

An Examination of Washington State Workers' Compensation Claims for Home-Based Health Care Workers, 2006 to 2016: Part I. Description of Claims and Claimants

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Abstract

Home-based health care can be physically and emotionally demanding, resulting in injury or illness. Washington State's workers' compensation compensable claims between 2006 and 2016 were analyzed to describe the characteristics of injured home-based health care (HBHC) providers and the burden created by these injuries. Comparisons were made with clinical health care (CHC) providers, as well as between all compensable claims and work-related musculoskeletal disorder (WMSD) claims. Over 90% of claimants for both HBHC and CHC were female. The mean age of all compensable HBHC claimants (45.7 years) was significantly older than for CHC, with the majority (54.5%) between the ages of 40 and 59. However, HBHC claimants with WMSDs were younger, overall. Across health care type and claim type, the majority of injured care providers were overweight or obese (BMI ≥ 25). The highest mean age occurred among claimants injured from falls, either on the same level or to a lower level (HBHC: 48.3–48.6 years, CHC: 46.1–48.1 years). This same group also had the highest BMIs. WMSDs accounted for 47.3% of HBHC compensable claims and 50.3% for CHC. Falls on the same level were the second most common injury event among HBHC claims. For both HBHC and CHC, back injuries were the most common body part for both claim types (all compensable claims: 28.8% HBHC and 23.9% CHC, WMSD claims: 60.8% HBHC and 47.5% CHC). Overexertion was the injury event most attributed to WMSDs (HBHC: 82.6%, CHC: 71.6), overexertion during lifting being the most prevalent overexertion type (HBHC: 27.8%, CHC: 19.6%).

Keywords

home health care, home care, workers' compensation, work-related musculoskeletal disorders, occupational injuries, home-based care

Introduction

Home-based health care (HBHC) relies heavily on aides, who provide the most frequent and intensive care.¹ Given the physical demands of caring for those with functional impairments, it is not surprising that these health care support workers have been shown to suffer a high rate of work-related injury. In Washington State, between 2012 and 2016, the most common workers' compensation claims for this occupational group were for work-related musculoskeletal disorders (WMSDs), falls on the same level, and being struck by or against objects, costing \$86 million.² Nationally, in 2019, home health aides and personal care aides had almost as high a combined injury/illness incidence rate (94.5/10,000 FTEs) for non-fatal injuries involving days away from work as registered nurses.³ Wipfli et al found that home health aides suffered work-related injuries at a rate 3 times higher than the

national average for all occupations.⁴ The workforce of home-based health care is predominantly female^{1,5-7} and immigrant.^{5,7} A growing number of workers are in the fifties^{1,5} and have been found to be older than non-home based health care workers.⁶ Injury rates have been found to be higher in HBHC providers who are female, and older (50–65 years of age).⁸ An early examination of workers' compensation claims (1995–1996) of home health care workers found an injury incidence

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rate that fell between nursing home workers and hospital-based workers.⁹ This same examination also found that the mean number of days of lost work (44 days) was significantly more than that for nursing homes and hospitals.⁹ An examination of accepted workers' compensation claims of unionized home care aides found the most common injury events were overexertion and repetitive motion, falls and struck by or against objects.⁸ Injuries to these workers are most often attributable to patient handling.^{4,10,11} In a 2010 study of workers' compensation claims in Washington State, the overwhelming majority of severe claims filed by HBHC workers arose from interactions with patients.¹²

WMSDs continue to be the most prevalent occupational injury nationally and across all industries. In 2018, WMSDs accounted for 30% of the injuries requiring days away from work.¹³ It is estimated that almost one-third of the U.S. working age population has been permanently removed from the workforce over the past 30 years due to disabilities related to WMSDs.¹⁴ Three of the top five diagnoses associated with the longest number of years lived with disability are back, neck, and other musculoskeletal disorders.¹⁴ Though on the national level, nursing assistants, who are commonly employed as home-based health care aides, have accounted for 52% of the WMSDs in the private sector,¹³ few studies have looked at WMSDs specifically to support care workers in the home-based health care industry. In Washington State, the most prevalent workers' compensation injury type among HBHC workers was musculoskeletal disorders.¹² Previous studies found back WMSDs to be the most prevalent injury among home care workers.¹⁵ Longer periods of work as a home-based care provider (>2 years with a patient) and frequent back flexion have been identified as risk factors of those suffering from chronic or persistent WMSDs.¹⁶

