associated with contact with combative residents. A higher risk of assault was found among women and higher risks of injury and assault were observed among full-time employees compared to per diem or pool agency workers. In addition, weekend shifts were found to have a higher rate of injuries and a lower rate of assaults than weekday shifts. In similar long-term care facilities with psychiatric populations, efforts should be made to reduce lifting and avoid circumstances that agitate residents. Work organization factors should be taken into consideration when developing interventions.**

**ABOUT THE AUTHORS**

Dr. Myers is Postdoctoral Research Fellow, University of Illinois at Chicago, Chicago, IL. Dr. Kriebel, Dr. Karasek, and Dr. Punnett are Professors, and Dr. Wegman is Professor and Dean, School of Health and Environment, University of Massachusetts, Lowell, MA.

The incidence of acute injuries and physical assaults among health care workers are both widely recognized problems. The rate of Occupational Safety and Health Administration (OSHA) recordable injuries for nursing and residential care facilities in 2003 was 10.1 per 100 full-time equivalent (FTE) employees—higher than rates found in construction, manufacturing, and mining (U.S. Department of Labor, 2005). In 1999, nonfatal assaults to hospital employees occurred at a rate of 8.3 per 10,000 workers, more than four times the rate for all private sector industries (National Institute of Occupational Safety and Health [NIOSH], 2002). These rates include only those events severe enough to cause lost work time, require treatment beyond first aid, cause loss of consciousness, or result in restricted work duties or transfer to another job (U.S. Department of Labor, 2005). The rates of less severe injuries and assaults are likely

## What Does This Mean for Workplace Application?

At this study site, the risk of worker injury and assault was higher for staff working with the least physically and mentally ill residents and lower for those working with the most ill. A potential lesson from this study is that organizations may address hazards and take measures to avoid assault and injury where danger is anticipated, but are less vigilant in areas where excess risk is not expected. It is suggested that administrators examine their own data to determine high-risk areas and ensure that prevention strategies are applied throughout their facilities to protect all staff members. In addition, the patterns of injuries and assaults found in this study suggest additional facility-wide steps are needed to reduce the frequency and weight of physical lifting tasks and contact with hostile residents.

much higher; and under-reporting of injuries and assaults is common (Barlow & Rizzo, 1997; Bensley et al., 1997; Lipscomb & Love, 1992). In addition, the rate of injuries and assaults among registered nurses, licensed practical nurses, and certified nursing assistants (CNAs) may be higher than that of the health care industry as a whole because the industry-wide rate includes employees working in all occupations, some of which have lower exposures to the more hazardous aspects of health care.

In this study, incident reports, rather than OSHA-recordable events, were used to calculate the rates of work-related acute injury and physical assault among health care workers. Certified nursing assistants, less often studied than registered nurses, were included in this study. These two features provide a more complete assessment of the frequency of these events among health care workers.

The facility investigated in this study was a dual-diagnosis long-term care setting—residents had psychiatric as well as physical conditions. The combination of physical and psychiatric needs of its resident population made this a more challenging work environment than would be found in a standard long-term care nursing home because many of the residents were prone to combative behavior. In addition, the physical needs of the population created a more complex environment than standard psychiatric institutions. The demands on the nurses and CNAs, both in lifting and encountering aggressive behavior, were the principal physical exposures measured and analyzed in this study. At least three structural features known to be associated with high rates of assault (Gerberich et al., 2004) were present in this facility—it was a long-term care facility, members of the resident population were mainly geriatric, and residents had psychiatric or behavioral conditions for which many were prescribed medication. In addition, the facility was chronically short-staffed, a situation known to increase the risk of sharps-related injuries (Clarke, Sloane, & Aiken, 2002), reported by nurses as the cause of back injuries (Yassi et al., 1995), and a known risk factor for violence (NIOSH, 2002).

The objective of the present study was to quantify patterns of acute injury and physical assault by several work-related categories so prevention strategies could be proposed. This study also documents the high rates of injuries and assaults among health care workers employed in a long-term psychiatric care facility.

## METHODS

### *Study Setting*

The study setting was a 122-bed long-term care facility in New England. It was a dual-diagnosis facility, most of the residents were elderly, and all had psychiatric disorders, including Alzheimer's disease and dementia, in addition to physical ailments. Approximately half of the residents were immobile or required physical assistance with daily activities, including eating, dressing, toileting, and moving to and from their beds.

The work was organized into three shifts (7:00 a.m. to 3:30 p.m., 3:00 p.m. to 11:30 p.m., and 11:00 p.m. to 7:30 a.m.) and four floors. The ground floor had 25 beds, and housed male and female residents with the most severe psychiatric disorders. The first floor had 35 beds, and housed male and female residents with the most severe medical and physical conditions, including immobility. The second floor (35 beds for men) and third floor (27 beds for women) housed residents with less severe psychiatric and physical problems than those on the ground and first floors. For analysis of incidence rates by weekday and weekend days, weekend shifts were defined to include all shifts between the evening shift (3:00 p.m. to 11:30 p.m.) on Fridays through the overnight shift (11:00 p.m. to 7:30 a.m.) on Sundays.

### *Study Population*

A cohort of nurses and nurse aides working in a long-term care facility was studied for a total of 16 months. Twelve months of data were collected prospectively and combined with retrospective data for the preceding 4 months. All registered nurses, licensed practical nurses, CNAs, and CNA trainees were included in this study. Charge nurses were included, but nurse administrators were not. Approximately 160 nurses and CNAs were employed by the institution at any given time. Approximately 80 nurses and aides were required to provide coverage on an average day.

