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**Personal Assistance Service:
Musculoskeletal Disorders and Injuries in Consumer-Directed Home Care**

ABSTRACT

Background: Like other types of home care for disabled or elderly adults, consumer-directed Personal Assistance Services may present multi-factorial risks for work-related musculoskeletal disorders and injuries (WRMSDs).

Methods: Using telephone survey data (n=855, including 474 family members), we compared providers who experienced WRMSDs in the previous year to those who did not to identify functional, temporal, physical and social risk factors for transient and chronic conditions.

Results: Longer work experience with the recipient and more frequent bending increased the risk of being in the most chronic group (≥ 12 painful episodes), whereas predictable work hours with rest breaks and greater social support from the recipient appeared protective. For transient conditions (1-2 episodes), both longer work experience with the recipient and predictable hours with rest breaks appeared protective.

Conclusions: Improvements in training might facilitate recognition and amelioration of occupational risk factors in the home as well as positive recipient-provider relationships.

Key Words: Personal assistance services, home care, occupational injury, musculoskeletal, social support.

INTRODUCTION

Personal assistance services (PAS) address the personal care and housekeeping needs of elderly and disabled adults to enable them to remain independent in their homes. A unique working relationship between the person hired to provide PAS care and the recipient of that long term care may develop in the intimacy of the home, in contrast to the institutional environment of the nursing home or hospital (Lindahl et al., 2011). Homes, however, are typically unregulated work environments. Our limited knowledge about the home as a workplace, and the risk of occupational injury to home care providers, poses problems for policy related to protecting provider health, and also the quality of care for the recipient. To address this knowledge gap, we investigated the work environment of the home for occupational risks associated with musculoskeletal disorders and injuries among PAS providers, and related impairment in work role functioning.

Consumer-directed PAS care. Nationally, more than 5.4 million community dwelling adults have limitations in at least one activity of daily living (ADLS, e.g., bathing, dressing, eating), and about three times this number have limitations in instrumental activities of daily living (IADLs, e.g., housecleaning, shopping) (National Center for Health Statistics [NCHS], 1994). About 13% of these individuals receive all or most of their ADL/IADL-related personal assistance from paid help (Kaye et al., 2010). In California, the location of our study, family members account for over half of paid providers for PAS recipients over 18; whereas for recipients aged 3-17, about 85% are family members, usually the parent. The number of paid workers approached one million individuals in 2005 and is projected to be 1.2 million by 2018 (Bureau of Labor Statistics [BLS], 2008; Kaye et al., 2010). Continuing increases in assistive services are expected as a result of the aging of the population, the growing shift of acute care to home settings, and increased Medicaid spending on home care (Howard & Adams, 2010; Kaye et al., 2006).

Historically, Medicaid and home and community-based programs have relied predomi-

nantly on agency-employed workers for paid PAS care. This contrasts with consumer-directed care, where PAS workers are typically ‘independent providers,’ or effectively self-employed. Consumer-direction, which has gained in prominence over the past decade, may give recipients a role in deciding who is hired as their care provider, the option of hiring family members, more control over the services received, and responsibility for supervising and training the worker (Benjamin et al., 2000). As of 2009, 38 states offered consumer-direction within at least one Medicaid home and community-based service waiver program or through their Medicaid state plan benefits (Ng et al., 2011).

Occupational risks. Regardless of the service delivery model, work-related musculoskeletal disorders and injuries such as strain and sprain (WRMSDs) are prevalent problems for those who provide ADL/IADL services (BLS, 1997; Galinsky et al., 2001). Incidence rates for WRMSDs requiring days away from work put nursing aides, orderlies and attendants among the highest risk occupations nationally, with overexertion being their leading exposure and the back the most common body part affected (BLS, 2009). Moreover, the rate of overexertion injuries in home care is 61% higher than in other health care settings (Galinsky et al., 2001). With upwards of 44% of low back pain patients in the general working population reporting a recurrence within one year (Woolf & Pfleger, 2003), multiple episodes or chronicity among home care providers also needs to be considered. Although several studies have documented rates among home health nurses and aides, only a few have focused on paid PAS workers in the home (Kim et al., 2010; Meyer & Muntaner, 1999; Ono et al., 1995).