Risk factors for injuries and illnesses in HBHC have been identified, some unique to this type of health care. As a consequence of better health and cost outcomes from home-based health care, there is an increased demand for home-based health care. However, as the demand for HBHC workers has grown, it has become increasingly difficult to meet this demand with the pool of available workers,¹⁷ creating a high workload for existing providers. Health care practices in clinical settings are evolving to where the length of stay is shorter, with more patients discharged to home care more often and sooner. The care provided has also intensified as advances in health care technology means more complex care, such as dialysis and home infusion therapies, can now be supported at home.² Patient/client characteristics, the organization of work, and the built environment also pose risk factors for injury.¹⁸ While patient care in clinical settings and home settings share similarities, such as frequent patient handling, significant differences exist that may create differential risk and impact the type and severity of injuries suffered. Unlike the clinical setting, homes are designed primarily for the healthy and able-bodied, and are not subject to specific regulations governing the design of a health care

facility. And unlike the clinical settings where multiple staff (often registered nurses) are able to care for a patient with readily available assistive equipment, providing care in the home often involves only one caregiver (a certified nursing assistant or aide) and very little, if any, assistive equipment. Home-based health care aides' overall health may also differ from those in clinical settings, potentially posing additional risk factors for injury. Home-based health care support workers in Washington State were more often found to be overweight, and suffer from arthritis and diabetes more frequently than non-home based support occupations.⁶

Workers' compensation claims data are a reliable data source for conducting injury and illness surveillance, though the generalizability of its findings may be limited to individual states due to state-specific workers' compensation regulations, such as coverage and reporting requirements, and administrative practices.¹⁹ And despite the acknowledgment that workers' compensation systems underestimate the actual prevalence of occupational injuries,²⁰⁻²³ its data are an important component to occupational research and prevention efforts. Few states have the capacity to conduct state-wide ongoing injury surveillance research of workers' compensation claims, resulting in a lack of population-based injury and illness data in the HBHC industry. With a monopolistic workers' compensation system, Washington State is able to evaluate occupational injuries and illnesses among populations that are difficult to identify in other surveillance systems. Workers' compensation records provide information on injury outcomes, severity, direct costs of medical care, and financial benefits to injured workers with lost work time or permanent disability.²⁴ This research aims to provide current population-level injury data of home-based care aides in Washington State.

As a group, until recently, workplace safety and health in HBHC has not received the same consideration as clinical health care (CHC). Studies comparing HBHC care to more traditional health care in hospitals and nursing homes have found some differences between demographics, injury types and rates,^{6,25-27} and such, the efficacy of care practices, workplace policies, and programs developed in the clinical setting is not clear in the home setting.²⁸ In order to understand this, identification of the similarities and differences in injuries and illnesses suffered by home-based health care and clinical health care providers is needed. This may help to highlight the impact of occupational health and safety issues in the home-based health care industry.

The purpose of this research is to summarize the work-related injuries suffered by home-based health care aides with respect to demographics, injured body regions, injury events and costs, using Washington State's workers' compensation claims data between 2006 and 2016. Additionally, workers' compensation claims were compared between home-based health care workers and clinical health care workers to highlight differences between these 2 groups. As WMSDs are the most prevalent injury type in Washington

State's workers' compensation program among HBHC services,² specific attention is paid to this injury type.

Methods

Washington Workers' Compensation Claims

This study used compensable claims data between 2006 and 2016 from the Washington State workers' compensation claim system to quantify the injuries suffered by home-based health care workers and then compared these injuries to those suffered by clinical health care workers. Workers' compensation claims data were extracted in February 2019 for claims accepted between January 1, 2006 and December 31, 2016, based on the adjudicated date of injury.

With few exceptions, all employers in Washington are required to obtain workers' compensation insurance from the state, unless they are approved to self-insure. The Washington State Department of Labor and Industries administers the state-funded industrial insurance system, commonly referred to as the State Fund (SF). Among Washington's workforce required to be covered, approximately 72% are reported in the State Fund. Self-insured (SI) employers cover the remaining employees. For this research, accepted compensable claim data (both SF and SI) were extracted for analysis. A claim is considered "compensable" when a worker is eligible for wage replacement or disability benefits. These claims are considered more severe than claims limited to medical treatment only. In Washington State, injured workers are eligible for wage replacement if they are unable to work after a 3-day waiting period. The SF workers' compensation database includes administrative data needed to adjudicate claims, including codes for characterizing the injury or illness; costs associated with disability payments, medical procedures and treatments; and physician diagnosis codes. Comparatively, SI claim data are incomplete compared to SF data in that data for medical billing, costs, and days of missed work are available only for closed claims.

From each claim, data regarding claim status (medical only or compensable), body part, injury event, associated costs and lost workdays due to injury were extracted. Body part and event were classified by Occupational Injury and Illness Classification System (OIICS) codes (v1.01). OIICS codes are assigned at the beginning of the claim process and represent an initial description of the injury. Costs were expressed in 2015 U.S. dollars using the Consumer Price Urban Workers Index. Complete claim cost data were only available for SF claims. Closed claim costs reflected the actual dollars paid out during the analysis period (2006-2016), though costs may have continued to be paid out even after the claims were closed. Open claim costs reflected the actual dollars paid out to the end of the analysis period, in addition to case reserve estimates for future claim costs.