The staff consisted of a three-tiered work force of both nurses and CNAs—standard employees, per diem employees, and pool workers. Standard employees were those paid directly by the facility, typically working full-time and receiving benefits. Those working less than full-time received no benefits. Per diem employees were paid directly by the institution and worked on an on-call basis. Per diem employees earned a 15% premium in pay compared to standard employees, but they received no benefits and could not be required to work as could standard employees. Pool workers were nurses and CNAs employed and paid by an external agency that provided coverage on an on-call basis. Because the facility was chronically short staffed, per diem and pool workers were used regularly.

## Definitions

**Person-time**
Total person-time is the time at risk accumulated by all members of a cohort during a study period. In this study, it is the total amount of time worked by all those who were in this cohort of workers for the 16-month period of observation.

**Person-shift**
A person-shift is a single 8-hour shift worked by one individual. A worker "punches in," works 8 hours and "punches out," and has completed one person-shift. It is the time at risk for one shift worked.

**Person-year**
A person-year in this study is 2,000 hours worked. This represents the time that would accrue for full-time employment for a single individual for a year (measured as 50 weeks per year times 40 hours per week). This is a measure of time, not number of individuals, and a single person-year of time could be represented by one person working 2,000 hours or two people working 1,000 hours each, 10 people working 200 hours each, 2,000 people working one hour each, etc.

### *Data Sources*

The shift schedule data were maintained by two staff coordinators and consisted of attendance records for all nurses and aides for all shifts during the study period. In this facility, the schedule was organized by job title, floor, shift, and date for each 2-week period. Employee rosters containing name, date of hire, and job title were gathered from the institution's central office three times during the study period. Rosters did not consistently include the same variables and often did not include employees of short duration (e.g., pool workers, those who terminated employment shortly after being hired). The roster data were supplemented with the shift schedule data, providing evidence of work attendance even for short-term employees.

The institution's medical records administrator recorded all self-reported injuries and assaults and maintained injury and assault data. Information included the employee's name, employment status, and job title as well as the date, location, time, and shift on which the event occurred. In addition, the incident reports provided type and nature of the incident, body part affected, treatment provided (used to measure severity), and a brief description of the event. These descriptions were used to clarify and augment any questionable or missing data. Events were coded using the Bureau of Labor Statistics' standard classification system (Bureau of Labor Statistics, 1992).

For this study, injuries were defined as including all acute, at-work incidents reported by nurses or aides but excluding those events involving abusive behavior by the residents. Assaults were defined as all events in which a staff member reported abusive physical contact with a resident and could include events in which no physical harm was reported. Only the self-report of an event was required for inclusion.

Two rounds of standard, self-administered surveys were distributed to collect resident ages and verify physical exposures at the group level. These data were also used to supplement missing roster data for variables such as gender, job title, and employment status.

Targeted interviews with CNAs were conducted to gather physical exposure data. One CNA from each of the four floors who had substantial experience with the residents on that floor was asked to rate each resident's physical needs and propensity for combativeness. Physical needs were measured as the average number of times per day the resident needed to be lifted. To determine the number of times the resident required lifting, CNAs were prompted to consider all daily activities including feeding, bathing, toileting, dressing, and recreational activities. To measure resident hostility, the CNAs were asked to estimate the average number of times per day the resident became "combative," a term regularly used by staff members at this facility to describe agitated residents. The number of events reported for each resident was summed for all residents on the floor for a total number of events that could be expected on an average day for that floor. This provided floor-level estimates of lifting demands and resident hostility for CNAs working on the first shift.

To determine how these demands varied across shifts, targeted interviews were conducted with two additional CNAs who were familiar with the work routines on all three shifts. By considering the frequency of job tasks typically performed on each shift (e.g., number of meals, bathing), they estimated lifting demands on the evening shift to be between 25% to 50% of those on the day shift. They reported there was very little routine lifting on the night shift, but occasionally a resident would fall out of bed and need to be lifted.

This information led to the creation of multipliers of 37.5% (halfway between the estimated 25% to 50%) and 15% (to represent a small but larger than zero amount of lifting compared to the day shift) for the amount of lifting the CNAs estimated occurred on the second and third shifts, respectively, compared to the first shift. Therefore, on the second shift, the amount of lifting performed was scored as 37.5% of the amount performed on the day shift for each floor, and on the third shift, the amount of lifting performed was scored as 15% of what was reported on the day shift for each floor. These same multipliers were used to adjust the exposure to resident combativeness on the assumptions that the decline in contact with the residents used to adjust the physical demands would be proportional to a decline in risk of facing combative residents.

Table 1

**Population Demographics**

| | All | | Nurses | | Certified Nursing Assistants | |
|---|---|---|---|---|---|---|
| | Mean | N | Mean | N | Mean | N |
| Age in Years* | 36.0 | 92 | 41.0† | 22 | 34.5† | 70 |
| Tenure in Years‡ | 2.6 | 225 | 3.3 | 65 | 2.4 | 160 |
| | % | N | % | N | % | N |
| Gender*,‡ | | | | | | |
| Women | 88.9 | 233 | 93.1 | 95 | 87.1 | 203 |
| Men | 11.1 | 102 | 6.9 | 7 | 12.9 | 30 |
| Employment Status*,‡,§ | | | | | | |
| Standard Employee | 55.9 | 185 | 43.1** | 44 | 61.6** | 141 |
| Per Diem | 19.3 | 64 | 23.5 | 24 | 17.0 | 40 |
| Pool Agency | 24.8 | 82 | 33.3 | 34 | 20.4 | 48 |

*Survey data*

†*Mean age difference between nurses and CNAs, t = 2.32, 90 df, p = .02.*

‡*Roster data*

§*Staff schedule data*

** *Proportion of employment status by job title chi-square test = 10.0, 2 df, p = .007.*

In addition to adjusting physical demands for variation by shift, an adjustment was made for job title. The routine lifting performed in this facility was performed almost entirely by CNAs. Nurses, however, were observed doing some non-routine lifting and restraining of combative residents during research visits to the facility. Starting with the floor and shift scores reported for CNAs, a multiplier of 25% was further applied to the lifting and combative scores for each floor and shift to approximate the demands on nurses. The final scores assigned to nurses, therefore, were 25% of those assigned to CNAs for each floor and shift. A validation of these physical exposure measures was conducted using survey questionnaire data (Sidebar on page 496).

