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Musculoskeletal Pain Is Impacted by Job Tasks in Temporary Construction Workers Hired Through Construction Staffing Agencies

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Abstract

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To the Editor:

Construction staffing agencies play a key and growing role in the US construction industry by providing on-demand and cost-effective access to construction workers during various phases of a construction project.[1,2] These temporary staffing agencies are generally for-profit labor market third-parties that provide non-skilled and skilled labor to construction companies.[3,4] The labor provided by the temp agency is different from traditional construction subcontractors who are individuals or companies hired by the general construction firm to supply labor on a temporary basis usually for a specific trade or craft.[1,5–7] Laborers from construction staffing agencies on the other hand have alternative and

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temporary worker employment arrangements and are assigned non-skilled general labor efforts on a construction site. Despite the increasing use of workers from temporary construction staffing agencies,[1] few studies have characterized the occupational safety and health of these workers. A recent epidemiologic study of construction workers employed across three large commercial construction sites documented that OSHA-10 training was significantly protective of reporting hazardous working conditions in temporary workers when compared with construction workers on payroll.[8] While safety training for temporary workers is protective of reporting hazards, it is unclear how temporary work arrangements might impact reporting of musculoskeletal disorders in this vulnerable worker group.

In 2016, data from the Bureau of Labor Statistic indicated the rate of work-related musculoskeletal disorders (WMSDs) in the US construction industry was 16% higher than the rate for all US industries combined (ie, 29.8 per 10,000 FTEs).[9] For construction workers, these WMSDs are a leading cause of loss of productivity at work, functional impairments, and permanent disability.[10–13] Despite epidemiologic studies documenting different construction trades being at risk for different WMSDs,[14–16] little is known about the WMSDs experienced by temporary construction workers that have very brief stints on a jobsite, especially how their individual job tasks may relate to the WMSDs. Understanding the risk factors for WMSDs is the first step in an evidence-based worksite-based approach to injury control and prevention at the construction worksite. Given the recent growth in nonstandard employment arrangements, and employment through temporary staffing agencies in particular, there is a need to document and better understand the health and safety issues surrounding workers employed through temporary construction staffing agencies.

In this study, as a first step to documenting temporary construction worker health and safety, we use data collected from part of a larger health and safety training curriculum project to describe and characterize the acute musculoskeletal disorders and work tasks experienced by construction workers employed through temporary staffing agencies.

METHODS

Study Design and Sample

Between April and June 2017, as part of a National Institute for Occupational Safety and Health (NIOSH)-funded project to adapt and evaluate a foundational health and safety training curriculum for temporary construction workers, our research team conducted four focus group sessions with construction workers hired through temporary staffing agencies in Florida. Each session had between five and 10 temporary construction workers and was conducted at the agency facility at the end of the workday; no agency or construction firm management representatives were present. Prior to the start of the focus group session, workers were asked to complete a 45-item paper-based survey using validated measures assessing for: work injury experience; health status; musculoskeletal pain location and severity; tobacco and alcohol use; worker socio-demographic; and job characteristics. Workers were compensated $45 for completing the survey and participating in the focus group. A total of 38 of the 41 temporary construction workers approached completed the

consent and survey instrument (response rate=92.7%). Three workers could not participate in the study due to time commitment and transportation logistics.

Survey Measures

This analysis used specific validated survey items from the longer survey administered to the construction workers. Standard and validated measures on socio-demographic and work characteristics were obtained from the National Health Interview Survey. Survey items assessing musculoskeletal pain location were obtained from a modified Nordic questionnaire[17] while pain severity for the past 7 days in five body areas (low back, neck/shoulder, wrist/forearm, knee, ankle/feet) was assessed on a five-point Likert-type scale ranging from 1=none to 5=extreme pain.[18] The five responses were summed for a single pain score ranging from 5 to 25. The survey item assessing specific job tasks for non-temporary and temporary construction workers was adapted from existing validated construction worker questionnaires.[19–22] The question asked workers ‘‘Which of the following tasks do you commonly work on at the current construction site? Check all that apply.’’ The 10 possible response items included: load, unload, and identify building materials, machinery, and tools; clean up construction site; install barricades; demolition (hand and by means of mechanical devices); carpentry; provide assistance to equipment operators; operate heavy equipment; assist in concrete or asphalt installations; disposing of waste; and electrical work. Occupational Safety and Health Administration (OSHA) training was assessed with the question, ‘‘What level of OSHA training have you completed? Check all that apply’’ with response options: none, 10-hour, 30-hour, and other. Responses were dichotomized into having or not having OSHA training.