Claims data were grouped into 17 injury events, based on the OIICS coding. The injury events were: WMSDs, Fall on the Same Level, Fall to a Lower Level, Struck by/Against,

Vehicle Accidents, Overexertion (not a result of cumulative exposure), Caught In/Under/Between, Violence, Bodily Reaction, Exposure to Loud Noises, Respiratory Diseases, Exposure to Toxins, Exposure to Extreme Temperature, Abrasion, Electrical, Explosion, and Others. These groupings are used in previous analyses of workers' compensation claims data for all industries in Washington State.^{29,30}

Definition of Occupational Groups, Home-Based Health Care (HBHC), and Clinical Health Care (CHC)

For each claim to the Washington State workers' compensation system, a risk classification code is assigned. Washington State uses its own risk classification system when setting insurance rates. This system of over 300 risk classifications is based on the degree of hazard for occupations or industries. Each claim is also assigned a code from the North American Industrial Classification System (NAICS), a federal standard commonly used to classify businesses. Although NAICS is often used to analyze and publish statistical data, for the purposes of this study, the applicable NAICS codes that include home-based health care (6216-Home Health Care Services and 6241-Individual and Family Services) are too general to differentiate home-based health care claims. As such, HBHC was identified as compensable claims with the combination of NAICS codes 6216 or 6241 and a risk class of either 6110 (Home Services, Nursing Care Not Otherwise Classified), 6511 (Chore Services/Home Care Assistants), or 6512 (Home Care Services/Home Care Registry). A total of 5,558 claims were extracted. Claims for CHC, were also extracted and used as a comparison. To identify claims for clinical health care, an initial data step involved the extraction of claims with NAICS codes 621 (Ambulatory Health Care Services), 622 (Hospitals), and 623 (Nursing and Residential Care Facilities). This initial data extraction yielded 82,641 claims. A review of the risk classes associated with these claims was completed and risk classes not associated with CHC services were removed from the dataset (117 risk classes). After medical-only claims were eliminated, the final dataset consisted of 43,513 claims.

Case Definition of Work-Related Musculoskeletal Disorders (WMSDs)

In the Washington workers' compensation system, claims are categorized as non-traumatic or traumatic onset to differentiate cumulative exposures from acute exposures. WMSD cases involve combinations of OIICS codes for body part, injury nature, and non-traumatic event type consistent with WMSDs (Appendix 1). WMSDs were identified either by a specific body part code and a general WMSDs diagnosis, a generalized body part code with a diagnosis that clearly indicated the specific body part, such as carpal tunnel syndrome, or the injury

Table 1. Description of Washington State Workers' Compensation Compensable^a Claims for Home-Based Health Care and Clinical Health Care, 2006 to 2016.

Health care type	All Compensable ^a Claims		WMSD Compensable ^a Claims	
	HBHC	CHC	HBHC	CHC
Industry size, FTEs (1000s)	397.1	2036.7		
Claim count				
All comp claims (SF+SI)	5558	43,513	2631	21,899
Percent of all comp claims (SF + SI)	100	100	47.3	50.3
State fund comp claims	5355	19,325	2540	8973
% of Claims by body part				
Back	28.8	23.9	60.8	47.5
Neck	6.3	3.1	13.3	6.1
Shoulder	9.2	8.9	19.4	17.7
Elbow	2.5	2.3	5.3	4.5
Hand/Wrist	3.7	7.3	7.8	14.5
Knee	4.2	3.7	8.8	7.4
% of Claims by injury event (SF + SI)				
WMSD	47.3	50.3		
Falls on the same level	18.2	13.5		
Falls to a lower level	4.7	2.1		
Struck By/Against	5.2	5.9		
Overexertion	7.7	6.6		
Violence	5.9	8.8		
Vehicle accidents	5.5	1.2		
All Others	5.5	11.6		

Note. SF = State Fund Insured; SI = Self-Insured; WMSD = work-related musculoskeletal disorders; HBHC = home-based health care; CHC = clinical health care; FTE = full-time equivalent (2000 hours worked/year).

^aInvolves an injured or ill worker medically certified as unable to perform normal work duties beyond 3 calendar days, not including the date of injury.

coding alone clearly indicated a WMSD. This case definition of WMSD has been previously published.^{6,31-33} Body regions included the trunk, upper extremities, lower extremities, and multiple body parts. Injury nature involved dislocations; sprains, strains, and tears; back pain, non-specified soreness, pain, hurt excluding the back; carpal tunnel syndrome and other disorders of the peripheral nervous system; diseases of the circulatory system; and disorders and diseases of the musculoskeletal system. WMSD exposures included contact stress and bodily reaction, and exertion.