Previous research has shown that physical, psychosocial, and organizational factors all play a role in the etiology and course of WRMSDs (Bernard, 1997; National Research Council, 2001). Hazards in the home that may impact on WRMSDs include poor task ergonomics; lack of space or equipment to get the job done; and barriers to care, such as unruly pets, alcohol or ille-

gal substance use, and physical or verbal abuse by care recipients or their family members (Baron & Habes, 2004; Geiger-Brown, Muntaner et al., 2007; Kim et al., 2010; Markkanen et al., 2007; Sherman et al., 2008). Furthermore, hazards in the home are often uncontrolled and less predictable than in regulated care environments such as nursing homes. Consumer-directed care, without formal training or professional consultation, may result in poor awareness of hazards in the home for both consumer and provider. It may also be difficult for the provider whose employment depends directly upon the consumer, and who may be a family member, to ask for improvements in work conditions.

To organize our investigation of potential hazards in the work environment of home care, we utilized a theoretical model that integrates physical, organizational, and psychosocial risk factors (Faucett, 2005). The Integrated Model posits that the design of work impacts worker outcomes (e.g. psychological strain, occupational illness/injury, disability) in addition to employer productivity goals. Broadly conceived for use across different types of work settings, the model focuses on four domains of work: functional; physical; temporal; and relations with the employer, supervisor and coworkers. The impact of these features of work on worker health and safety occurs through job-related exposures, and also indirectly through worker perceptions about their work and job strain. In the case of consumer-directed home care, ‘production goals’ are the maintenance of the care recipient’s health and quality of care; and, as paid employees, the four domains of work remain relevant for the PAS provider. For this study of PAS delivery, we theorized that increased risk for WRMSDs would be associated with increased exposure to biomechanical risk factors; more years of employment and more weekly work hours in home care; and greater task complexity (i.e., combining ADL/IADL work tasks), and job strain. We also proposed that reduced risk would be associated with formal training, predictable work hours with rest breaks, and support from the recipient.

MATERIALS AND METHODS

Study data were obtained from a cross-sectional survey conducted in 2009, using a statewide cohort of PAS recipients and providers in California's In Home Supportive Services (IHSS) program. Eligible recipients were age 65 and over or disabled, and eligible for Supplemental Security Income/State Supplementary Payments or met those eligibility criteria except for income limits (California Department of Social Services [CDSS], 2003). IHSS includes more than 350,000 PAS recipients per month and employs over 330,000 PAS providers. About 90% of IHSS recipients obtain assistance from independent providers who are hired under the consumer-directed model of care.

The research protocol was approved by the California State Committee for the Protection of Human Subjects; University of California, San Francisco Committee for Human Research; and San Francisco State University's Committee for the Protection of Human Subjects. Because this was a telephone survey, each subject received an information letter and the interviewer documented verbal consent over the phone before scheduling the actual interview.

Sample. The sample was limited to paid care providers for PAS recipients aged 18 or older and with limitations in two or more ADLs. The sample frame was compiled from the State's Case Management Information and Payrolling System, which includes recipient and provider contact information, recipient assessments, and demographic information. Assessments were used to screen recipients on their ADL limitations and then stratify them into two age groups: 18-64 and 65 or more. Within each age group, we matched recipients to their providers and sorted them into those having relatives (other than spouses and parents) as paid PAS providers, and those with non-relatives as paid providers. Recipients having agency-employed providers were excluded. An age and provider relationship stratified probability sample (n=5000) was selected from those meeting the ADL criterion. Equal numbers of those aged 18-64 and 65

or more, and relative and non-relative PAS providers within the recipient age groups were selected. Race/ethnicity groups were selected proportional to their presence in each subgroup, rather than with overweighting.

