

Exhibit No. EH-20
Docket U-180680
Witness: Erin Hutson

BEFORE THE WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION

DOCKET NO. U-180680

TESTIMONY OF

ERIN HUTSON

LABORERS INTERNATIONAL UNION OF AMERICA

Exhibit EH-20

February 8, 2019

Temporary Workers in Washington State

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Background Evidence regarding the unequal burden of occupational injuries between workers employed by temporary agencies and those in standard employment arrangements is unclear. Studies range from no significant differences in risk to substantial increased risk for temporary workers. The purpose of this study is to compare the workers' compensation experience of a large cohort of temporary agency employed workers with those in standard forms of employment.

Methods Washington State Fund workers' compensation data were obtained for claims with injury dates from January 1, 2003 to June 30, 2006, resulting in 342,540 accepted claims. General descriptive statistics, injury rates (per 10,000 FTE), and rate ratios (temp agency/standard employer) were computed by injury type and industry.

Results Temporary agency employed workers had higher rates of injury for all injury types, and higher median time loss (40 vs. 27 days) but lower time loss costs (median \$1,224 vs. \$1,914, $P < 0.001$) and lower medical costs (\$3,026 vs. \$4,087, $P < 0.001$) than standard arrangement workers. Temporary agency workers had substantially higher rates for "caught in" and "struck by" injuries in the construction (IRR 4.93; 95% CI 2.80–8.08) and manufacturing (IRR 4.05; 95% CI 3.25, 5.00) industry sectors.

Conclusion Temporary agency employed workers have higher claims incidence rates than those in standard employment arrangements. The rate ratios are twofold higher in the construction and manufacturing industry sectors. More research is needed to explore potential reasons for this disparity in occupational injuries. Industry or some measure of job exposure should be included when comparing injury rates in different types of employment in order to better identify areas for prevention. *Am. J. Ind. Med.* 53:135–145, 2010. © 2009 Wiley-Liss, Inc.

KEY WORDS: contingent workers; temporary workers; injury rates; occupational; health disparities

INTRODUCTION

The use of contingent employment has increased in the past few decades as new forms of work processes and

work organization in the global economy have emerged. Numerous studies have been conducted on contingent worker employment characteristics and health outside of the United States. The findings have varied considerably from no difference in health outcomes [Virtanen et al., 2001, 2003; Bardasi and Francesconi, 2004], to significant findings of higher rates and severity of occupational injuries [Saha et al., 2004; Benavides et al., 2006]. Studies have also shown differences in risk between temporary and standard employment to be based more on the industry than the type of employment arrangement [Saloniemi et al., 2004]. Much of the discrepancy in research findings for contingent, flexible or alternative work arrangements may be due to differential classification among countries of what constitutes a contingent worker.

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In Europe, flexible employment refers to part-time work, work involving temporary contracts, fixed-term employment periods, or self-employment [Benach et al., 2000; Amuedo-Dorantes, 2002]. Flexible employment in 2000 accounted for 15% of paid employment in the European Union. In the United States contingent employment is defined by the Bureau of Labor Statistics as "... any job in which an individual does not have an explicit or implicit contract for long-term employment" [Polivka, 1996]. Data from the 2005 Current Population Survey (CPS) Contingent Workforce Supplement, estimate that contingent workers account for 1.8–4.1% of the United States workforce [BLS, 2005]. Among the various types of contingent workers in the CPS Supplement, temporary agency employed workers comprised approximately 1% of the U.S. Workforce [BLS, 2005].

Benavides et al. [2000] found that temporary workers had higher odds of muscular pain (OR 1.21, 95% CI 1.03–1.43) than permanent (standard work arrangement) workers. Morris [1999] found temporary workers in a manufacturing setting to have injury rates two to three times higher than permanent workers. Saha et al. [2004] found increased rates of incidence, frequency, and severity for temporary piece rate workers compared to permanent workers. A recent study exploring the cost of contingent workers found that temporary workers had four to seven times the claim frequency compared to permanent workers [Park and Butler, 2001].

A recent review of the literature (mostly European studies) regarding the relationship between temporary employment and health outcomes found that temporary workers had higher risks of occupational injuries than permanent workers [Virtanen et al., 2005].

While most of the research conducted on temporary workers and occupational injuries has been done in Europe and Australia, a few focused studies have been conducted in the United States [Foley, 1998; Morris, 1999; Park and Butler, 2001]. Foley [1998], using a large cohort of Washington State workers' compensation claimants found that temporary workers had higher rates, frequencies, and costs of workers' compensation claims than their permanent counterparts. This study did not break down the workers' compensation claims by the type of injury or illness. In addition, since the late 1990s, the temporary help service industry in Washington State has had a known high-risk for upper-extremity musculoskeletal disorders [Silverstein et al., 1998, 2002]. To our knowledge, there have not been any other large cohort studies that calculate injury rates of temporary workers by industry and injury type in the United States.

The primary aims of this study are to further describe the demographic, employment and injury experiences of temporary agency workers and to compare these with their standard employment counterparts. The identification of types of injury by industry sector can focus resources for

preventing injuries among temporary agency workers and reduce the occupational health outcome disparities they may face.

METHODS

Data Ascertainment and Variable Definitions

Data from State Fund workers' compensation claims with dates of injury from January 1, 2003 to June 30, 2006 were extracted in September 2008 from the Washington State Department of Labor & Industries (L&I) workers' compensation (WC) system. Data consisted of all filed claims with one of 17 "Temporary Help Services" (temporary agency) Washington industrial insurance risk classifications (WIC) [Washington State, 2007, WAC 296-17A]. These claims were matched with all non-temporary help services (standard arrangement) filed claims using the claimants' employer North American Industrial Classification System (NAICS) industry sector (Table I). Temporary workers in this study do not include day labor, self-employed, contract workers, company direct-hire temporary workers or others where the work arrangement does not occur through a temporary help services company.