Data Analysis

Extracted claims data were analyzed using SAS[®] 9.4 software. All compensable claims and WMSD claims, a subset of compensable claims, for HBHC and CHC were analyzed. Claimant demographic data, recorded on the claim initiation form, were summarized (age, gender, and body mass index [BMI]). Descriptive statistics of general claim data were determined. Claim rates for all compensable claims and WMSD claims, expressed as claims per 10,000 full time equivalents (FTEs), were determined. An FTE is defined as an employee working 2000 hours per year and is based on the number of working hours reported by employers. Chi-square statistics were used to compare categorical variables between HBHC and CHC

samples (significance level $P < .05$); t -tests were used compare interval variables (significance level $P < .05$).

Results

Description of Workers' Compensation Claims

Workers' compensation claimant demographic data were analyzed. Ninety-four percent (94%) of all compensable claims between 2006 and 2016 (HBHC and CHC combined) were within the State Fund industrial insurance. Descriptive statistics of claims are displayed in Table 1. WMSD claims in HBHC accounted for 47.3% of all compensable claims in this sector. For CHC, WMSDs accounted for 50.3% of all compensable claims. The back was the most common body region injured. Back injuries accounted for 28.8% and 23.9% of all compensable claims for HBHC and CHC, respectively; back WMSDs accounted for 60.8% and 47.5% of HBHC claims and CHC claims, respectively. The number of neck WMSDs for HBHC was double that for CHC (13.3% vs 6.1%). Conversely, for all compensable claims, the number of hand/wrist claims for HBHC was half that of CHC claims (3.7% vs 7.3%). HBHC claims for WMSDs and falls on the same level (FSL) were the two most common event types, with claims for WMSDs ($n=2631$) more than double that of FSL ($n=1010$),

Table 2. Washington State Workers' Compensation Compensable^a Claims Costs and Lost Productivity for Home-Based Health Care and Clinical Health Care, 2006 to 2016.

Health care type	All Compensable ^a Claims		WMSD Compensable ^a Claims	
	HBHC	CHC	HBHC	CHC
Claim Rate, claims/10,000 FTEs (SF+SI)	139.9 ^α	213.6	66.2 ^α	107.5
Claim costs ^b (SF only)				
Total costs (million)	\$145 ^α	\$485	\$69 ^α	\$233
Median claim cost	\$9432 ^β	\$7743	\$10,061 ^β	\$8868
Medical costs				
Total cost (million)	\$78 ^α	\$235	\$37 ^α	\$114
Median claim cost	\$6324 ^β	\$4959	\$6672 ^β	\$5926
Non-medical costs				
Total cost (million)	\$67 ^α	\$250	\$32 ^α	\$118
Median claim cost	\$2348	\$2080	\$2707	\$2301
Days away from work ^c (SF only)				
Total days missed	974,967 ^α	3,255,921	487,378 ^α	1,574,148
Median missed days	62	37	73	43
Average missed days	182	168	192	132

Note. SF=State Fund Insured; SI=Self-Insured; WMSD=work-related musculoskeletal disorders; HBHC=home-based health care; CHC=clinical health care; FTE=full-time equivalent (2000 hours worked/year).

^aInvolves an injured or ill worker medically certified as unable to perform normal work duties beyond 3 calendar days, not including the date of injury.

^bCosts expressed in 2015 US dollars, using the Consumer Price Index-Urban Workers index.

^cAmong claims with wage replacement benefits.

^α $P < .0001$. ^β $P \leq .05$.

which in turn was almost 4 times more frequent than the next injury event, falls to a lower level, FLL ($n=260$). Both HBHC medical costs of all compensable claims and WMSD claims were approximately 54% of the total claim costs. For CHC, that proportion was approximately 49% (Table 2). HBHC claims were found to be significantly more expensive than CHC claims for all compensable claims (median cost: \$2,348-HBHC, \$2,080-CHC), and for WMSD claims (median cost: \$2707-HBHC, \$2301-CHC) (Table 2). Additionally, claims for HBHC involved significantly more missed workdays for all claims (median number of days: 62 days-CHC, 37 days-HBHC), and WMSD claims (median number of days: 73 days-CHC, 43 days-HBHC) (Table 2). WMSD claims accounted for close to half of the lost workdays for both HBHC and CHC (49.9% and 48.3%, respectively) (Table 2). Though not statistically significant, the median number of lost workdays was greater for HBHC for all compensable claims and WMSD claims (Table 2). The mean number of missed workdays per claim for all HBHC compensable claims (182 days) was 8% higher than for CHC (168 days), while for WMSD claims, the mean number of missed workdays for HBHC (192 days) was 37% more than for CHC (132 days).

