Washington State Department of Labor & Industries

SHARP Safety & Health Assessment & Research for Prevention

Washington State Janitorial Workload Study

Progress report to the Legislature

December 2023

SHARP Report #102-144-2023

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Acknowledgments

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Executive Summary

This is the fourth annual progress report to the Washington State Legislature regarding advances in the Washington State Janitorial Workload Study. Conducted by the Department of Labor & Industries' (L&I) Safety & Health Assessment & Research for Prevention (SHARP), the research study addresses high injury rates among janitors and will help quantify the physical workload of janitors so their workload can be correctly assigned to reduce work-related injuries.

One of the primary goals of this research is to develop a method to calculate janitorial workload based on a combination of the work assigned, tools, and environment. There are many different environments where janitors work and myriad combinations of tasks, equipment, and cleaning methods. Given constraints on research methods during the COVID-19 pandemic and the limited timeframe, research has focused on one type of environment — commercial office buildings — to develop this workload tool, which was created and released in preliminary (beta) form.

This phase of the study further develops the workload calculator tool, and continues data collection through injured worker interviews while also creating educational materials to share knowledge about common hazards and injury prevention with janitors and community partners. Previous components of the study and detailed methods are provided in the December 2022, January 2022, and June 2020 reports to the legislature. As per the budget proviso, annual progress reports are mandated until year 2025 or until tools, that assess risk factors for injury, are fully developed and deployed.

Analysis is ongoing, and brief progress reports on the status of the current study components are included in this report. These include:

1. **Injured worker interviews**: Regularly contacting injured workers who have filed a workers' compensation claim has resumed following a pause during the COVID-19 pandemic. Janitors who agree to participate in these interviews provide valuable information on their injuries and work organization factors that can be analyzed to identify root causes of work-related injuries and illnesses, and can be used to provide educational materials to reduce work hazards and prevent worker injuries.
2. **Develop and test a workload calculator**: All data collected in this study are used to inform, refine, and expand the workload calculator tool that can help employers and labor groups determine safe workloads when developing worksite contracts and in-house cleaning schedules, or assign appropriate staffing levels. A beta version of this tool was released and is available to community partners for testing. The current priorities for this project component are to solicit feedback from stakeholders to improve the tools and to place the tool on the L&I website. A field validation study will be planned and conducted to further refine this workload calculator tool.

3. **Education and training documents**: While creating the program, the diversity of the janitorial workforce and the need for culturally and linguistically appropriate safety and health training resources for low-literacy populations were identified. To this end, SHARP research staff continue to add to existing educational materials to identify hazards and general health information to help janitors and employers to keep workers safe. All documents are available in English, Spanish, Russian, Vietnamese, Bosnian, Chinese (Traditional), Amharic, Somali, and Tagalog. Published educational and training documents are available on the study website.

Introduction

Background & Scope

Janitorial work is considered labor-intensive with a demanding pace and high musculoskeletal and cardiovascular loads (Hagner and Hagberg, 1989; Seixas et al., 2013; Søgaard et al., 1996). The body parts most affected by this type of work are the back, legs, and arms (Seixas et al., 2013). The main factors that may influence these exposures are work procedures (tasks), the environment, tools/methods, and organizational and psychosocial contexts such as working hours, staffing inadequacy, contract duration and stability, safety culture and climate, turnover, and other market and firm characteristics, policies, and practices.

With these risks in mind, the number of janitors and cleaners (excluding maids and housekeeping cleaners) employed in Washington State rose by about 20% between 2013 and 2018 (BLS, 2020). An increase in workload was also found.

A study of union and non-union janitors found that work intensity increased 8.6% over a three-year period (Seixas, 2013). In Minnesota, Green et al. (2019) conducted survey research to identify the relationship between workload and injury, and found that a rise in self-reported workload correlated with occupational injury.

Janitorial Study: Legislative Mandate

In 2018, the Washington State Legislature provided L&I's SHARP program with funds to conduct research to address the high injury rates of the janitorial workforce. The research must:

- quantify the physical demands of common janitorial work tasks;
- assess janitorial workers' safety and health needs;
- identify potential risk factors associated with increased injury risk in this workforce; and
- measure workload based on body strain per specific janitorial work tasks.

L&I must conduct interviews with janitors and their employers to:

- collect information on risk factors;
- identify the tools, technologies, and methodologies used to complete work;

- understand the industry's safety culture and climate;
- issue an initial report to the legislature on June 30, 2020; and
- determine usable support tools (the workload calculator) to reduce risk of injury.

NOTE: Public sector cleaning workers are generally called "custodians," while those in the private sector are called "janitors." This report generally refers to all workers as "janitors."