The sample of providers, once contacted, was screened to further confirm eligibility based upon the following additional criteria.

- The provider may be either a relative or non-relative of the service recipient. Recipients having a spouse or parent paid as a primary provider were excluded.
- If there were multiple paid providers working for the same recipient, the provider selected was the one having the most authorized service hours.
- The provider must be able to communicate in English, Spanish, Cantonese, Mandarin or Tagalog.

Procedures. Provider and recipient addresses, telephone numbers, and preferred language of communication were provided in the state's administrative records. All sample subjects were mailed a recruitment letter and information sheet describing the purposes of the survey and offering a participation honorarium of \$20, with a postcard to decline. Since the predominant languages spoken by PAS providers are English, Spanish, Cantonese, Mandarin, and Tagalog, mailing materials and survey instruments were developed in these five languages. Each mailing included a version in English and also, as needed, one in the provider's language preference as indicated by the administrative records. About half of the records were missing language preference; in those cases, the second language selected for the mailing was that of the care recipient. Trained interviewers, bilingual in English and one of the four other languages, were matched to these language preferences. For each active telephone number, an average of 9.5 attempts were made to contact the respondent and complete an interview. Messages were left up to two times on answering machines. Potential respondents who indicated willingness to cooperate in the sur-

vey or who had completed some portion of the survey were called up to 40 times.

Because of missing information in the administrative records, the interviewers screened all providers for language preference and eligibility. From the original sample of 5000, screening revealed that 2091 were ineligible because ADL, age, relationship or language requirements were not met. Further, we were unable to locate 1183, leaving 1726 eligible providers who were contacted. Of those, 871 declined to participate, leaving a final sample of 855 providers (49.5% of all eligible providers who were contacted).

Survey development. Survey items measuring the domains of the Integrated Model were drawn from the instruments described below. Cognitive interviews in English, Spanish, Cantonese, Mandarin, and Tagalog were conducted before implementing survey to ascertain the understanding of the survey items among a sample of respondents (n=10) in each of these language groups.

Work environment measures. Functional characteristics were assessed by asking workers about 14 types of tasks, including ADLs such as assistance with dressing or bathing, and IADLs such as housekeeping. Job Strain as well as Job Demand and Decision Latitude were obtained from subscales of the Job Content Questionnaire (JCQ; Karasek et al., 1998). Temporal work characteristics were assessed with items about hours of work per week with the recipient, in all current home care jobs, and in all jobs; ability to take rest breaks; the predictability of work hours; and the duration of the employment relationship with the recipient. Workers were asked to report about physical/biomechanical aspects of PAS work using items about the space and equipment (including lift equipment) available to do their work; stair climbing; and the number of times per day their work required them to lift or transfer the recipient, bend below their hips, reach above their elbows, squat for a prolonged period of time, or push, pull, lift or carry loads greater than 25 pounds. The social environment of work was described using three items of the JCQ Social Support scale, modified to reflect support provided to the worker by the care recipi-

ent. Scores could range from 0-12. Scores at or above the median were classified as moderate or high social support, respectively.

Outcome measures. The interview documented symptoms of musculoskeletal disorders and injuries experienced by the provider during the previous 12 months, using items drawn from the Nordic Musculoskeletal Questionnaire (Kuorinka et al., 1987). The survey inquired about injuries (i.e., acute problems occurring on a specific day/at a specific time) and also the musculoskeletal aches and pains that ‘build up over time’ and/or ‘come and go periodically’. These musculoskeletal aches and pains take into account cumulative trauma disorders, which can arise gradually over repeated exposure to biomechanical and other risk factors. Providers reported on the location, severity and frequency of their symptoms and attributions of cause. The impact of WRMSDs on the ability to provide home care to the recipient was also assessed using the 15-item Work Role Functioning Questionnaire modified for home care providers (Amick et al., 2004). The Work Role Functioning Questionnaire reports scores from 0-100% functionality, with 100% being fully functional.