### *Data Analysis*

Data were managed and analyzed using Stata version 7.0 (StataCorp, College Station, TX). Descriptive analyses included the calculation of incidence rates (IR) and incidence rate ratios (IRR). Ninety-five percent confidence intervals and *p*-values were also computed. Two-tailed *t*-tests were used to compare means and chi-square tests were used to test associations between categorical variables. Conditional logistic regression models were used to analyze trends across shifts and employment categories, and to evaluate and control confounding effects.

For cost reasons, a database of injury and employee roster data was created only for days on which at least one injury or assault occurred—approximately 32% of the total days in the 16-month study period. Because not all person-shifts were entered, person-time denominators used to calculate IRs and IRRs were estimated from this data sample. (Person-time, person-shift, and person-year are defined in the Sidebar on page 491.) This estimation was performed using the average number of person-shifts per day in the sample as an estimate of the number of person-shifts for all days in the study period and multiplying this average by the number of dates in the study period for which shift data were not entered.

Table 2

**Injury and Assault Frequency and Severity**

| | Injuries | | | Assaults | | |
|---|---|---|---|---|---|---|
| Severity | IR* | (95% CI) | N | IR* | (95% CI) | N |
| No Treatment | 25.3 | (18.1 to 34.4) | 41 | 42.6 | (33.1 to 53.9) | 69 |
| First Aid Only | 5.6 | (2.5 to 10.5) | 9 | 7.4 | (3.8 to 12.9) | 12 |
| Refer to Clinic | 8.0 | (4.2 to 13.7) | 13 | 3.7 | (1.4 to 8.1) | 6 |
| Emergency Room | 9.3 | (5.2 to 15.3) | 15 | 2.5 | (0.7 to 6.3) | 4 |
| Unknown | 7.4 | (3.8 to 12.9) | 12 | 11.1 | (6.6 to 17.6) | 18 |
| Total | 55.6 | (44.7 to 68.3) | 90 | 67.3 | (55.2 to 81.2) | 109 |

**Incidence rate per 100 full-time equivalent employees per year (200,000 hours worked)*

This product was added to the person-time in the sample to estimate the total person-time in the study period (157.3 person-years).

This approach was evaluated for accuracy by comparing the resulting person-time estimate to an alternative estimate based on regression analysis. In this validation, the number of person-shifts per shift was modeled as a function of shift, floor, weekday, and weekend status, and an interaction term for shift and weekend status. This analysis produced a model that was used to predict the number of person shifts for each date in the study period not entered in the sample. This method produced an estimate of 161.9 total person-years of observation. This slightly larger estimate was used as a denominator to be conservative when estimating the incidence rates.

For subgroups, such as those within job title or gender, this total estimated time was multiplied by the proportion of time the sample was characterized by these attributes. For example, women represented 88.7% of the person-shifts in the sample. Therefore, to determine the amount of person-