Description of Workers' Compensation Claimants

From Table 3, HBHC workers' compensation claimants were predominantly female (90.1% for all compensable claims, 91.6% for WMSD claimants). These proportions were statistically significantly more ($P < .001$) than the CHC claimants

(79.5% for all compensable claims, 81.7% for WMSD claims). The mean age of HBHC claimants was also significantly older ($P < .001$) than CHC claimants for all compensable claims (45.7 vs 43.8 years) and for WMSD claims (45.3 vs 42.9 years). The majority of the claimants were between the ages of 40 and 59 (HBHC compensable claimants-54.5%, CHC compensable claimants-53.5%, HBHC WMSD claimants-42.5%, CHC WMSD claimants- 52.6%). HBHC WMSD claimants, however, were younger, overall. The majority of these workers fell between 30 and 49 years of age. HBHC claimants had significantly higher BMIs ($P < .001$) than those in CHC. Among all compensable claims, HBHC had a median BMI of 30.4 compared to 28.4 for clinical health care claimants. The median BMI for HBHC WMSD claimants was also significantly greater ($P < .001$) than for CHC claimants (30.3 vs 28.3, respectively). Across all claim types and occupational groups, the majority (64.2%-72.0%) had BMIs in the overweight and obese range ($BMI \geq 25.0$). HBHC compensable claimants had the highest proportion with 72.0%. In the examination of claimant characteristics by event type (Table 4), falls (both FSL and FLL) had the highest mean age for both HBHC and CHC, though HBHC claimants were older than CHC claimants. These same event types also had the highest proportions of claimants that were overweight and obese by BMI (76.1% and 75.8% for HBHC claimants with injuries from FSL and FLL, respectively; 68.8% and 65.5% for CHC for FSL and FLL). More HBHC claimants than CHC claimants were overweight and obese across each event type.

Table 3. Washington State Workers' Compensation Claimant^a Description by Health Care Type, 2006 to 2016.

	All compensable ^a Claims		WMSD compensable ^a claims	
	HBHC (n=5558)	CHC (n=43,513)	HBHC (n=2631)	CHC (n=21,899)
Gender (% Female)	90.1*	79.5	91.6*	81.7
Age (mean)	45.7*	43.8	45.3*	42.9
Age Group (%)				
<20 years	1.3	1.3	1.2	1.3
20-29 years	12.9	15.0	13.0	16.2
30-39 years	15.5	19.4	15.6	21.0
40-49 years	24.3	25.1	25.5	25.8
50-59 years	30.9	28.8	31.8	27.1
60+ years	15.1	10.5	12.9	8.6
Body mass index, BMI (median)	30.4*	28.4	30.0*	28.3
BMI group (%)				
Underweight (BMI < 18.5)	9.1	12.1	8.6	11.0
Normal, healthy (18.5 ≤ BMI < 25.0)	18.9	23.7	19.9	25.2
Overweight (25.0 ≤ BMI < 30.0)	24.1	26.9	24.9	27.5
Obese (BMI ≥ 30.0)	47.9	37.3	46.6	36.3

Note. WMSD = work-related musculoskeletal disorders; HBHC = home-based health care; CHC = clinical health care.

*significance level $P < .0001$.

^aAn injured or ill worker medically certified as unable to perform normal work duties beyond 3 calendar days, not including the date of injury.

Table 4. Washington State workers' Compensation Claimant^a Description by Health Care Type and Injury Event, 2006 to 2016.