Work-relatedness. For analyses of providers’ WRMSDs, we defined as *prominent disorders* those that caused an average pain severity of three or greater on a 0-10 numerical scale (i.e., moderate to severe pain). Subjects who reported more than one prominent disorder were asked to select the one that was ‘most prominent or caused the most difficulty.’ We further delimited subjects’ prominent disorders by using the criteria below to define *work-relatedness*.

- The provider had been employed by the recipient through IHSS for at least 12 months.
- The prominent disorder was experienced within the previous 12 months.
- The provider attributed the prominent disorder to
 - home care work or a specific home care task (e.g., cleaning floors),
 - physical effort related to home care (e.g., repeated kneeling or lifting), or
 - non-specific complaints, such as ‘stress’, ‘strain’ or ‘pressure’.

We excluded from work-related cases any prominent disorder representing injuries or illnesses that the provider acquired outside of work (e.g., from a motor vehicle accident) or due to previous or current work not in the field of home care (e.g., hotel maintenance). We also excluded providers who reported any non-work-related injuries or disorders of any severity in addition to their prominent work-related disorder. Finally, we placed these prominent work-related disorders into three groups. Group 1 included those with transient, i.e., acute or subacute, disorders who experienced their WRMSD or injury only 1-2 times in the last year. Group 2 included those who had experienced their WRMSD more than 2 but less than 12 times in the last year. In contrast, Group 3 included those with the most persistent or chronic problems, those who experienced 12 or more episodes (e.g., monthly) of their WRMSD during the last year. We selected a cut-off of 12 for Group 3 to reflect the portion of the National Institute for Occupational Safety and Health definition that states that a WRMSD is one *with a moderate level of pain occurring monthly* (Bernard et al., 1994).

Data analyses. Work-related cases in Groups 1-3 were compared to providers who reported no symptoms of MSDs or injuries (the reference group) on demographic and work environment variables using bivariate tests (e.g., chi-square, Student's t-test). To test our hypotheses, we also employed multinomial logistic regression to examine the associations of work environment variables with group membership. The dependent variable in this analysis compared asymptomatic reference group members to providers in each of three groups of cases. Analyses were computed using SPSS, version 18.0.3.

RESULTS

Sample. Sample demographics for the PAS providers (N=855) are shown in Table I. Providers were predominately from minority groups (n=626, 73%). The majority ranged from 41-60 years of age (n=476, 56%), with an additional 12% (n=101) over 60. Most (n=502, 59%) had 12 years or fewer of education. Although most responded in English, 31% (n=269) responded to the survey in Spanish, Cantonese, Mandarin or Tagalog.

Insert Table I About Here

Thirty-one per cent (n=262) reported symptoms of injury or MSDs from any cause that had occurred in the last 12 months and that reached a level of 3 or greater on a 0-10 scale for average pain (i.e., prominent disorders). Of these, 233 reported work-related prominent disorders, with 220 of those reporting only work-related prominent disorders and no non-work-related ones. We further analyzed this subsample of 220 to consider the number of painful episodes reported for the previous 12 months. The majority (n=180) was able to estimate the number of episodes. At the more acute or transient end of the spectrum, 66 reported no more than two episodes of their WRMSD within the last 12 months (Group 1). Forty-nine reported 3-11 episodes (Group 2). At the more chronic end of the spectrum, 65 reported 12 or more episodes of their WRMSD (Group 3). A remaining 40 did not report on the number of episodes they experienced in the last 12 months. In Group 1, there were 13 acute injuries, including 10 reported as sprain/strain or ligament/tendon problems. The remainder of reports from Groups 1-3 were for MSD symptoms that emerged gradually with no acute event. For each of groups, including those who did not report on episodes, pain in the neck/shoulder/upper back or lower back regions predominated, followed by lower and upper extremity pain.