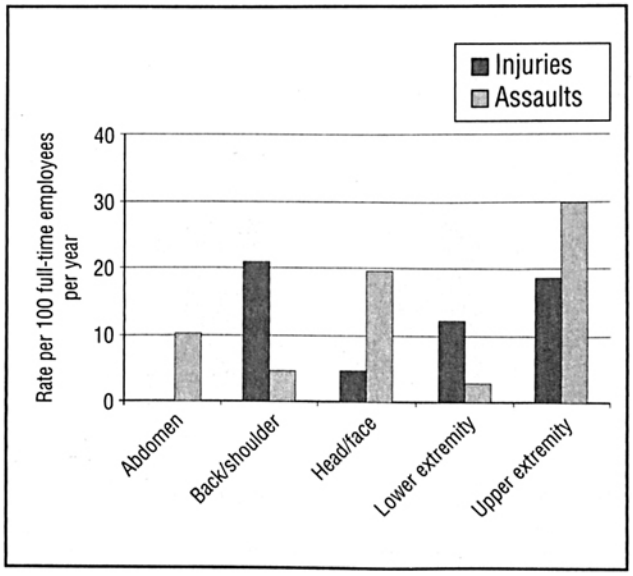


**Figure 1. Body parts affected by injury or assault.**

Table 3

## Injuries and Assaults by Nature and Type

| | IR* | (95% CI) | N |
|---|---|---|---|
| ***Nature of Event*** | | | |
| Injuries | | | |
| Sprain or strain | 30.9 | (22.9 to 40.7) | 50 |
| Contusion | 11.8 | (7.1 to 18.3) | 19 |
| Cut or puncture | 6.8 | (3.4 to 12.1) | 11 |
| Exposure | 2.5 | (0.7 to 6.3) | 4 |
| Burn | 1.2 | (0.1 to 4.5) | 2 |
| Scratch or abrasion | 1.2 | (0.1 to 4.5) | 2 |
| Fracture | 0.6 | (0.0 to 3.4) | 1 |
| Assaults | | | |
| No injury | 24.1 | (17.1 to 32.9) | 39 |
| Scratch or abrasion | 14.2 | (9.0 to 21.3) | 23 |
| Contusion | 6.2 | (3.0 to 11.4) | 10 |
| Exposure | 5.6 | (2.5 to 10.5) | 9 |
| Sprain or strain | 3.1 | (1.0 to 7.2) | 5 |
| Cut or puncture | 2.5 | (0.7 to 6.3) | 4 |
| ***Type of Event*** | | | |
| Injuries | | | |
| Overexertion | 20.4 | (14.0 to 28.6) | 33 |
| Struck by | 14.2 | (9.0 to 21.3) | 23 |
| Fall—same level | 7.4 | (3.8 to 12.9) | 12 |
| Struck against | 6.2 | (3.0 to 11.4) | 10 |
| Bodily reaction | 3.7 | (1.4 to 8.1) | 6 |
| Rubbed/abraded | 3.1 | (1.0 to 7.2) | 5 |
| Caught in | 0.6 | (0.0 to 3.4) | 1 |
| Assaults | | | |
| Hit, kick, or beat | 35.2 | (26.6 to 45.6) | 57 |
| Scratch | 13.6 | (8.5 to 20.6) | 22 |
| Squeeze, twist, or pull | 8.6 | (4.7 to 14.5) | 14 |
| Spit | 3.1 | (1.0 to 7.2) | 5 |
| Bite | 2.5 | (6.7 to 6.3) | 4 |
| Puncture | 0.6 | (0.0 to 3.4) | 1 |

**Incidence rate per 100 full-time equivalent employees per year (200,000 hours worked).*

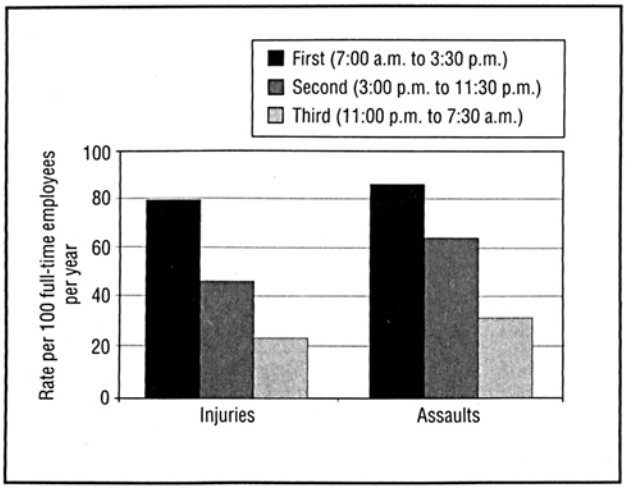


**Figure 2. Rate of injuries and assaults by shift.**

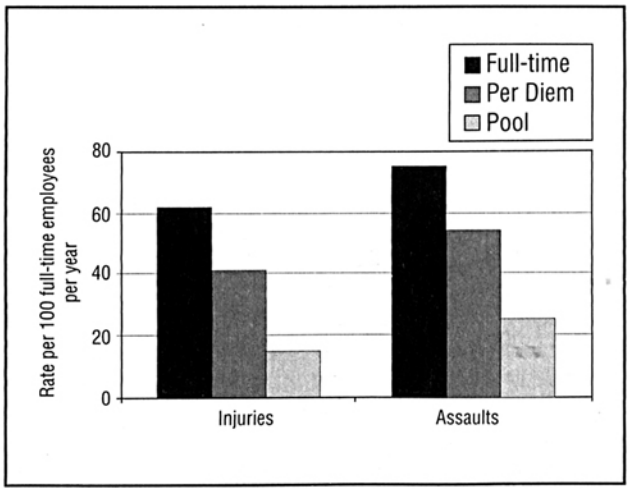


**Figure 3. Rate of injuries and assaults by employment category.**

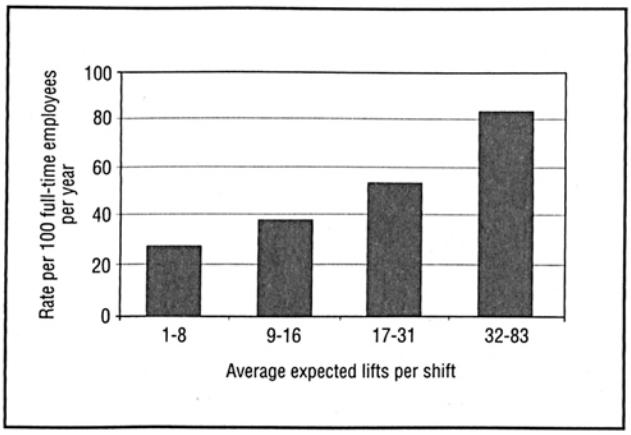


**Figure 4. Rate of injuries by lifting demands.**

time in the whole period worked by women, the total estimated person-time—161.9 person-years—was multiplied by .887 to get 143.6 person-years. This amount of person-time was then used as the denominator in the calculation of the rate of injuries and assaults among women.

## RESULTS

Three hundred thirty-nine individuals worked at least one shift during the study period; 89% of them were women. Sixty-nine percent were nurse aides and 31% were nurses (Table 1). Approximately 25% of all individuals were pool workers employed by external agencies. Of those employed by the study facility (not including pool agency employees), 26% were per diem employees. The median age of the 92 individuals who completed the surveys was 34 years and was older for nurses than for CNAs (44 years compared to 31.5 years). A *t*-test of the difference in mean age showed that nurses were, on average, significantly older ($t = 2.32$, $p = .02$, two-tailed test). Mean tenure was 2.6 years and was higher among nurses than among CNAs. This mean difference by job title was also statistically significant ($t = 2.07$, $p = .04$, two-tailed test). Tenure could not be measured among pool agency workers.