The Washington State Department of Labor and Industries' State Fund (SF) is the exclusive provider of workers' compensation insurance to Washington State employers, except those who are able to self-insure or those who are covered by alternative workers' compensation systems (e.g., the federal government, Longshore and Harbor Workers' Act). The L&I State Fund system covers approximately two-thirds of all employees in the State of Washington and 99.5% of all employers.

The WIC system combines industry and occupation to group work activities by similar risk of injury for insurance purposes. For example, clerical workers in a financial company and a construction company will have different NAICS codes but are assigned the same risk class. Washington State has a unique set of over 300 WIC classifications for its industrial insurance system, but similar risk classification systems exist for other workers' compensation rating systems [Oregon State, 2007]. For workers' compensation insurance premium payments, employers must report quarterly the number of hours worked by their employees in the appropriate risk classifications.

Temporary services risk classifications exist for 19 different industry/occupation groups, Table I. We excluded 7104 "Administrative office personnel" as this risk class includes full-time employees of the temporary staffing agency employers. Employers are assigned risk classification codes by the Employer Services Division of L&I after consultation with the business as to the nature of services and work they provide. Employers assign WIC codes to each

TABLE I. Temporary Services Risk Classifications and NAICS Sector for Comparison

Temporary staffing services risk classification code/description			Comparable NAICS code/sector ^a
7112	Agricultural operations	11	Agriculture, forestry, and fishing
7121	Logging		
7116	Flagging for public utility construction	22	Utilities
7118	Construction employment, NOC	23	Construction
7109	Light assembly work	31–33	Manufacturing
7115	Food processing operations		
7117	Manufacturing occupations; specialty trades		
7122	Manufacturing		
7106	Retail or wholesale store operations	42	Wholesale trade
		44–45	Retail trade
7114	Warehouse operations, NOC	48–49	Transportation and warehousing
7119	Vehicle operations; sawmill operations		
7108	Warehousing operations		
7110	Field technical services	54	Professional, scientific and technical services
7105	Office support services	56	Administrative and support and waste management and remediation services
7111	Health care services	62	Health care and social assistance
7107	Food services; musicians and entertainers	72	Accommodation and food services
7113	Janitorial, maintenance and grounds keeping services	81	Other services

^aNAICS Sectors were grouped into the following categories for analysis: NAICS 23, construction; 31–33, manufacturing; 48–49, transportation and warehousing; and NAICS sectors 11, 22, 42, 44, 45, 54, 56, 62, 72, and 81, other.

worker’s work hours based upon the type of work that they do. Employee hours cannot be assigned to more than one classification at a time, but may move between classifications if they change jobs within the same company. Individual workers’ compensation claims are assigned a WIC from the employer’s assigned WICs and the type of work the claimant was performing at the time of injury.

The NAICS coding system similarly provides a system to classify business establishments based on their economic activity. Businesses that use the same or similar processes to produce goods or services are grouped together. All businesses are assigned a NAICS code that best fit the goods or services produced or provided when they establish a workers’ compensation account with L&I.

Claimant data extracted from the SF claims and administrative databases included: claimant’s age at date of injury, gender, marital status, the number of dependents, length of employment, and the occurrence of a previous or subsequent workers’ compensation claim. Additional data extracted includes, occupation (Standard Occupational Classification code [OMB, 2000]), the claimant’s self-reported height and weight, American National Standards Institute (ANSI) Z16 codes for the occupational injury or illness, WIC codes, and workers’ pre-claim wage data.

The data for accepted claims from the WC system were missing length of employment for approximately 25% of the data. Additional length of employment data were obtained by matching Uniform Business Account (UBI) numbers from employers and Social Security Numbers (SSNs) from claimants to Washington State Employment Security Department (ESD) data. Employers report by workers’ social security number (SSN), hours and wages worked by all employees on a quarterly or yearly basis to ESD as part of their unemployment insurance premium payments. The length of employment variable in this study used ESD data as the primary source and was supplemented with L&I data if missing from ESD.

Economically distressed counties were determined by identifying all counties in Washington State with a 3-year average unemployment rate equal to or greater than 120% of the statewide unemployment rate. The county where the company of record for the injury is located was used to determine whether or not the injury occurred in an economically distressed county [ESD, 2007].

Workers’ compensation claim information was obtained from the both the Report of Industrial Injury or Occupational Disease form (RIIOD) and WC claims administration system. The date of injury, work-relatedness of the injury

or illness, initial diagnosis and compensability of a claim (from the initial health care provider) and the preferred language for communicating with L&I about the claim are obtained from the RIIOD when available and collected by claims managers if not on the initial report of injury. The languages presented on the RIIOD were English, Spanish, Russian, Korean, Chinese, Vietnamese, Laotian, Cambodian or a narrative for "Other."

The variable for an employer questioning the validity of the claim is an item from the RIIOD that the employer can check when they initially complete their portion of the claim form, but is not a legal challenge to the claim. The variable for an employer protesting the claim is an official process whereby the employer legally challenges the validity of the claim.

Common injury types were grouped according to previously described procedures [Silverstein et al., 2002; Bonauto et al., 2006]. Eight claim groups describing type or nature of claim were used: musculoskeletal disorders of the neck, back, and upper extremity (neck, back, and UE-MSDs); musculoskeletal disorders of the lower extremity; struck by or against injuries (struck by); caught in, under, and between injuries (caught); fall from elevation; fall on same level; contact with radiations, caustics, toxic, and noxious substances (toxics); and "other injuries."

We identified the claim status for each SF workers' compensation claim. Claims can be rejected or accepted. Accepted claims can be medical only or compensable. Compensable claims involve injuries where either wage replacement for time loss was paid, a disability award was paid, a fatality occurred or the worker was kept on salary during the course of claim.