Demographics for the total sample, Groups 1-3, and the reference group (n=580) who reported no symptoms are shown in Table I. Chi-square tests showed significant differences for

the reference group: they were less likely to be women as compared to Groups 2 ($\chi^2= 7.65$, $p\leq 0.01$) and 3 ($\chi^2=6.62$, $p\leq 0.01$), described themselves as healthier than Groups 1 ($\chi^2= 18.09$, $p\leq 0.01$) and 2 ($\chi^2=33.62$, $p\leq 0.01$), and reported less education than Group 1 ($\chi^2=9.98$, $p\leq 0.05$). Bivariate and analysis of variance comparisons of those who reported WRMSDs but did not report the number of episodes ($n=40$) showed that they did not differ substantially from Groups 1-3, nor from the reference group, on their demographics. This group is further discussed in the section on post hoc analyses, below.

Most cases in Groups 1-3 had reported their WRMSD to the recipient ($n=121$) but fewer sought out a professional health care provider ($n=70$). Those in Group 3 were somewhat more likely to seek the help of a health professional, but did not differ significantly from those in the Groups 1 or 2. Family members were no more likely to report their WRMSD to the recipient or a health care provider than providers who were not related to the recipient.

Work environment characteristics.

Functional work characteristics. PAS providers in the total sample assisted recipients with home care for a mean of 10.08 tasks per day (s.d.=2.49, $N=855$). The most commonly reported tasks were cleaning/laundry (98%), shopping (96%), and meal preparation (95%). IADLs were more common than ADLs such as dressing (71%) or bathing (67%).

The Job Demand subscale failed to meet acceptable standards of reliability (alpha coefficient=0.42, $n=732$), even in separate analyses for racial/ethnic group, sex or family membership. The Decision Latitude subscale demonstrated modest reliability, but poorer participation (alpha coefficient=0.73, $n=709$). Thus, our hypothesis about Job Strain was not considered for further testing.

Significant differences on functional work characteristics, using Student's t-test, are shown in Table II.

Insert Table II About Here

Physical work characteristics. Just over half (58%) of the total sample reported assisting with transfers or lifting the recipient, for example, from bed to chair. Nearly 42% reported between 1-10 transfers per day, with another 15% reporting up to 20 transfers per day. However, 85% of those who performed transfers daily reported that lift equipment or aids were not available. The number of transfers/lifts was significantly correlated with the number of ADLs and IADLs performed, as were the other four types of physical exertion (bending, reaching, etc.). Men and women did not differ significantly on the physical exertion measures of their work.

Table II shows that the most chronic group (Group 3), but not Groups 1 or 2, differed significantly from the reference group on a number of the types of physical exertion.

Temporal work environment. PAS providers in the total sample provided a mean of 23.67 hours (s.d.=12.50 hours, N=855) of care per week to PAS recipients. Most reported that they were able to take rest breaks on a typical day (74%), with 64% agreeing that they had enough time to do their work. Fifty-nine percent stated their work hours were predictable.

Table III shows the frequencies for temporal work characteristics for Groups 1-3 and the reference group. Chi-square tests showed significant differences for the reference group: they were significantly more likely to have predictable work hours as compared to Groups 1 ($\chi^2=8.77$, $p\leq 0.01$) and 3 ($\chi^2=8.74$, $p\leq 0.01$), more likely to take rest breaks than Groups 2 ($\chi^2=5.69$, $p\leq 0.05$) and 3 ($\chi^2=5.30$, $p\leq 0.05$), more likely to have worked more than two years for the recipient than Group 1 ($\chi^2=6.19$, $p\leq 0.01$), and less likely to have worked more than two years for the recipient than Groups 2 ($\chi^2=9.98$, $p\leq 0.01$) and 3 ($\chi^2=10.61$, $p\leq 0.01$).