The overall IRs were 55.6 per 100 FTE workers for injuries and 67.3 per 100 FTE workers for assaults (Table 2). Forty-four percent of all reported injuries, and 63% of all reported assaults, required no first aid. The incidence rate for more severe assaults (those requiring more than first aid) was lower, as would be expected. However, for injuries, the incidence rate rose slightly but steadily with level of severity, beginning with injuries requiring first aid, followed by those requiring referral to a clinic, and those requiring emergency care.

Injuries and assaults affected various body parts (Figure 1). For injuries, the most commonly afflicted body parts were the back and shoulders (combined), followed by upper extremities and lower extremities. For assaults, the upper extremities were most commonly afflicted, followed by the head and face and the abdominal region.

The most common cause of injury was overexertion (IR = 20.4 per 100 FTE). The next most frequent were "struck by" incidents (i.e., being struck by inanimate objects, does not include assaults of any kind) (Table 3). Five needlestick injuries occurred: two during disposal, two after disposal, and one when a resident became combative (recorded under "Cut or puncture" in Table 3). Assaults were mainly punches or kicks (IR = 35.2 per 100 FTE). Scratches were the second most common type of assault. Other assault types were twists and pulls, bites, and spit. The incidence rates of assaults and injuries are shown in Table 3.

Strains and sprains were the most frequent nature of injuries (IR = 30.9 per 100 FTE) followed by contusions and lacerations/punctures (Table 3). Most reported assaults had no associated injury. The most common harm reported due to assaults was scratches and abrasions (44% of assaults for which harm was reported) followed by contusions.

Injuries and assaults both showed steadily decreasing patterns across work-shifts, with the day shift having the greatest risk for both injury and assault (Figure 2). Regression demonstrated significant downward trends across shifts ($p \leq .01$) for both injury and assault shift trends. Injury and assault rates also varied by floor. The second floor staff, who care for all male residents with less severe psychiatric or physical needs, had the highest incidence rates of injury and assault (71.9 and 89.3 per 100 FTE, respectively). The third floor staff, who care for all female residents with less severe psychiatric or physi-

cal needs, had the lowest rate of injuries with 41.2 per 100 FTE. The first floor staff, who care for male and female residents with the greatest physical demands, reported the lowest rate of assaults (45 per 100 FTE).

Conditional logistic regression modeling showed no association between age and risk of injury or assault. This finding held after controlling for job title and physical exposures. Similarly, an analysis of job tenure failed to show any association with risk of injury or assault. Although gender did not modify the risk of being injured (IRR = .9, $p = .77$), women were two and a half times more likely than men to report assaults (IRR = 2.6, $p = .02$). This result was consistent across all levels of injury severity.

Aides experienced more injuries (IRR = 1.5, $p = .11$) and assaults (IRR = 1.5, $p = .08$) than did nurses. When analyzed separately, the results were not statistically significant. However, when injuries and assaults were combined, CNAs had a significantly greater risk of injury or assault (IRR = 1.5, $p = .02$) than did nurses.

Differences in the risk of injury and assault for the three employment categories were calculated (Figure 3). Regression analysis revealed these differences were significant for both injuries and assaults ($p = .05$ and $p = .03$, respectively). An increase in the risk of injury on weekends (IRR = 1.5, $p = .07$) was in contrast to a decrease in assaults on weekends (IRR = .6, $p = .10$). However, statistical significance was not reached.

Resident lifting was positively and significantly associated with risk of injury (Figure 4). The incidence rate of injuries increased steadily across the quartiles of lifting exposure ($p < .01$). Similarly, the risk of assault showed a significant upward trend across quartiles of exposure to hostile residents ($p < .01$) (Figure 5).

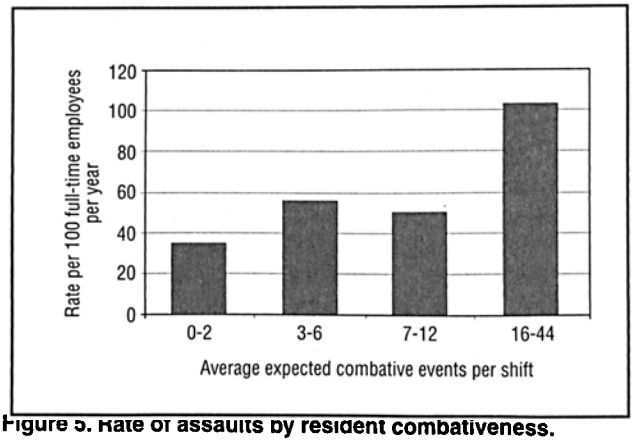

Figure 5. Rate of assaults by resident combativeness.

## DISCUSSION

Injury and assault rates in this long-term nursing facility were quite high. The rate of injuries, including those resulting from assaults severe enough to be OSHA-recordable (i.e., requiring more than first aid), was 23.5 per 100 FTEs—more than double the national rate of injuries and illnesses for nursing and personal care facilities (10.1 per 100 FTEs [U.S. Department of Labor, 2005]). The rate for this facility is underestimated in this study because it included only acute injuries and excludes occupational illnesses, cumulative trauma injuries, and events for which no severity information was reported. The rate of all self-reported injuries, regardless of severity, was more than double the rate of those severe enough to be OSHA-recordable.

Assaults were especially common in this work setting. The rate of nonfatal assaults among hospital workers nationwide in 1999 was an estimated 8.3 per 10,000 workers, more than four times the rate for all private sector industries (NIOSH, 2002). In this facility, the rate of OSHA-recordable assaults was 6.2 per 100 workers, nearly 75 times greater than the estimated national average for all hospital workers. Although the national rate is an estimate, this vast difference suggests a clustering of assaults within particular segments of the health care industry. The injury and assault rates in this facility indicate the need to focus prevention efforts on certain industry segments and types of facilities to reduce the risk of these outcomes to health care workers.