Event	WMSD		Fall on Same Level		Falls to Lower Level		Struck By/ Against		Overexertion		Violence		Vehicle Accidents		All Others	
	HBHC	CHC	HBHC	CHC	HBHC	CHC	HBHC	CHC	HBHC	CHC	HBHC	CHC	HBHC	CHC	HBHC	CHC
Health Care Type	HBHC	CHC	HBHC	CHC	HBHC	CHC	HBHC	CHC	HBHC	CHC	HBHC	CHC	HBHC	CHC	HBHC	CHC
Gender, female	91.6%	81.7%	91.3%	85.3%	87.3%	82.1%	89.2%	77.5%	86.7%	74.3%	86.3%	67%	85.7%	62.6%	89.2%	78.0%
Age (mean)	45.3	42.9	48.6	48.1	48.3	46.1	44.1	44.2	44.6	42.3	41.2	42.3	43.2	42.7	47.4	44.4
Age Group																
<20 years	1.2%	1.3%	0.8%	1.5%	1.2%	0.9%	1.9%	1.9%	2.2%	1.6%	1.9%	1.0%	1.4%	0.6%	1.4%	1.6%
20-29 years	13.1%	16.2%	9.1%	8.8%	8.4%	12.9%	17.1%	13.7%	13.5%	18.1%	22.4%	18.5%	16.3%	17.6%	9.9%	13.4%
30-39 years	15.6%	21.0%	12.7%	13.6%	13.6%	16.6%	13.4%	18.6%	17.0%	20.3%	20.8%	21.7%	21.7%	20.2%	14.0%	18.1%
40-49 years	25.5%	28.5%	22.1%	22.1%	23.6%	22.7%	26.4%	25.0%	24.7%	25.2%	20.8%	25.0%	23.7%	27.7%	23.5%	25.4%
50-59 years	31.8%	27.1%	33.5%	36.3%	30.8%	32.2%	29.7%	30.4%	28.4%	26.6%	26.3%	25.4%	24.1%	25.1%	31.4%	29.9%
60+ years	12.9%	8.6%	21.7%	18.3%	22.4%	14.6%	11.5%	10.5%	14.2%	8.1%	7.7%	8.5%	12.9%	8.8%	19.8%	11.6%
Body Mass Index (mean)	31.3	29.6	33.2	31.3	32.5	30.9	31.5	29.2	31.5	29.3	31.3	30.1	31.1	30.3	31.6	29.6
BMI Group ^b																
Underweight	8.6%	11.1%	9.1%	12.5%	10.8%	14.1%	10.8%	12.5%	5.8%	10.6%	8.8%	6.8%	12.7%	11.4%	11.8%	20.8%
Normal	19.9%	25.2%	14.9%	18.7%	13.5%	20.5%	20.6%	25.8%	22.0%	26.1%	21.3%	23.7%	21.1%	22.2%	18.3%	21.4%
Overweight	24.9%	27.5%	22.3%	25.1%	25.8%	24.3%	22.4%	27.4%	25.2%	27.9%	24.3%	27.3%	21.2%	25.2%	24.2%	25.8%
Obese	46.6%	36.3%	53.8%	43.7%	50.0%	41.2%	46.2%	34.4%	47.0%	35.3%	45.6%	42.2%	45.1%	41.3%	45.7%	32.0%

Note. WMSD = work-related musculoskeletal disorders; HBHC, home-based health care; CHC, clinical health care.

^aAn injured or ill worker medically certified as unable to perform normal work duties beyond 3 calendar days, not including the date of injury.

^bBMI Group: underweight = BMI < 18.5, normal = 18.5 ≤ BMI < 25.0, overweight = 25.0 ≤ BMI < 30.0, obese = BMI ≥ 30.0.

The detailed event leading to WMSDS was analyzed (Table 5). Overall, overexertion was the recorded injury event for 72.7% of the claims. More HBHC claims had this as the event (82.6%) than CHC (71.6%). For both health care types, overexertion from lifting was the most common (27.8% HBHC, 19.6% CHC). After overexertion, the most common event type for HBHC was bending/climbing/crawling/reaching/twisting (5.1%). For CHC, 6.2% of the claims recorded repetitive motion as the injury event.

Discussion

In this research, HBHC aides had a lower claim rate than its comparison, CHC. However, previous studies have found home health aides have a higher risk of injury, and higher injury rates than other health care occupations.^{9,25,34,35} In contrast, the average time loss (number of lost workdays) experienced by HBHC workers (182-192 work days lost per claim) was much higher than a previously published result of

Table 5. Washington State Workers' Compensation Compensable^a WMSD Claims by Health Care and Event, 2006 = 2016.

Event type	Total (n)	HBHC (%)	CHC (%)
Overexertion, lifting	5023	27.8	19.6
Overexertion, pushing/pulling	2441	7.0	10.3
Overexertion, holding/carrying/turning/wielding objects	2119	11.0	8.4
Overexertion, throwing objects	68	0.1	0.3
Overexertion, other/unspecified	8182	36.7	33.0
Bodily reaction and exertion	1152	3.8	4.8
Repetitive motion	1420	2.8	6.2
Repetitive placing/grasping/moving objects and tools	560	1.2	2.4
Bending, climbing, crawling, reaching, twisting	1409	5.1	5.8
Other	2156	4.6	9.3

Note. WMSD = work-related musculoskeletal disorder; HBHC = home-based health care; CHC = clinical healthcare.

^aInvolves an injured or ill worker medically certified as unable to perform normal work duties beyond 3 calendar days, not including the date of injury.