Insert Table III About Here

Social work environment. The JCQ Social Support scale was retained for analyses (alpha coefficient=0.81, n=795). The mean score for the JCQ Social Support scale was 8.57

(s.d.=1.84), with a median of 9.0. Scores of 9.0 were considered moderate social support (n=333 of 855, 39%), and scores above the median were considered high social support. Providers who were related to the recipient did not differ significantly from those who were not related in terms of the social support they received from the recipient. The reference group had significantly more social support than Group 3 ($\chi^2=14.51$, $p\leq 0.01$).

Work role functioning. Cases in Groups 1-3 were asked about work role functioning to examine the degree to which their WRMSD might impact their ability to care for the PAS recipient. The great majority reported no lost work days, and many reported little loss of function in terms of providing home care assistance, despite repeated episodes of pain, but the range was broad (mean=85.47% of full function, s.d.=17.68). Groups 1-3 did not differ significantly from each other in their work role functioning.

Multinomial logistic regression analysis. The multivariate test investigated the association of group membership with a number of predictor variables (Table IV). The analysis compared providers reporting no symptoms of injury or MSD in the last year (Reference Group) to each of the three groups of providers who reported WRMSDs (Groups 1-3).

Formal training in home care and the number of transfers/lifts and squatting events were included for hypothesis testing, even though they had not shown significant results in the bivariate tests. Reaching was excluded, as was pushing/pulling/carrying loads over 25 pounds, because of correlations with the other physical measures of transfers, bending and/or squatting. We examined the personal characteristics of sex and education, which showed significant differences in the bivariate tests, and also age and family membership because of sample stratification.

The overall model likelihood ratio test was significant ($\chi^2=98.449$, $p<0.000$). Five variables demonstrated significant associations with the dependent variable in likelihood ratio tests. These included more than two years of employment with the recipient, the number of bending

activities below the hips daily, better work hours (dichotomized as predictable work hours with rest breaks vs. all other combinations), better social support from the recipient, and being female. We explored those variables further by examining the parameter estimates (Table IV).

Table IV shows that having more than two years of experience working for the recipient lowered the risk of membership in the group with the most acute problems (Group 1) by almost 50%. In contrast, having more than two years of experience working for the recipient approximately doubled the risk of greater chronicity (Groups 2 and 3). Predictable work hours with rest breaks appeared to be protective, dropping the likelihood of being in Group 1 by roughly half, and also decreasing the likelihood of being in Group 3. The likelihood of being in Group 3 increased by 7% with each additional bending activity, above and beyond the number of transfers/lifts per day. Higher levels of social support from the recipient, on the other hand, reduced the risk for membership in Group 3 by 38%, Being female increased by over 4 times the likelihood of being in Group 2, but did not reach significance for Group 3.

In post-hoc analyses, we examined the group who reported WRMSDs but who did not report a specific number of episodes in the last year (n=40). Notably, the significant findings reported for the multiple logistic regression analysis for Groups 1-3, discussed above, remained significant after including this cohort of 40 as a separate, additional group. Although the cohort met the criteria for case membership, none of variables in our study offered potential explanations for their WRMSDs.

Insert Table IV About Here

DISCUSSION

We theorized that temporal, physical and social aspects of home care work would all play a part in distinguishing PAS providers who reported WRMSDs from those who did not. We found that a cluster of four of these work environment characteristics differentiated PAS providers who reported painful symptoms related to their work: the duration of employment with the recipient, whether work hours were predictable and included rest breaks, the number of times bending was required – whether for ADL or IADL tasks, and social support from the recipient. Most notably, these factors operated differently for providers reporting transient or acute disorders in contrast to those reporting the most chronic of disorders.