Data regarding benefits were restricted to 2 years from date of injury to allow each claim to have a common period of maturity. Claim cost data reflect that which had been paid to date during the 2 years after the date of injury and adjusted to 2006 dollars. Time loss days were counted for those paid during the 2-year period after the date of injury. Yearly wages were calculated using the employer provided wage and hour information for each WC claimant. Employee hours as reported for each employer WC account were assigned to the corresponding NAICS sector and summed over the study period. One full time equivalent employee is equal to 2,000 hr.

Data Analysis

Descriptive analyses for demographic and claims adjudication data were performed and data were either categorized, or medians with the first and third quartiles were reported. Tests of statistical significance included Chi-square tests and Wilcoxon Rank Sum tests. Incidence rates were standardized to units of 10,000 full-time equivalent workers (FTEs).

Days between injury and receipt of the claim, between the first medical visit and receipt of the claim, days from receipt of the claim to initial determination (accepted or rejected), and days between receipt of the claim and first time loss payment (for compensable claims) were highly skewed and were categorized in this study based on the distribution of the data. Payments (in dollars) for medical aid and time loss as well as the total number of days of time loss were also highly skewed and are presented in this study with the median and first and third quartiles (Q1, Q3).

Injury rates for temporary agency workers for the most common occupational injuries were compared to the corresponding NAICS sector injury rates for standard employment workers. Incidence rate ratios (IRR) and 95% confidence intervals (95% CIs) were calculated for all reported rates. Body mass index (BMI) was calculated using the formula of $703 \times [\text{weight in pounds}/\text{height in inches}^2]$, BMI < 14.9 were excluded. Statistical analyses were computed using Intercooled Stata 8.0 (Stata Corporation, College Station, TX).

RESULTS

There were 377,736 claims filed with the Washington State Fund (SF) workers' compensation system from January 1, 2003 to June 30, 2006 that met the study inclusion criteria. Of the filed claims, 342,540 (90.7%) of these were accepted. For temporary workers this was 10,640 (86.3%), and for standard arrangement workers it was 331,900 (90.8%) of filed claims. Among the accepted claims, 254,696 were medical only (accepted but not compensable). For temporary agency workers this was 7,755 or 72.9% and for standard arrangement claims it was 246,941 or 74.4% of accepted claims. Compensable claims (claims with time loss days paid, disability payments or for workers kept on salary while off work) accounted for 87,844 or 25.6% of accepted claims, for temporary agency employed workers this was 2,885 or 27.1% and for standard employment workers it was 84,859 or 25.6% of accepted claims. General characteristics for medical only and compensable claimants are listed in Table IIa.

Medical Only Claims

Compared to standard employment workers, temporary agency claimants were less likely to be female (27% vs. 41%) ($P < 0.001$), had a higher proportion of workers who were younger than 25 years old, were less likely to be married ($P < 0.001$), and were less likely to live in economically distressed counties ($P < 0.001$). For job related variables, very large differences were seen between temporary and standard employed workers. Temporary workers were much more likely to be low wage earners (<\$25,000/year), (80% vs. 55%) than standard workers, and to work at the employer

TABLE IIa. Characteristics of the Cohort, Personal Factors

	Medical only claims, n (%)		P-value ^a	Compensable claims, n (%)		P-value ^a
	Temporary agency (N = 7,755)	Standard employment (N = 246,941)		Temporary agency (N = 2,885)	Standard employment (N = 84,959)	
Gender (female)	1,885 (23.9)	72,769 (29.9)	<0.001	771 (26.7)	24,924 (29.3)	<0.001
Age (years) ^b			<0.001			<0.001
<25	2,145 (28.1)	56,253 (23.15)		483 (16.9)	11,152 (13.2)	
25–34	2,233 (29.2)	68,098 (28.0)		763 (26.6)	19,890 (23.6)	
35–44	1,757 (23.0)	58,176 (23.9)		792 (27.7)	22,897 (27.2)	
45–65	1,469 (19.2)	58,660 (24.1)		806 (28.1)	29,240 (34.7)	
>65	36 (0.47)	1,846 (0.76)		20 (0.7)	1,114 (1.3)	
BMI ^c			<0.001			0.078
<25	2,593 (33.5)	80,288 (32.5)		860 (29.8)	23,707 (27.9)	
25–29.9	2,409 (31.1)	83,215 (33.7)		973 (33.8)	29,361 (34.6)	
>29.9	2,746 (35.4)	83,294 (33.8)		1,050 (36.4)	31,866 (37.5)	
Married	2,051 (26.5)	100,225 (40.6)	<0.001	933 (32.3)	40,906 (48.2)	<0.001
Number of dependents			<0.001			<0.001
None	6,956 (89.7)	210,520 (85.3)		1,984 (68.8)	53,924 (63.5)	
1–2	657 (8.5)	29,840 (12.1)		705 (24.4)	24,269 (28.6)	
More than 2	142 (1.8)	6,581 (2.7)		196 (6.8)	6,766 (8)	
Live in an economically distressed county	1,279 (16.5)	47,080 (19.1)	<0.001	437 (15.2)	15,713 (18.5)	<0.001
Low wage worker (<\$25,000/year)	6,222 (80.2)	136,563 (55.3)	<0.001	2,364 (81.9)	36,118 (42.5)	<0.001
Employer provides medical insurance (N = 85,540 compensable claims only)	—	—	—	78 (2.7)	30,176 (35.5)	<0.001
Days at current employer ^d			<0.001			<0.001
<1 month	2,444 (33.3)	18,696 (8.1)		746 (35.5)	5,832 (10.4)	
1 to <3 months	2,293 (31.3)	33,505 (14.6)		522 (24.8)	6,597 (11.8)	
≥3–12 months	2,030 (27.7)	69,382 (30.2)		560 (26.6)	15,928 (28.5)	
>1–5 years	511 (7.0)	80,127 (34.9)		225 (10.7)	15,240 (27.3)	
>5 years	58 (0.8)	28,225 (12.3)		49 (2.3)	12,279 (22)	
Industry			<0.001			<0.001
Construction	973 (12.5)	52,747 (21.4)		357 (12.4)	22,047 (25.9)	
Manufacturing	3,138 (40.5)	39,412 (15.9)		1,043 (36.2)	11,046 (13.0)	
Transportation and warehouse	1,959 (26.3)	10,641 (4.3)		861 (29.8)	5,885 (6.9)	
Other	1,685 (21.7)	144,141 (58.4)		624 (21.6)	45,981 (54.12)	

^aChi-square or Wilcoxon rank sum test.