28 days per injury, obtained from publicly funded home-based care programs for low income individuals in Oregon.⁴ Other research has found time-loss claims of HBHC workers to last longer than those for comparable workers in clinical settings.⁹ The mean age of HBHC WMSD claimants in this study was 45.3 years. A 2007 study of carpal tunnel syndrome workers' compensation claims by Foley et al³⁶ found older workers faced longer time-loss (a median of 145 time-loss days for those 37-49 years old). A hesitancy by aides to report injuries, resulting in a delay in treatment, may contribute to longer recoveries.¹ A study of unionized injured home health workers in Washington State found that 28.4% of injuries resulted in paid time-loss.⁸ Home-based health care is unique among health care services in that care providers do not deliver care in a controlled environment of their own design. It is difficult to find alternative work activities of light duties for injured workers that can keep them on the job. In this study, it was found that HBHC claims were significantly more expensive than CHC claims for all compensable claims. Wage replacement for the greater number of lost workdays for injured HBHC providers may account for these higher costs. Among health care workers, having experienced a work-related injury has been found to be positively correlated with taking sick leave as a result of the injury and job stress, while negatively correlated with workplace safety climate perceptions.³⁷ Though the claim rate for HBHC was less than that for CHC, basing the prioritization of injury prevention by health care type solely by these numbers may be misleading. Differential claim filing by injured workers and/or differential employer acceptance (claim suppression or contestation) may contribute to the differences in claim rate observed.

Within the workers' compensation compensable claims between 2006 and 2016, HBHC providers were significantly older than CHC provider, though the distribution between age groups differed between all compensable claims and WMSD claims (Table 3). Previous research have documented a similar profile of an HBHC provider—female, and in their late thirties or forties.^{4,9,38} In the BLS Survey of

Occupational Injuries and Illnesses, registered nurses over the age of 45 were found to have more occupational injuries and illness than those younger, as well as experiencing more severe injuries and illnesses.³⁹ Greater physical job demands have been found to have a greater impact on injury rates among older workers (≥ 45 years)⁴⁰ and in particular, an increased risk of musculoskeletal disorders.⁴¹

HBHC providers were significantly heavier than those providing CHC. Close to one-third (72.0%) of all compensable HBHC claimants were either overweight or obese (BMI ≥ 25). The same proportion of WMSD claimants were also either overweight or obese (Table 3). These results mirror those found by Howard and Marcum (2019) in an examination of BRFSS data, where significantly more HBHC workers were obese compared to all other occupations.⁶ The direct and indirect effects of obesity on employment can be extensive. Obesity has been associated with several chronic diseases, such as asthma, arthritis, and diabetes³⁴; cardiovascular disease⁴²; and cancer.⁴³ Obese workers have been found to have the greatest impairment of and disruption at work^{44,45} which can exert an adverse influence on productivity and workers' compensation costs.^{46,47} Additionally, obese HBHC workers may have abbreviated careers due to reduced work capacity. This may contribute to the shortage of HBHC aides that the United States is experiencing,^{48,49} while increasing the caseload for aides who remain. A linear relationship has been found between BMI and rates of workers' compensation claims, lost workdays, and costs per claim.⁵⁰ To address the overall health of home-based health care providers, Total Worker Health[®] (TWH) has been developed. TWH is a worker health and safety approach from the National Institute of Occupational Health and Safety that integrates the prevention of health and safety hazards with the promotion of overall well-being of workers. Evidence has shown that addressing the multi-causal nature of occupational injury and illness through the integration of occupational health and safety strategies with health-enhancing ones is more effective than addressing each separately.⁵¹ An intervention, developed using a TWH perspective, produced significant

improvements in fruit and vegetable consumption, high-density lipoprotein cholesterol, grip strength, and regular interaction between peers.⁵²

Though WMSDs are the most prevalent injury among HBHC aides, and as such, has received much attention, the persistent high prevalence of fall injuries deserves attention as well. In this study, falls (FSL and FLL) were the second and third most common injury event (Table 1). Additionally, HBHC fall claimants (FSL and FLL) were older (mean age: FSL=48.6, FLL=48.3) and heavier (mean BMI: FSL=33.2, FLL=32.5) than claimants for other event types (Table 4). Other research has also identified a higher prevalence of falls on the same level than other event types, with the exception of WMSDs.^{8,12} As those working in HBHC continue to age, they may begin to experience the same age-related impairments as the population they care for, including increasing risk of falls. Age-related declines in postural control, reflexes, and muscle strength can impair the ability to arrest a fall.⁵³ Age-related declines in vision has also been found to contribute to falls.⁵⁴ Associations between obesity and falls have been documented. In a comparison with normal weight workers, obese workers were more likely to report an occupational injury due to a fall.^{50,55} Patient care factors in home-based health care such as feeling rushed, an increasing number of patients, patient's weight bearing state and issues with patients' home have been related to slip, trips and falls.⁵⁶ Other factors within the home environment that have been identified as contributing to slips, trips or falls have included wet floors, rugs and cords, ice, steps and stairs, and carrying loads such as laundry or groceries.⁵⁷