For every assault resulting in an OSHA-reportable injury, approximately 10 additional assaults were reported. It is possible that a lack of attention to the less physically severe events, including those requiring no treatment, may result in a serious distortion of the effect assaults have on the staff. It may be that many assaults result in trauma not readily amenable to first aid. A worker may be bruised by a blow to the face, request no first aid, and still be markedly traumatized by the event. Anecdotes from staff members demonstrate this possibility. For example, a worker reported that no first aid treatment was sought for a slap in the face hard enough to send the worker's eyeglasses "flying across the room." A greater shortcoming, however, might be ignoring the emotional, psychological, and social effects of assaults, including anger, anxiety, stress, depression, and job changes (Findorff-Dennis, McGovern, Bull, & Hung, 1999; Needham, Abderhalden, Halfens, Fischer, & Dassen, 2005; Ryan & Poster, 1989) which may result from assaults requiring no first aid treatment. In addition, only physical assaults were analyzed in this study. The occurrence of verbal assaults and their potentially substantial impacts (Gerberich et al., 2004) were not recorded.

Likely explanations for the high rates of injury and assault in this facility include the combination of heavy manual lifting demands and the multiple disorders, physical and psychological, among the resident population. Several aspects of the data combine to support the conclusion that resident lifting is a central factor in the high rate of injuries in this facility. Lifting demands were directly associated with increased risk of injury. In addition, the pattern of injury associated with resident handling could be seen indirectly throughout the data. The body parts most often afflicted (backs and shoulders), the type of injury (sprains and strains), and the nature of most injuries (overexertion) all suggest that lifting is the exposure of concern.

The trend in injuries across shifts corresponded to the decreasing level of routine resident care, and the CNAs, who perform most of the manual lifting, had higher injury rates than nurses. The researchers acknowledge the association between lifting and injury risk may be confound-

## Validation of the Physical Exposures

To validate the estimates of physical exposures measured by targeted interviews with CNAs on each floor, a subsample of the survey data was selected. In the survey, physical demands were measured using the Physical Effort subscale of the Job Content Questionnaire (Karasek, 1985) and one survey item asking respondents how many times per day they lifted combative residents. Twenty-eight nurses and aides completed these survey items and also reported they usually worked on the same floor and shift. The responses of this subsample were used because it was necessary for respondents to identify a specific floor and shift on which they usually worked to link floor-level exposure scores to respondents' survey answers. Correlations between the survey items and the floor-level measures were calculated to test the validity of the floor-level measures.

Scores for the Physical Effort subscale obtained from the surveys and the number of lifts per shift obtained by targeted interviews with CNAs were moderately correlated ($R = .50$ with one outlier removed). The survey item in which respondents identified how many times per day they lifted combative residents was not correlated with the average number of expected combative events per day as measured at the group level ($R = .02$). It is possible that many other interactions with hostile residents occured in addition to resident lifting, and this single survey item may be insufficient for validating the exposure to combative residents measured by targeted interviews with the CNAs.

ed by work organization factors that are also patterned by floor and shift and may be correlated with lifting demands. However, the associations found throughout the data suggest that organizational factors were not likely to explain these associations entirely. The identified patterns support the view that manual client handling is largely responsible for the high rates of acute injuries (Evanoff, Wolf, Aton, Canos, & Collins, 2003; Garg & Moore, 1992; Owen 1999, 2000; Retsas & Pinikahana, 2000; Smedley, Egger, Cooper, & Coggon, 1995; Smedley et al., 2003; Stobbe, Plummer, Jensen, & Attfield, 1988), particularly low back injuries (Lagerstrom, Hansson, & Hagberg, 1998).

The patterns of assaults demonstrated the danger of contact with residents in a psychiatric facility. The level of resident combativeness was directly associated with risk of assault. Additional evidence that supported this conclusion included the finding that CNAs, who had greater routine contact with residents, were assaulted more often than nurses, and that the risk of assaults declined with a corresponding decrease in routine resident contact across shifts. These findings are consistent with the literature on assaults among health care workers (Arnetz & Arnetz, 2001; Arnetz, Arnetz, & Soderman, 1998; Carmel & Hunter, 1989; Gerberich et al., 2004), especially when considering the psychiatric needs of the resident population at this facility (Cooper & Mendonca, 1991; Lee, Gerberich, Waller, Anderson, & McGovern, 1999).

The higher risk of assault to female workers was not consistent with findings in other studies (Carmel & Hunter 1989; Gerberich et al., 2004). In a study of nurses working in a variety of health care facilities, men had a higher risk of assaults than women (Gerberich et al., 2004). At least one study suggests the significance of facility-specific characteristics should be considered when contradictory results are found in studies of assaults among health care workers (Jones, 1985). It may be that the unusual resident population in this facility contributed to the association between gender and risk of assault.

Caring for residents in the long-term setting includes dressing, bathing, and toileting. It may be that having women provide care in such personal ways creates a level of discomfort that leads to greater hostility among male psychiatric residents. The authors speculated that this may also explain why the second floor of this facility had the highest rate of assaults overall. However, it also could be male residents are more violent than female residents. Future studies of assaults in psychiatric facilities should explore the possibility that male residents are exceptionally combative toward female caregivers.

The lack of association between age or tenure and the risk of injury and assault may suggest the complexity of the relationships between these factors and outcomes. Because factors such as age and tenure have sociological meaning in addition to physical dimensions, it is possible that factors specific to the organization might modify the risk associated with them. It is possible that, in some facilities, coworkers and supervisors treat older and more senior workers differently than they treat younger or newer workers. This could affect workload and subsequent risk of injury or assault. In future studies of multiple worksites, the structural features of organizations that may determine associations among age, tenure, and the risk of injury and assault should be investigated.