^bAge category: Medical only N = 250,673 (7,640 temporary, 243,033 standard).

^cBMI: medical only N = 254,545 (7,748 temporary, 246,797 standard).

^dData at current employer limited to 90.3% of sample (7,336 temporary, 229,935 standard).

of injury for three months or less (33% vs. 8%) than standard workers, $P < 0.001$, Table IIa. Another important difference between temporary agency and standard employed workers is that temporary and standard workers are concentrated in different industries. Temporary workers were much more likely to be employed in the manufacturing (40.5% vs. 15.9%) and transportation and warehouse (26.3% vs. 4.3%) sectors than standard employed workers (Table IIa). Temporary workers were also almost twice as likely to work in production occupations as standard workers (23.2% vs.

12.3%) (Table IIb). Temporary workers were also less likely to have filed a prior workers' compensation claim than standard employment workers (52.6% vs. 63.7%, $P < 0.001$) and were less likely to have a subsequent claim (26.8% vs. 30.4%, $P < 0.001$) during the study period (Table IIb).

For the workers' compensation administration variables, the time between the date of injury to first medical visit, and from first medical visit to L&I receipt of claim were only marginally different between temporary agency and standard

TABLE IIb. Characteristics of the cohort, work and workers' compensation factors

	Medical only claims, n (%)			Compensable claims, n (%)		
	Temporary agency (N = 7,755)	Standard employment (N = 246,941)	P-value ^a	Temporary agency (N = 2,885)	Standard employment (N = 84,959)	P-value ^a
Filed a prior workers' comp claim	4,076 (52.6)	157,410 (63.7)	<0.001	1,715 (59.5)	60,548 (71.3)	<0.001
Filed a subsequent workers' comp claim	2,078 (26.8)	74,956 (30.4)	<0.001	636 (22.0)	21,086 (24.1)	0.001
Non-English language preference (yes)	260 (3.4)	11,657 (4.7)	<0.001	198 (6.9)	7,452 (8.8)	<0.001
2-Digit SOC ^b classification ^c			<0.001			<0.001
35 Food preparation and serving related occupations	27 (0.3)	25,740 (8.4)		13 (0.5)	5,971 (5.7)	
47 Construction and extraction occupations	520 (6.7)	44,020 (14.4)		189 (6.5)	18,956 (18.0)	
49 Installation, maintenance, and repair occupations	194 (2.5)	25,415 (8.3)		65 (2.2)	8,038 (7.6)	
51 Production occupations	1,801 (23.2)	37,721 (12.3)		555 (19.2)	11,111 (10.6)	
53 Transportation and material moving occupations	2,558 (33.0)	33,054 (10.8)		1,113 (38.6)	15,253 (14.5)	
All other occupations	1,166 (15.0)	102,806 (33.7)		445 (15.4)	35,118 (33.4)	
99 Not classified	1,450 (18.7)	35,418 (11.6)		499 (17.3)	10,419 (9.9)	
Employer questioned validity of claim (N148,488)	377 (9.7)	7,222 (5.0)	<0.001	274 (19)	7,719 (15.6)	<0.001
Employer formally protested the claim	218 (2.8)	3,628 (1.5)	<0.001	90 (3.1)	1,674 (2.0)	<0.001
Claim initially rejected	180 (2.3)	2,629 (1.1)	<0.001	422 (14.6)	10,319 (12.1)	0.003
Days between injury and receipt of claim			<0.001			<0.001
<7 days	2,925 (37.7)	84,074 (34.1)		951 (33.0)	21,916 (25.8)	
7–14 days	3,966 (51.1)	135,883 (55.0)		1,637 (56.7)	49,419 (58.2)	
>14 days	864 (11.1)	26,984 (10.9)		297 (10.3)	13,624 (16.0)	
Days from first medical visit to receipt of claim			<0.001			<0.001
<14 days	4,075 (52.5)	117,476 (47.6)		1,441 (50.0)	35,734 (42.0)	
14–21 days	2,639 (34.0)	91,717 (37.1)		1,010 (35.0)	32,334 (38.1)	
>21 days	1,041 (13.4)	37,748 (15.3)		434 (15.0)	16,891 (19.9)	
Days from receipt of claim to initial determination			<0.001			0.017
<7 days	3,241 (41.8)	109,257 (44.2)		1,437 (49.8)	42,775 (50.3)	
7–14 days	3,439 (44.3)	108,682 (44.0)		1,150 (39.9)	34,702 (41.0)	
>14 days	1,075 (13.9)	29,002 (11.7)		298 (10.3)	7,482 (8.8)	
Days between receipt of claim to first time-loss payment	—	—				<0.001
<14 days				469 (16.3)	21,470 (25.3)	
14–21 days				722 (25.0)	20,082 (23.6)	
>21 days				1,694 (58.7)	43,407 (51.1)	
Time loss fund, median (Q1, Q3), dollars	—	—		1,224 (267, 6,757)	1,914 (302, 10,826)	<0.001
Medical aid fund, median (Q1, Q3), dollars	404 (258, 653)	394 (229, 722)	<0.001	3,026 (1,004, 9,599)	4,087 (1,179, 11,609)	<0.001
Time loss paid, median (Q1, Q3), dollars	—	—		997 (227, 4,237)	1,226 (188, 6,203)	0.021
Time loss days, median (Q1, Q3)	—	—		40 (9,160)	27 (4, 127)	<0.001