Our findings support accumulating evidence that PAS providers, like home health care providers, are at high risk for occupational musculoskeletal problems. Twenty-seven percent of the provider sample reported a moderate to severely painful WRMSD within the prior year; including 65 (7.6%) who experienced at least 12 occurrences of musculoskeletal pain in the last year. Women, who dominate the PAS role, were especially at risk for repeat episodes, even though their physical characteristics of their work did not differ from men. A slightly higher rate (12.6%) for all types of WRMSDs was reported among PAS providers surveyed in Los Angeles County (Kim et al., 2010, Wave 2). Among home health care providers, compensation records show overall injury claim rates of approximately 13.8% in Washington State (Howard & Adams, 2010) and 5.2% in West Virginia (Meyer & Muntaner, 1999). Unlike studies using claims data, many cases in our sample remained remarkably capable in performing their job duties, with the majority reporting only modest decrements in function and few work loss days. Like many studies about workers, our study is subject to a ‘healthy worker effect,’ with a potential for underestimation: providers with more serious WRMSDs may stop providing home care, leaving a sample of workers who are healthier.

Temporal factors. Temporal factors previously associated with WRMSDs include long or unpredictable work hours and the availability of rest breaks (Faucett et al., 2007; Galinsky et al., 2007; Grosch et al., 2006; Trinkoff et al., 2006). Our hypotheses about temporal work factors was supported in part: Having predictable work hours with rest breaks appeared protective against both transient and the most chronic of disorders, dropping the risk by 42-55%. Our proposition that risk was associated with longer job duration was also partially supported; although transient and chronic disorders varied, such that longer job duration posed a greater risk of having a chronic disorder, but was apparently protective for more acute disorders. More on-the-job experience may reduce the likelihood of acute injury, while the potential for a chronic problem may increase the longer one works in home care. The number of home care hours of work per week was not significantly associated with WRMSDs, but it is important to note that the majority of PAS providers in our study worked 35 hours or less in home care, just under half providing 20 hours or less of care to the specific recipient in the study. Limiting exposure to biomechanical risk factors through shorter or more predictable work hours or rest breaks may alleviate strains associated with demanding or poor work conditions; however, these temporal factors will require further research attention.

Physical factors. Exposure to biomechanical risk factors such as awkward or static postures, force, and repetitive motion are frequently associated with WRMSDs. The combination of IADL and ADL tasks in home care is likely to increase exposure to such risk factors through repeated lifting, reaching, bending and squatting. For example, tasks like cleaning the floor (an IADL) and putting shoes on the recipient of care (an ADL) both contribute to the number of times a provider bends below the hips during each shift. We were unable to demonstrate that a greater number of different ADL or IADL tasks increased risk, or that the number of transfers or lifts performed daily differentiated cases from those reporting no symptoms. However, above

and beyond the number of transfers and lifts for the recipient, bending below the hips increased the risk of chronicity by 7% for each additional bend. This suggests that a combination of tasks that require bending may increase the risk of musculoskeletal problems for PAS providers. Similarly, Kim and colleagues found a modest increase in risk (OR=1.14; CI=1.08-1.19) for physical demands among PAS providers (Kim et al., 2010). Other studies of care providers have also found challenges in identifying the role of physical risk factors in WRMSDs or related disability (Ando et al., 2000; Simon et al., 2008), or determining the most problematic physical risk factor in home care (Cheung et al., 2006; Ono et al., 1995). Most of these studies, like ours, were self report surveys, and lacked validation from medical or disability records, which may lead to misclassification of cases or imprecision of the models. Given the seriousness of reported injury rates, future research, perhaps using observational measures, must continue to examine the physical tasks of home care.

Social Support. Our hypothesis about the social characteristics of work was supported for providers in the group with the most WRMSD recurrences. Moderate to high social support from the recipient dropped the risk of being in the most chronic group by approximately one-third. Positive emotional ties connecting providers with recipients may mitigate job strain and impart dignity to an otherwise difficult, demanding, and often demeaning, service job (Chichin, 1992; Denton et al., 2002; Stacey, 2005). Furthermore, Lindahl and others have described the relationship between the home care professional and care recipient as one of ‘being there for each other’ (Lindahl et al., 2011). Such support may extend to protecting the vulnerable provider from risky tasks or further injury. The alternative, that painful WRMSDs reduce social support is possible, but logically less likely. Social support from work peers, friends, and the spouse of the home care provider has previously been associated with lower work stress, better health, and higher job satisfaction (Delp et al., 2010; Denton et al., 2002). To our knowledge, however, so-

cial support from the care recipient has not been quantitatively investigated for its impact on PAS provider reports of injury or MSD symptoms.