Data Analysis

Descriptive statistics were computed for sociodemographic and job characteristics, musculoskeletal pain location and severity (Nordic scale), and work tasks variables. Frequencies were calculated for categorical variables, whereas means and standard deviations were computed for continuous variables. The existence of outliers was evaluated by the square distance of Malahanobis (D^2) and normality was assessed by the uni- and multivariate coefficients of skewness and kurtosis. Non-parametric Spearman correlations were chosen because of the ordinal ratings of the scales used in assessing these survey measures; and the highly skewed distributions of these parameters. Correlation analyses explored associations between total number of anatomic musculoskeletal pain sites and total number of work tasks assigned. To ensure our correlations were not driven by the influence of potential covariates, we ran multiple linear regression models on associations that had significant ($P < 0.05$) correlations and adjusted for potential covariates such as age, sex, race, ethnicity, educational attainment, musculoskeletal pain, sites, and severity, OSHA training, and tenure as a temp agency construction worker. For the multiple linear regression models, the dependent variable was total number of anatomic musculoskeletal pain sites. All analyses were performed with SPSS software Version 23 (IBM Corp., Armonk, NY).

RESULTS

A total of 38 construction workers employed through temporary staffing agencies completed the study survey with mean age of 42.7±13.1 (standard deviation) years, 78.9% male, 75.7% of black/African American race, 18.9% Hispanic ethnicity, 59.5% with a high school diploma, 45.9% with 1 to less than 3 years as a temp construction worker, and 32.4% with 1 to 3 days working on the current job site (Table 1). The two most frequently reported job tasks by temp agency workers at a construction site were clean-up activities (89.5%), and manual material handling (52.6%). Compared with workers without acute musculoskeletal pain, workers with pain more frequently reported assisting equipment operators (12.5% vs 40.9%; P=0.037) and operating heavy equipment (0.0% vs 18.2%). Workers with musculoskeletal pain significantly reported more job tasks while on the construction site (90.5% vs 52.9; P=0.009) and two or more anatomic sites with pain (47.6% vs 0.0; P=0.000) than workers without any acute musculoskeletal pain. The total number of anatomic musculoskeletal pain sites was significantly and moderately correlated to the total number of work tasks assigned (r_s=0.438; P=0.007). After adjustment for covariates, the multivariable linear regression model estimated the number of job tasks was significantly related (β=0.250, P=0.017) to the total number of reported musculoskeletal pain sites (F[10,12]=8.267, P=0.001, R^2=0.873, Table 2).

DISCUSSION

Construction workers employed through temporary staffing agencies in this pilot study reported on various tasks assigned to them at the construction worksite. Some job tasks were significantly correlated to reporting of acute musculoskeletal pain such that temp construction workers with acute pain reported hazardous tasks including assisting equipment operators and operating heavy equipment. A report from the European Agency for Safety and Heath at Work found that temporary workers often receive less occupational health and safety training, which increases the risk of occupational injuries and accidents.[23] They also found that personal protective equipment is often made less available to temporary workers than to payroll or permanent workers. While construction site clean-up is the most frequently reported job task among temporary construction workers, there were tasks reported in this study (ie, assisting equipment operators and operating heavy equipment) that carry significant safety critical responsibilities that perhaps should be assigned to more skilled construction trades to limit potential musculoskeletal disorders.

Despite a small sample size of temporary construction workers, this study is the first to document the relationship of job tasks to musculoskeletal pain in this vulnerable and generally racial/ethnic minority worker population. This temporary workforce often works very long hours with high levels of job insecurity and frequently changing work environments.[8] These working conditions make the collection of research data challenging in terms of survey administration or qualitative data collection. Not all tasks asked to these workers carry the same type of occupational risk and further investigation in the full breadth and scope of tasks that these general labor temp workers perform while onsite are needed. Research on how construction firms, temporary staffing agencies, subcontractors, and the temporary construction workers interact and communicate health and safety are needed.

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TABLE 1.

Socio-Demographic and Work Characteristics by Self-Reported 7-day Acute Joint Pain Among Temporary Construction Workers Participating in the Teaching Temporary Employees About Competencies in Health and Safety Study