^aChi-square or Wilcoxon rank sum test.^bSOC, standard occupational classification, 2000 U.S. Office of Management and Budget.^cMissing 237 (0.2%)

workers. Claims administration took longer to provide an initial determination of the claim (accepted or rejected), ($P < 0.001$) for temporary versus standard employment (Table IIb). Temporary agency workers had a higher median cost for medical bills than those in standard employment ($P < 0.001$). Employers were almost two times more likely to question the validity of the workers' compensation claim (for

medical only), (9.7% versus 5.0%), ($P < 0.001$), and to formally protest the validity of the claim, (2.8% vs. 1.5%) ($P < 0.001$), for temporary agency workers compared to standard employment workers. Although very few accepted claims were initially rejected, temporary worker claims were more than twice as likely to be initially rejected as claims of standard workers (2.3% vs. 1.1%), Table IIb.

Compensable Claims

The differences in general characteristics between temporary agency and standard arrangement employees with compensable claims are similar to what was seen with medical only claims (Table IIa). Standard work arrangement employees appeared to receive a faster initial determination on their claim compared to those from temporary agencies and have a larger proportion of their time loss payments paid within 14 days of the receipt of their claim. Temporary agency employed workers received far less in both medical aid and time loss payments ($P < 0.001$) but had considerably more time loss days than standard employment workers (median 40 vs. 27 days, $P < 0.001$). There were no differences between temporary and standard workers in regards to employers questioning the validity of the claim ($P = 0.49$), but there were still significant differences in employers officially protesting the claim with 14.6% of the compensable temporary agency claims protested versus 12.1% for standard employed workers ($P < 0.001$).

Injuries by type

Medical only. Injury types for medical only and compensable claims are grouped into eight categories (Table III). For both temporary agency and standard arrangement employees, injury rates were highest for both neck, back and UE-MSDs and “struck by or against” injuries. Temporary workers, however, were at higher risk for these injuries, (IRR 1.3; 95% CI 1.2, 1.3) and (IRR 1.3; 95% CI 1.3, 1.4) respectively. Temporary agency employed workers had higher rates of injury for all injury types except “fall” (same level and elevation) injuries, with rate ratios for other injury types ranging from 3% higher (“Other”) to 90% higher (“caught in”) compared to standard employees (Table III). Temporary workers were about one and a half times more likely to suffer an injury related to toxic substances (“toxics”), than standard employees (IRR 1.5; 95% CI 1.3, 1.6).

Compensable Claims. Incidence rates for temporary agency workers were higher in all of the injury type categories, with statistically significant rate ratios for six of the eight categories ranging from 17% to 222% higher for neck, back and UE-MSDs and caught in injuries, respectively than for standard employment workers (Table III). Share of total claims of individual claim types were for the most part similar for medical only and compensable claims, with the exception of neck, back UE-MSDs and struck by/against which nearly doubled from medical only to compensable claims for both temporary agency employed and standard employed workers.

Injuries by type and industry sector

Medical only. Table IV compares injury rates by injury and industry group (2-digit NAICS) for temporary agency and

TABLE III. Medical Only and Compensable Claims Incidence Rates (per 10,000 FTE) by Temporary Agency Workers and Standard Employed Workers

Injury type	Medical only claims					Compensable claims					
	Temporary agency (N = 7,755)		Standard employment (N = 246,941)		IRR	Temporary agency (N = 2,885)		Standard employment (N = 84,959)		IRR	95% CI
	n (%)	IR	n (%)	IR		n (%)	IR	n (%)	IR		
Caught in	411 (5.3)	58.4	8,691 (3.5)	31.3	1.87	175 (6.1)	52.0	2,575 (3.0)	235.9	2.22	1.89–2.58
Falls from elevation	235 (3.0)	33.4	9,919 (4.0)	35.7	0.94	167 (5.8)	310.3	7,402 (8.7)	255.4	1.21	1.04–1.42
Falls from same level	430 (5.5)	61.1	17,717 (7.2)	63.8	0.96	204 (7.1)	225.7	8,327 (9.8)	212.3	1.06	0.92–1.22
Neck, back UE-MSDs	1,729 (22.3)	245.6	54,132 (21.9)	194.8	1.26	1,198 (41.5)	262.3	33,512 (39.4)	224.9	1.17	1.1–1.24
Struck by/against an object	3,257 (42.0)	462.6	97,414 (39.5)	350.6	1.32	672 (23.3)	386.1	15,394 (18.1)	234.2	1.65	1.52–1.78
Toxic	355 (4.6)	50.4	9,478 (3.8)	34.1	1.48	48 (1.7)	334.3	968 (1.1)	228.1	1.47	1.07–1.96
Lower extremity MSDs	269 (3.5)	38.2	8,651 (3.5)	31.1	1.23	127 (4.4)	250.0	5,831 (6.9)	232.0	1.08	0.90–1.28
Other	1,069 (13.8)	151.8	40,939 (16.6)	147.3	1.03	294 (10.2)	341.0	10,950 (12.9)	235.9	1.45	1.28–1.62

IR, incidence rate; IRR, incidence rate ratio; 95% CI, 95th percent confidence interval; Neck, Back UE-MSDs: neck, back and upper extremity-musculoskeletal disorders.