The back was the most frequent injured body region for all compensable and WMSD claims. Back symptoms and injuries among HBHC providers have been frequently reported.^{6,9,15,58} Between HBHC and CHC, WMSD claims accounted for half of all compensable claims (SF and SI combined); 47.3% of the HBHC claims were for WMSDs. Kim et al⁵⁹ found that 76% of WC claims among health care workers in a large health system were identified as musculoskeletal disorders. Previous studies have also found back WMSDs to be the most prevalent type.¹⁵ Back and neck WMSDs are associated with the longest period of time living with disability.¹⁴ The lack of opportunities to work with co-workers, which is most often the case in HBHC, has been associated with permanent disability.⁶⁰

This study found that 82.6% of the event types associated with WMSDs for HBHC were classified as overexertion, with over a quarter attributed to overexertion from lifting. The second most common event type for WMSDs of HBHC was bodily reaction and exertion. The Paraprofessional Health Institute (PHI) has reported that the leading cause of injury to care providers in the home was overexertion and bodily reaction.⁶¹ Previous research has also identified overexertion injuries within home-based health care.^{4,9,35} Anderson et al³³ found a positive dose response between back injury and the number of transfers performed per day. In an analysis of workers' compensation claims, Kim et al⁵⁹

found the majority of lifting WMSDs were attributable to patient handling. Lifting and transferring unassisted clients has been identified as a task causing the most pain or concern for injury among HBHC providers.⁴

Limitations

This research examined injuries and WMSDs within the home-based health care sector. WMSDs develop from cumulative exposures over a period of time, which may result in the illness not being apparent at the time of reporting or in the failure of the health care provider in recognizing the WMSD or the work-relatedness. This may also lead to misclassification in the workers' compensation filing. Underreporting in the workers' compensation system has resulted in underestimations of workplace injuries. Wuellner and Bonauto⁶² found BLS Survey of Occupational Injuries and Illness data estimated 34% more WMSD cases than Washington State workers' compensation data. The use of self-insured WC data in this research may have impacted the results found. The incompleteness of SI data, such as limited access to diagnostic information and costs, and the reporting of injury/illness data by employers rather than the industrial insurance administrator, may have introduced potential underestimations and inaccuracies. Finally, the impact of SI data issues may be greater for CHC than HBHC, as most hospitals and hospital systems in Washington State are self-insured.

Conclusion

Due to the increasing demand for home-based health care as more Americans "age in place," it is crucial to understand the circumstances involved in these injuries. The prevention and treatment of injuries and illnesses to HBHC providers is essential for the health of the patient, care provider and industry as a whole. The Washington State workers' compensation system allowed researchers to examine the occupational injury data of home-based health care as an explicitly defined industry sector. This study showed a difference between home-based health care and clinical health care providers in the prevalence of injuries and the events causing these injuries, suggesting that this working population is distinct and not an extension of clinical health care. A comprehensive understanding of the injuries and illnesses suffered by those in home-based health care will help to identify and develop injury prevention strategies specific to home-based health care.

This research also found that injured HBHC providers were significantly older and more often overweight and obese than injured workers in CHC. With the health effects of aging and obesity, a question arises of how much longer these care providers will be able to meet the demands of this profession. It will be important to understand the contribution of aging and obesity to HBHC provider injuries, as well as the influence these factors play in providers leaving the profession.

Appendix I

Washington State Workers' Compensation Case Definition of Work-Related Musculoskeletal Disorders: Occupational Injury and Illness Classification System (OIICS) Codes.^a

Body Region	OIICS Code ^a
Trunk	20, 21,23, 230-234, 238, 239, 28, 29
Upper extremities	30, 31, 310-313, 318, 319, 32, 33, 34, 38, 380-383, 389, 39
Lower extremities	40, 41, 410-413, 418, 419, 49
Multiple body parts	8
Injury nature	
Dislocations	011
Strains, sprains, tears	021, 029
Back pain	0972
Non-specified soreness, pain, hurt, excl. the back	0973
Carpal tunnel syndrome and other disorders of the peripheral nervous system	1241, 1249
Diseases of the circulatory system	1371
Disorders and diseases of the musculoskeletal disorders	17, 171, 172, 1720-1723, 1729, 173, 1730-1736
Exposure	
Contact stress	05, 050-052, 059, 06, 061, 062, 069
Bodily reaction and exertions	20, 201, 211, 214, 216, 217, 219, 22, 220-224, 229, 23, 231-233, 239, 25, 29

^aOccupational Injury and Illness Classification System (OIICS) codes, version 1.01.

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