The observed associations between employment category and risk of injury and assault were not expected. Previous studies showing higher rates of injuries among inexperienced workers (Barlow & Rizzo, 1997; Myers, Silverstein, & Nelson, 2002; Yassi et al., 1995) led to the hypothesis that pool agency workers, who are less familiar with the setting than other workers, would have the highest rate of injuries. However, it may be that pool workers, while not experienced at this particular facility, are seasoned nurses and aides and their experience does help keep them safe. This logic may extend to per diem workers who, unexpectedly, had a lower risk of injury and assault than full-time workers. Alternatively, it may be that in this workplace, standard employees perform more of the work, or more often perform the most dangerous tasks, thereby keeping those less familiar with the facility out of harm's way.

The finding that weekends had higher rates of injuries was unexpected, and lack of supervision may be a factor. The finding that assaults declined on weekends, however, was not unexpected, and may be explained by staff members' claims that weekends were "quieter" than weekdays. Nurses interviewed at the facility reported fewer administrators and no physicians were present on weekends and saw this as producing a more relaxed social environment for both staff and residents. This observation may lead to testable hypotheses about social environment and risk. Because assaults are by definition the product of an intentional human act, it is logical that there are social components to at least some assaults.

Individuals with psychological problems may be unsettled by the clamor of additional activities and stressed by the presence of authorities who have some degree of control over their lives. These factors may create an environment more likely to result in residents becoming irritated and striking out at their caregivers. The comparatively relaxed environment of the weekends may reduce the readiness of the residents to react violently.

In addition, residents' family members may be present on weekends, thus altering the mental states of residents and reducing the time staff members spend tending to the residents. Nurses and administrators reported residents became agitated when the frequency of resident smoke breaks (residents must be transported outside to smoke) was reduced. This supports the idea that creating a less stressful environment may also keep staff members from being assaulted.

The patterns of injury risk in this study indicate that steps must be taken to reduce the number and weight of lifts in health care facilities. The association between resident contact and risk of assault suggests that new ways of interacting with residents should be explored. The patterns of injury and assault by floor may provide clues about how to reduce risks.

In this facility, the first floor housed residents with the greatest physical demands, yet this floor had the lowest rate of injuries. Similarly, the ground floor residents had the most severe psychiatric conditions, yet this floor had assault rates only slightly above the floor with the lowest rates. This suggests that members of the organization likely are aware of high-risk areas and are taking steps to address these hazards.

It appears that risk was higher in areas where it was not expected. Both injuries and assault rates were highest on the second floor where the residents were all men without excessive physical or psychiatric needs. Assault risk was elevated on the third floor where the residents were all females but who, again, had exceptional needs. It is possible that these populations were not perceived as particularly dangerous compared to the special needs populations on the ground and first floors. Similarly, injury risk was elevated on the ground floor where the focus was likely on the risk of assault.

This pattern suggests that measures must be implemented, possibly those already in place on the floors where danger is anticipated, to reduce the rates of injuries and assaults on these floors. These measures may include ensuring appropriate staffing levels, assigning experienced staff members to the more dangerous areas, providing and requiring use of lifting devices, and, only when absolutely necessary to protect staff members, using restraints and medications to manage the most hostile residents. In addition to making efforts where an increased risk is anticipated, appropriate preventive steps must be taken throughout the facility.

The study site had a mandatory safety training program for its new employees, and staff who were injured more than once in a short time period repeated the safety training. Results from this study might be added to the training materials, including the finding that the upper extremities were the most frequent targets of assault, because employees may not expect this. The number of assaults involving scratches suggests that this problem might be addressed through teaching restraint techniques that consider the danger of fingernails, care of the residents' nails, and, perhaps, resident use of gloves or mittens during some procedures. It is recommended that care should be taken not to leave objects that could be used in an assault in resident areas, however no incident involving a weapon of any sort was reported in this study.

Consideration should be given to teaching and using new techniques, perhaps using teams to handle frequently combative residents. In addition, staff should be made aware that the use of mechanical lifting devices not only reduces the physical loads on staff members, but also may make residents feel more comfortable during lifting (Owen, 2000) and possibly reduce the risk of assault. This knowledge may encourage the staff to use such devices.

The high rates of injuries and assaults for the entire facility suggest additional measures are needed beyond applying their best practices throughout the facility and improving training. The facility was short-staffed and administrators identified turnover as a problem. These factors may have contributed to the injury and assault rates, however, because only one site was studied, no comparisons could be made. It is possible that being short-staffed resulted in an overworked and tired staff. It may be that this facility did not have the staff needed to manage resident hostility safely and manually transport residents as needed. High turnover may result in a workforce of inexperienced workers who may be a danger to themselves and those working with them. Therefore, efforts to hire and retain more staff may reduce overall rates of injury and assault.

## CONCLUSION

This psychiatric facility had exceptionally high rates of injuries and assaults compared to national rates. Long-term care facilities with psychiatric populations should be specifically targeted for prevention efforts to protect caregivers. Efforts should be made to reduce resident lifting. Resident contact was a strong predictor of both injury and assault in this study. Because it is difficult to reduce contact with residents, new means of calming residents and new approaches to interacting with them should be explored. Because results suggest the commotion of

weekdays may encourage combative behavior, consideration should be given to policies and procedures that support residents so they remain calm, and steps should be taken to alert and prepare staff members during conditions that upset residents. In addition, administrators should be aware that risk might exist in places where it is not expected and that best practices should be applied throughout the facility.

Further research is recommended to explore matching the gender of the caregiver and resident to reduce discomfort of the residents and the propensity for hostility during routine care procedures. In addition, the many unexpected findings and inconsistencies with other studies suggest this facility may be unusual in many ways. Additional multilocation studies are recommended to understand the organizational contexts that may explain the discrepancies between the results from this and other studies.