TABLE IV. Medical Only and Compensable Claims Incidence Rates (Per 10,000 FTEs) and Rate Ratios for Temporary Agency and Standard Arrangement Employees, by Industry Sector

Industry and injury type	Medical only claims						Compensable claims						
	Temporary agency (N = 7,755)			Standard employment (N = 246,941)			Temporary agency (N = 2,885)			Standard employment (N = 84,959)			
	n	IR	IRR	n	IR	IRR	n	IR	IRR	n	IR	IRR	95% CI
Construction													
Caught in	37	182.6	3.62	1,622	50.4	3.62	16	57.6	4.93	535	11.7	4.93	2.80–8.08
Falls from elevation	58	286.3	3.13	2,941	91.3	3.13	43	154.9	2.27	3,117	68.1	2.27	1.64–3.07
Falls from same level	47	232.0	2.99	2,495	77.5	2.99	23	82.8	2.50	1,519	33.2	2.50	1.58–3.76
Neck, Back UE-MSDs	154	760.1	2.66	9,195	285.5	2.66	114	410.6	2.46	7,648	167.2	2.46	2.02–2.96
Struck by/against an object	460	2,270.4	3.23	22,648	703.3	3.23	97	349.4	3.57	4,476	97.8	3.57	2.89–4.37
Toxics	42	207.3	4.09	1,631	50.6	4.09	5	18.0	3.32	248	5.4	3.32	1.07–7.86
Lower extremity MSDs	36	177.7	3.00	1,906	59.2	3.00	26	93.6	2.68	1,602	35.0	2.68	1.74–3.93
Other	139	686.1	2.14	10,309	320.1	2.14	33	118.9	1.87	2,902	63.4	1.87	1.29–2.64
Manufacturing													
Caught in	209	216.8	2.92	2,428	74.3	2.92	98	76.2	4.05	787	18.8	4.05	3.25–5.00
Falls from elevation	46	47.7	1.88	831	25.4	1.88	37	28.8	2.54	474	11.3	2.54	1.77–3.55
Falls from same level	143	148.4	2.67	1,819	55.7	2.67	62	48.2	2.63	768	18.3	2.63	1.99–3.41
Neck, Back UE-MSDs	628	651.6	2.51	8,476	259.4	2.51	413	320.9	2.99	4,496	107.4	2.99	2.70–3.31
Struck by/against an object	1,334	1,384.1	3.00	15,090	461.8	3.00	261	202.8	3.82	2,225	53.1	3.82	3.35–4.34
Toxics	177	183.6	3.68	1,630	49.9	3.68	19	14.8	3.29	188	4.5	3.29	1.94–5.28
Lower extremity MSDs	82	85.1	2.74	1,016	31.1	2.74	36	28.0	2.11	556	13.3	2.11	1.46–2.95
Other	519	538.5	2.17	8,122	248.5	2.17	117	90.9	2.45	1,552	37.1	2.45	2.02–2.96
Transportation and warehouse													
Caught in	119	92.1	1.71	489	53.7	1.71	41	22.0	1.73	180	12.7	1.73	1.20–2.44
Falls from elevation	63	48.8	0.79	562	61.8	0.79	52	27.9	0.74	536	37.8	0.74	0.54–0.98
Falls from same level	94	72.8	0.79	843	92.6	0.79	62	33.3	0.85	562	39.0	0.85	0.65–1.11
Neck, Back UE-MSDs	507	392.5	1.25	2,850	313.2	1.25	358	192.1	1.21	2,251	158.9	1.21	1.08–1.35
Struck by/against an object	820	634.9	1.78	3,253	357.4	1.78	226	121.3	2.17	790	55.8	2.17	1.87–2.52
Toxics	50	38.7	1.13	311	34.2	1.13	11	5.9	2.61	32	2.3	2.61	1.19–5.32
Lower extremity MSDs	77	59.6	0.95	571	62.7	0.95	28	15.0	0.44	485	34.2	0.44	0.29–0.64
Other	229	177.3	0.92	1,762	193.6	0.92	83	44.5	0.60	1,059	74.8	0.60	0.47–0.75
All other industries													
Caught in	46	10.0	0.49	4,152	20.4	0.49	20	3.2	0.81	1,073	4.0	0.81	0.49–1.26
Falls from elevation	68	14.8	0.54	5,585	27.4	0.54	35	5.7	0.46	3,275	12.2	0.46	0.32–0.65
Falls from same level	146	31.9	0.52	12,560	61.6	0.52	57	9.2	0.45	5,488	20.5	0.45	0.34–0.58
Neck, Back UE-MSDs	440	96.0	0.58	33,611	164.9	0.58	313	50.7	0.71	19,117	71.4	0.71	0.63–0.79
Struck by/against an object	643	140.3	0.51	56,423	276.8	0.51	88	14.3	0.48	7,903	29.5	0.48	0.39–0.60
Toxics	86	18.8	0.65	5,906	29.0	0.65	13	2.1	1.13	500	1.9	1.13	0.60–1.95
Lower extremity MSDs	74	16.1	0.64	5,158	25.3	0.64	37	6.0	0.5	3,188	11.9	0.5	0.35–0.70
Other	182	39.7	0.39	20,746	101.8	0.39	61	9.9	0.49	5,437	20.3	0.49	0.37–0.63

IR, incidence rate; IRR, incidence rate ratio; 95%CI, 95th percent confidence interval; Neck, Back UE-MSDs: Neck, back and upper extremity-musculoskeletal disorders.

standard employment workers for both medical only and compensable claims. For medical only claims, temporary agency workers had higher rates of injury for all injury/illness types in construction and manufacturing sectors ranging from 88% higher rates for falls from elevation in manufacturing (IRR 1.9; 95% CI 1.4, 2.5) to almost 400% higher for toxics in construction (IRR 3.7; 95% CI 3.1, 4.3). IRRs for temporary employees in the transportation and warehouse sector were also higher than standard employment workers for caught in, neck, back and UE-MSDs and toxics than standard employment workers (Table IV).