We found no differences between providers who were family members and those who were not in terms of their group membership or social support from the recipient. This suggests that family members hired as providers through the consumer-directed model do not experience differential risks for WRMSDs, or any advantage or disadvantage in terms of the social support they may receive from the recipient. Building a positive relationship with the care recipient may reduce the risk of WRMSDs for the provider, whether a relative or not.

Training. Although formal training in home care did not differentiate cases in our study, the lack of job training raises concerns about both provider and recipient safety. Over three-fourths of providers had never received formal training to prepare them to give home care or perform safely in the home. PAS providers are not required to have formal training, nor are they regulated by the State. In fact, many PAS providers receive their orientation and training from the recipient of care, who is similarly likely to never have had any training in how to supervise or work with a PAS provider (Newcomer, Kang, & Faucett, 2011). This contrasts with home health aides in California who are state-regulated and must complete a 75-hour training course and certification examination; certified nursing assistants require even more training. Both generally work through agencies under the supervision of a registered or licensed practical nurse. Thus, not only is formal training required, there is also access to skilled supervisory support and support from peers who work for the same agency.

Our findings about social support reinforce reports by others that formal training that fosters the working relationship between the provider and the recipient may be beneficial (Baron & Habes, 2004; Delp et al., 2010; Menne et al., 2007). Examples of such training might include sections on communication, role negotiation, conflict resolution, and assertiveness (Baron &

Habes, 2004; Menne et al., 2007). Furthermore, training programs that include both the provider and the recipient could enhance teamwork for physical activities such as lifts and transfers or bathing. NIOSH investigators have offered additional suggestions to modify risk factors in home care (Baron & Habes, 2004; Parsons et al., 2006a, 2006b; Waters et al., 2006).

Limitations. In addition to the limitations noted above, as a cross-sectional survey, the study cannot make causal inferences. Furthermore, despite considerable recruitment efforts, the response rate of about 50% leaves open the possibility of bias in the survey respondents. This bias was previously investigated (Newcomer, Kang & Faucett, 2011) and found to be toward an over-recruitment of mutually satisfied recipient-provider dyads. Such as bias would likely under-report both the true incidence of WRMSDs, and under-value the true association of social support on WRMSD outcomes. Lastly, the U.S. Occupational Safety and Health Agency defines work-relatedness as aggravated by, as well as caused by, events or exposures in the work environment (DOL, OSHA, 2012); but the similarity between personal domestic tasks and PAS work tasks may also confound attributions of work-relatedness in this occupation.

Conclusions. Findings about social support in consumer-directed home care indicate that the dyadic relationship between recipient and provider should be explored further, at least in terms of its benefits for providers as well as recipients of care (Lindahl et al., 2011). Social support from the home care recipient may represent unique accommodations on the part of the consumer that lower the risk for WRMSDs for the vulnerable worker, whether a family member or not. Specific factors that mitigate occupational risks in the home should be explored among recipient and provider pairs who are working well together, using participatory action research, for example. Furthermore, many providers lacked formal training and could perhaps benefit from training that enhances the working relationship between care provider and recipient.

The number of lifts and transfers performed daily did not stand out as a risk factor, de-

spite the lack of training and lift or slide equipment reported by most providers who performed these demanding tasks. However, our findings about the risk associated with bending suggest that investigation of the combination of tasks in home care should be examined further. Group differences in temporal work factors – the predictability of work hours, rest breaks, and hours and duration of work – suggest that the modification of risk through administrative controls (e.g., regular rest breaks) may be important in addition to engineering controls (e.g., lift equipment) in the challenging setting of home care; this is another area to be explored further.

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