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## REFERENCES

Arnetz, J.E., & Arnetz, B.B. (2001). Violence towards health care staff and possible effects on the quality of patient care. *Social Science & Medicine, 52*(3), 417-427.

Arnetz, J.E., Arnetz, B.B., & Soderman, E. (1998). Violence toward health care workers: Prevalence and incidence at a large, regional hospital in Sweden. *AAOHN Journal, 46*(3), 107-114.

Barlow, C.B., & Rizzo, A.G. (1997). Violence against surgical residents. *Western Journal of Medicine, 167*(2), 74-78.

Bensley, L., Nelson, N.,Kaufman, J., Silverstein, B., Kalat, J., & Shields, J.W. (1997). Injuries due to assaults on psychiatric hospital employees in Washington State. *American Journal of Industrial Medicine, 31*(1), 92-99.

Bureau of Labor Statistics. (1992). *Occupational injury and illness classification manual.* Washington, DC: Author.

Carmel, H., & Hunter, M. (1989). Staff injuries from inpatient violence. *Hospital & Community Psychiatry, 40*(1), 41-46.

Clarke, S., Sloane, D.M., & Aiken, L.H. (2002). Effects of hospital staffing and organizational climate on needlestick injuries to nurses. *American Journal of Public Health, 92*(7), 1115-1119.

Cooper, A.J., & Mendonca, J.D. (1991). A prospective study of patient assaults on nurses in a provincial psychiatric hospital in Canada. *Acta Psychiatrica Scandinavica, 84*(2), 163-166.

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. *American Journal of Industrial Medicine, 44*(5), 451-457.

Findorff-Dennis, M.J., McGovern, P.M., Bull, M., & Hung, J. (1999). Work related assaults: The impact on victims. *AAOHN Journal, 47*(10), 456-465.

Garg, A., & Moore, J.S. (1992). Epidemiology of low-back pain in industry. *Occupational Medicine, 7*(4), 593-608.

Gerberich, S.G., Church, T.R., McGovern, P.M., Hansen, H.E., Nachreiner, N.M., Geisser, M.S., Ryan, A.D., Mongin, S.J., & Watt, G.D. (2004). An epidemiological study of the magnitude and consequences of work related violence: The Minnesota Nurses' Study. *Occupational and Environmental Medicine, 61*(6), 495-503.

Jones, M.K. (1985). Patient violence: Report of 200 incidents. *Journal of Psychosocial Nursing and Mental Health Services, 23*(6), 12-17.

Karasek, R., Pieper, C., & Schwartz, J. (1985). *Job content questionnaire and user's guide* (Revision 1.1). Lowell, MA: Department of Work Environment, University of Massachusetts-Lowell.

Lagerstrom, M., Hansson, T., & Hagberg, M. (1998). Work-related low-back problems in nursing. *Scandinavian Journal of Work, Environment & Health, 24*(6), 449-464.

Lee, S.S., Gerberich, S.G., Waller, L.A., Anderson, A., & McGovern, P. (1999). Work-related assault injuries among nurses. *Epidemiology, 10*(6), 685-691.

Lipscomb, J.A., & Love, C.C. (1992). Violence toward health care workers: An emerging occupational hazard. *AAOHN Journal, 40*(5), 219-228.

Myers, D., Silverstein, B., & Nelson, N.A. (2002). Predictors of shoulder and back injuries in nursing home workers: A prospective study. *American Journal of Industrial Medicine, 41*(6), 466-476.

National Institute of Occupational Safety and Health. (2002). *Violence: Occupational hazards in hospitals* (Publication No. 2002-101). Retrieved September 7, 2005, from www.cdc.gov/niosh/2002-101.html#top

Needham, I., Abderhalden, C., Halfens, R.J., Fischer, J.E., & Dassen, T. (2005). Non-somatic effects of patient aggression on nurses: A systematic review. *Journal of Advanced Nursing, 49*(3), 283-296.

Owen, B.D. (1999). Preventing back injuries. *American Journal of Nursing, 99*(5), 76.

Owen, B.D. (2000). Preventing injuries using an ergonomic approach. *AORN Journal, 72*(6), 1031-1036.

Retsas, A., & Pinikahana, J. (2000). Manual handling activities and injuries among nurses: An Australian hospital study. *Journal of Advanced Nursing, 31*(4), 875-883.

Ryan, J.A., & Poster, E.C. (1989). The assaulted nurse: Short-term and long-term responses. *Archives of Psychiatric Nursing, 3*(6), 323-331.

Smedley, J., Egger, P., Cooper, C., & Coggon, D. (1995). Manual handling activities and risk of low back pain in nurses. *Occupational and Environmental Medicine, 52*(3), 160-163.

Smedley, J., Inskip, H., Trevelyan, F., Buckle, P., Cooper, C., & Coggon, D. (2003). Risk factors for incident neck and shoulder pain in hospital nurses. *Occupational and Environmental Medicine, 60*(11), 864-869.

Stobbe, T.J., Plummer, R.W., Jensen, R.C., & Attfield, M.D. (1988). Incidence of low back injuries among nursing personnel as a function of patient lifting frequency. *Journal of Safety Research, 19*, 21-28.

U.S. Department of Labor. (2005). *Survey of occupational injuries and illnesses, 2003.* Washington, DC: Author.

Yassi, A., Khokhar, J., Tate, R., Cooper, J., Snow, C., & Vallentyne, S. (1995). The epidemiology of back injuries in nurses at a large Canadian tertiary care hospital: Implications for prevention. *Occupational Medicine, 45*(4), 215-220.