Compensable Claims. Injury rates by industry for temporary agency employed workers compared to standard employment workers are for the most part, similar in compensable claims to those in medical only claims, with a few exceptions. IRRs increase significantly for “caught in” injuries in construction (from 3.6 to 4.9) and in manufacturing (from 2.9 to 4.0) (Table IV). The magnitude of compensable claim IRRs decreased for all injury types in construction, although the rates remained statistically significantly higher for temporary agency employees compared to standard arrangement employees (Table IV). Claim IRRs also increased significantly from medical only to compensable claims for “struck by or against” (3.0 vs. 3.8) in the manufacturing industry. IRRs in the transportation and warehousing industry remained fairly stable between medical only and compensable claims with the exception of toxics which more than doubled (from 1.1 to 2.6) (Table IV).

Temporary workers appear to have a higher risk of developing neck, back and UE-MSDs in all industries (except “Other”), from IRR 1.21 (95% CI 1.1–1.3) in transportation and warehouse to IRR 2.99 (95% CI 2.7, 3.3) for manufacturing.

DISCUSSION

In this study we found that temporary agency workers work in more hazardous industries (construction, manufacturing and transportation and warehousing) [Bonauto et al., 2006] and have higher claims rates than standard employment employees. These findings are consistent with previous studies [Benavides et al., 2000; Saha et al., 2004]. A more critical finding in this study is that the relative rates of injury for temporary agency workers look very different in different industry sectors. A dramatic example of this can be seen for “caught in” injuries, comparing IRRs between Tables III and IV. Table III presents an IRR of 1.87 for “caught in” injuries but when presented by industry sectors the IRRs vary from 0.49 to 3.62 (medical only) and from 0.81 to 4.93 (compensable). It appears then that the rates in Table III could either under or over estimate

the disparity in injury rates by a factor of 3 for certain industry sectors. This strongly suggests the need to control for industry or some form of job task data when studying injury disparities between different types of employment arrangements.

In addition to the unequal burden of occupational injuries, there also appear to be disparities in the processes involved in reporting and adjudicating a workers’ compensation claim. Higher proportions of employers questioned the validity of a claim (medical only) and a higher proportion officially protested claims for both medical only and compensable claims for temporary workers versus standard employment workers. In the WC system, although health care providers submitted the initial WC claim form more quickly for temporary agency workers than for standard employment workers, there appeared to be a higher proportion of rejected claims. The first time-loss payments for temporary agency workers were more likely to be delayed than for standard employment employees.

Temporary agency workers are most likely working in many different jobs and potentially receiving assignments from multiple agencies, so the distribution of the burden of workers’ compensation costs can be complicated and may make agencies more likely to protest claims. Quinlan [2004] discussed the challenges to the Australian workers’ compensation systems that may also be reflected in the United States. These include co-employment situations and the under reporting by means of misclassifying the type of work the temporary worker is doing.

The median costs for both time loss and medical payments were much lower for temporary workers, which is contrary to what Park and Butler [2001] found in their analysis of Minnesota’s workers’ compensation data. Temporary agency workers in our study had almost 1.5 times more days off work (median time loss) than standard employment workers, more consistent with findings from Park and Butler [2001]. Longer time loss duration may be due to the types of injuries requiring longer recovery, but are not due to increased medical procedures.

It is not clear in our study whether or not temporary agency employees file claims to sustain themselves financially when they are not regularly employed. However, a lower proportion of temporary agency workers in our study had prior claims and subsequent claims, and were paid far less for more days of time loss, compared to standard arrangement employees. Thus, it is not clear that temporary workers have a greater incentive to over-report work-related injuries. Quinlan [2004], using unpublished data from the National Occupational Health and Safety Commission (NOHSC), found that temporary workers were less likely than permanent workers to claim workers’ compensation in Australia. Time loss payment amounts in Washington State are based upon many factors including whether or not the claimant is married, how many children they have and

whether or not their employer provides health insurance.¹ Temporary agency employed claimants had higher proportions of single workers with no dependents and no employer provided health insurance, all of which might explain in part why they had lower time loss payments.

Alternatively, since injured temporary workers in this study were younger and likely less consistently employed, the lower proportions of prior claims and subsequent claims over time, may represent diminished prior or subsequent work exposures. Additional information about lifelong work histories are required to test hypotheses related to this issue.

Although there are no differences in the United States' Occupational Safety and Health Act (OSHA) regulations between standard employment workers and temporary agency employed workers, those in temporary agency employment situations are for the most part a vulnerable population with few employment protections and even less in terms of a formal structure or operational framework for returning to work after an injury with accommodation. While we have identified three industries in need of safety and health interventions (construction, manufacturing, and transportation and warehouse), and identified specific injury types (caught in, struck by, and MSDs) where disparities exist, more research is needed. Due to the small proportion of temporary agency employed workers in our cohort, we were unable to look more closely at other industries which are generally considered high users of temporary workers such as food preparation/servers and health care. A larger cohort would help to further explore these industries.

Strengths and Limitations

To our knowledge this is the first exploratory study of a large cohort of temporary agency employed workers' compensation claimants from the United States to provide detailed rates of injury by industry. We hope this data will promote the development of future hypotheses and studies. While we were able to look at all filed claims for SF workers' compensation claimants covering over two thirds of Washington States' working population, a major limitation of this study is that we relied completely on administrative data. These data are collected for the purposes of providing insurance coverage and for determining premium payment calculations. Therefore this study is limited in its ability to provide measures of other potentially important factors such as employee rates of chronic diseases, workplace physical exposures, work organization and psychosocial aspects of the workplace such as stress and perceptions of job insecurity. More research is needed in all of these domains of potential

risk factors for occupational injuries in temporary agency employed workers.

The use of WIC codes to identify our cohort is both a strength and a limitation of this study. Using a categorical system that combines industry and occupation such as the WIC provides some indication of exposure. However, the use of the crosswalk from WIC to NAICS to identify comparable standard work arrangement claimants may be problematic. In terms of the workers' true physical and psychosocial exposures on the job, both the WIC classifications and the NAICS codes are heterogeneous. We were unable to look at more specific (i.e., three or four-digit) NAICS codes as they would not have been comparable to the WIC classifications for temporary service agencies. Very specific comparisons of temporary workers to workers in standard employment arrangements with similar job tasks and hazardous exposures are not possible within the administrative data coding systems available to us.