Characteristics	Total Sample *N n* (%)*	MSD Pain *n* (%)*	No Pain *n* (%)*	*P*-Value
Total	38 (100.0)	16 (42.1)	22 (57.9)	
Age				0.067
18–29 years old	8 (21.6)	2 (9.5)	6 (37.5)	
30–39 years old	3 (8.1)	2 (9.5)	1 (6.3)	
40–49 years old	14 (37.4)	11 (52.4)	3 (18.9)	
50–59 years old	10 (27.0)	4 (19.0)	6 (37.5)	
60 and older	2 (5.4)	2 (9.5)	0 (0.0)	
Gender				0.736
Male	30 (78.9)	17 (81.6)	13 (76.5)	
Female	8 (21.1)	4 (19.0)	4 (23.5)	
Race				0.447
White	4 (10.8)	2 (9.5)	2 (12.5)	
Black/African American	28 (75.7)	17 (81.0)	11 (68.8)	
Native Hawaiian/Pacific Islander	1 (2.7)	1 (4.8)	0 (0.0)	
Other	4 (10.8)	1 (4.8)	3 (18.8)	
Ethnicity				0.095
Hispanic	7 (18.9)	2 (9.5)	5 (31.3)	
Non-Hispanic	30 (81.1)	19 (90.5)	11 (68.8)	
Educational attainment				0.920
Less than high school	9 (23.7)	5 (23.8)	4 (25.0)	
High school/GED	22 (59.5)	13 (61.9)	9 (56.3)	
Greater than high school	6 (16.2)	3 (14.3)	3 (18.8)	
Tenure as Temp worker				0.235
≤1 year	13 (35.1)	7 (35.0)	6 (35.3)	
1 < years ≤ 3	17 (45.9)	8 (40.0)	9 (52.9)	
3 < years ≤ 6	4 (10.8)	4 (20.0)	0 (0.0)	
>9 years	3 (8.1)	1 (5.0)	2 (11.8)	

Characteristics	Total Sample *N n* (%)*	MSD Pain *n* (%)*	No Pain *n* (%)*	*P*-Value
Days on current site				0.977
1–3 days	12 (32.4)	7 (35.0)	5 (29.4)	
4–7 days	8 (21.6)	4 (20.0)	4 (23.5)	
8–30 days	9 (24.3)	5 (25.0)	4 (23.5)	
>30 days	8 (21.6)	4 (20.0)	4 (23.5)	
Prior OSHA training				0.483
None	17 (44.7)	8 (38.1)	9 (52.9)	
10-hour	20 (52.6)	12 (57.1)	8 (47.1)	
30-hour	1 (2.6)	1 (4.8)	0 (0.0)	
Tasks engaged at jobsite				
Manual material handling	20 (52.6)	14 (63.6)	6 (37.5)	0.111
Clean up site	34 (89.5)	19 (86.4)	15 (93.8)	0.464
Install barricades	6 (15.8)	4 (18.2)	2 (12.5)	0.635
Demolition	14 (36.8)	10 (45.5)	4 (25.0)	0.197
Carpentry	6 (15.8)	4 (18.2)	2 (12.5)	0.635
Assist equipment operators	11 (28.9)	9 (40.9)	2 (12.5)	0.037
Operate heavy equipment	4 (10.5)	4 (18.2)	0 (0.0)	0.048
Assist in concrete/asphalt installations	7 (18.4)	6 (27.3)	1 (6.3)	0.099
Disposing of waste	14 (36.8)	10 (45.5)	4 (25.0)	0.197
Electrical work	3 (7.9)	3 (13.6)	0 (0.0)	0.124
Number of assigned tasks				0.009
One task only	10 (26.3)	2 (9.5)	8 (47.1)	
Two or more tasks	28 (73.7)	19 (90.5)	9 (52.9)	
Multisite pain				0.000
No pain	16 (42.1)	0 (0.0)	16 (94.1)	
One site pain only	12 (31.6)	11 (52.4)	1 (5.9)	
Two or more sites	10 (26.3)	10 (47.6)	0 (0.0)	

* Differences in sub-total population sample due to item non-response or missing.

OSHA, Occupational Safety and Health Administration.

TABLE 2.

Multiple Linear Regression Models With Unadjusted and Adjusted Estimates ($n = 38$)

Parameter	Estimate	95% Confidence Interval	Standard Error	*P*-Value
Unadjusted				
Job tasks	0.378	[0.234–0.523]	0.071	0.000
Adjusted				
Job tasks	0.250	[0.053–0.447]	0.090	0.017
Age	0.014	[−0.02–0.049]	0.016	0.391
Gender	0.312	[−0.64–1.272]	0.440	0.492
Race	0.133	[−0.18–0.454]	0.147	0.384
Ethnicity	0.137	[−0.89–1.172]	0.475	0.778
Educational attainment	0.526	[−0.15–1.206]	0.312	0.118
Multisite pain	1.183	[0.612–1.755]	0.262	0.001
Pain severity	−0.020	[−0.23–0.191]	0.097	0.839
OSHA training	0.258	[−0.78–1.298]	0.477	0.599
Tenure as temp worker	0.000	[−0.00–0.005]	0.002	0.835

OSHA, Occupational Safety and Health Administration.

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