Wages are used as the unit of exposure to estimate premium rates in all other states except Washington which uses the number of hours worked [Oregon State, 2007]. Therefore, unlike other states, Washington has the unique ability to determine the total hours worked by NAICS and by risk classification for all covered State Fund employer accounts. Hours reported by risk classification are audited extensively by L&I, as premium payments are based upon these reports. Hours worked in an industry or occupation are a better indication of risk than wages, as many hazardous jobs are also low wage.

Temporary agency workers in the United States constitute a substantial portion of the working population. In continuing efforts to quantify risks and associated prevention methods to reduce occupational health disparities, temporary workers should be considered a priority group as they are an easily identifiable at-risk sector of the contingent workforce. It also appears critical to not only identify temporary workers, but to identify which industries they are working in, as this is vital to fully appreciate the disproportionate rate of injuries suffered by temporary workers. Future research is needed to quantify the occupational hazards and more importantly devise intervention studies to reduce the disparities temporary workers face in some of our most dangerous industries.

REFERENCES

- Amuedo-Dorantes C. 2002. Work safety in the context of temporary employment: The Spanish experience. *Ind Labor Relat Rev* 55:262–285.
- Bardasi E, Francesconi M. 2004. The impact of atypical employment on individual wellbeing: Evidence from a panel of British workers. *Soc Sci Med* 58:1671–1688.
- Benach J, Benavides FG, Platt S, Diez-Roux A, Muntaner C. 2000. The health-damaging potential of new types of flexible employment: A challenge for public health researchers. *Am J Public Health* 90:1316–1317.

¹ Washington State Supreme Court ruling (*Cockle v. Department of Labor and Industries*, 172 Wn.2d 801, 16 P.3d 583 (2001)). The court held that time-loss benefits must be calculated not only with an injured worker's wages, but also any health or dental insurance benefits the employer paid on behalf of the worker.

- Benavides FG, Benach J, Diez-Roux AV, Roman C. 2000. How do types of employment relate to health indicators? Findings from the second European survey on working conditions. *J Epidemiol Community Health* 54:494–501.
- Benavides FG, Benach J, Muntaner C, Delclos GL, Catot N, Amable M. 2006. Associations between temporary employment and occupational injury: What are the mechanisms? *Occup Environ Med* 63:416–421.
- Bureau of Labor Statistics (BLS). 2005. Contingent and alternative employment arrangements. Washington, DC: United States Department of Labor.
- Bonauto D, Silverstein B, Adams D, Foley M. 2006. Prioritizing industries for occupational injury and illness prevention and research, Washington State Workers' compensation claims, 1999–2003. *J Occup Environ Med* 48:840–851.
- Washington State Employment Security Department (ESD). 2007. Labor Market and Economic Analysis. Accessed Workforce Explorer website on October 20, 2008 at: <http://www.workforceexplorer.com/article.asp?ARTICLEID=8098>.
- Foley MP. 1998. Flexible work, hazardous work: The impact of temporary work arrangements on occupational safety and health in Washington State, 1991–1999. *Res Hum Cap Dev* 12:123–147.
- Morris JA. 1999. Injury experience of temporary workers in a manufacturing setting. Factors that increase vulnerability. *AAOHN J* 47:470–478.
- Oregon State. 2007. Oregon workers' compensation premium rate ranking calendar year 2006. Accessed on June 29, 2009 at: http://www.cbs.state.or.us/imd/rasums/2083/08web/08_2083.pdf
- Park Y-S, Butler RJ. 2001. The safety costs of contingent work: Evidence from Minnesota. *J Labor Res* 22:831–849.
- Polivka AE. 1996. Contingent and alternative work arrangements, defined. *Monthly Labor Review*. volume 119, issue 10 pp: 3–9. Washington, DC: Bureau of Labor Statistics.
- Quinlan M. 2004. Workers' compensation and the challenges posed by changing patterns of work: Evidence from Australia. Sydney: Research project commissioned by the Work Cover Authority of New South Wales.
- Saha A, Ramnath T, Chaudhuri RN, Saiyed HN. 2004. An accident-risk assessment study of temporary piece rated workers. *Ind Health* 42:240–245.
- Saloniemi A, Virtanen M, Koivisto AM. 2004. Is fixed-term employment a new risk for adverse physical working conditions? *Int J Occup Saf Ergon* 10(1):35–42.
- Silverstein B, Welp E, Nelson N, Kalat J. 1998. Claims incidence of work-related disorders of the upper extremities: Washington State, 1987 through 1995. *Am J Public Health* 88:1827–1833.
- Silverstein B, Viikari-Juntura E, Kalat J. 2002. Use of a prevention index to identify industries at high risk for work-related musculoskeletal disorders of the neck, back, and upper extremity in Washington state, 1990–1998. *Am J Ind Med* 41:149–169.
- Virtanen M, Kivimaki M, Elovainio M, Vahtera J, Cooper CL. 2001. Contingent employment, health and sickness absence. *Scand J Work Environ Health* 27:365–372.
- Virtanen M, Kivimaki M, Elovainio M, Vahtera J, Ferrie JE. 2003. From insecure to secure employment: Changes in work, health, health related behaviours, and sickness absence. *Occup Environ Med* 60:948–953.
- Virtanen M, Kivimaki M, Joensuu M, Virtanen P, Elovainio M, Vahtera J. 2005. Temporary employment and health: A review. *Int J Epidemiol* 34:610–622.
- Washington State. 2007. Washington State Department of Labor and Industries. Workers' Compensation Insurance Manual (Chapter 296-17 Washington Administrative Code (WAC)). Olympia, Washington: Department of Labor and Industries, Insurance. Services Division, Classification Services.