Methodology

To understand janitors' physical workload and their capacity to perform such work, the research team used a variety of data collection methods including:

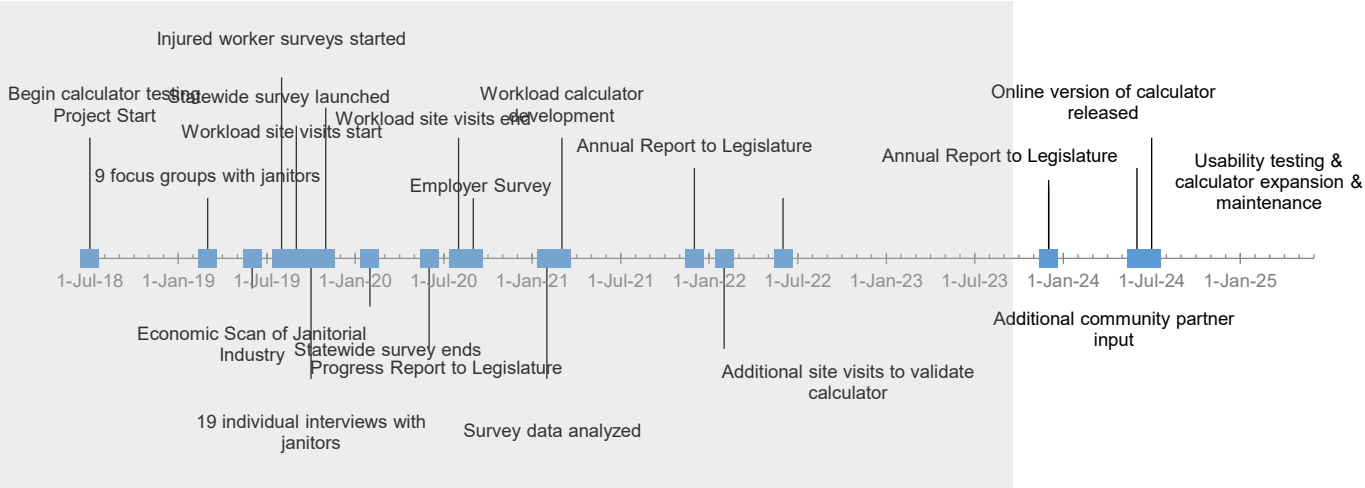
- worksite visits, where janitorial task observations enabled the team to estimate biomechanical and physiological workloads;
- survey and interview data to assess psychosocial and safety climate perceptions; and
- injured-worker interviews to collect more detailed data about the environmental and workplace characteristics in which the injury occurred.

Janitorial job-related factors (such as task, location/environment, tool used, square footage/number of fixtures) and work duration were collected, and detailed time study and biomechanical task analyses were conducted. Risk indexes for overall workload, hand/wrist, shoulder and low-back risks were calculated. The combined risk level of all tasks in a job was then calculated to estimate a janitorial job's total risk. The calculator also enables the user to adjust certain variables (such as time given for the task, or amount of square footage/fixtures to be cleaned) to improve conditions so that risk levels can be reduced. A worker's capacity (both physical and psychological) determines whether the workload is too high. Where the workload factors exceed a worker's capacity, negative health outcomes are expected. Thus, identifying both factors provides the necessary information to develop a measure that helps avoid workplace injuries among janitorial workers.

Study components

This study involves a multidisciplinary team of occupational health and safety researchers and includes multiple phases and components. Data analysis from site visits and statewide surveys continues, and educational training materials are continuously being developed. The workload calculator tool is in beta form, and work is underway to transition it to an online tool hosted by the agency, with the capability for future expansion.

Figure 1 represents the Janitorial Workload Study timeline (shaded area indicates completed work).



Prior research was completed in the initial phases of this study to understand current issues facing janitors including safety and health training, workload, work pace, and equipment issues, and to understand levels of workplace mistreatment, bullying, and violence. In addition, that research included an economic scan of the janitorial industry in Washington State and nationally. These formative research findings were included in the 2020 report to the legislature.

Continuing data collection and analyses

Initial data collection and analyses were accomplished in the first years of the study. Data collected via surveys and site visits are still being analyzed, and workload site visits may resume in the future as the calculator is refined. Currently, active study areas include: interviewing injured workers; validating the workload calculator and making it available online; and creating and disseminating education and training materials.

Publications and presentations

Researchers have shared their progress through publications in academic journals, presentations to business and community partners, professional associations, and industry and trade association conferences.

Next steps

The next phase of the study will involve: finalizing the workload calculator in a usable online format; releasing the accompanying user guide; conducting additional laboratory and field work to collect and assess exposures; analyzing data to refine and expand the workload calculator to other janitorial settings and/or tasks; and continuing to release educational and outreach materials. Feedback from our business and community

partners on the workload calculator, publications, and educational and outreach materials are key to shaping future work to reduce the burden of occupational injuries in the janitorial services industry.

Introduction: References

BLS (Bureau of Labor Statistics) (2020). Occupational Employment Statistics. https://www.bls.gov/oes/tables.htm

Seixas N, Domínguez C, Stover B, Simcox N. (2013, August). Janitors Workload and Health and Safety. Department of Environmental and Occupational Health Sciences, University of Washington.

Green, D.R., Gerberich, S.G., Kim, H., et al. (2019). Occupational injury among Janitors: injury incidence, severity and associated risk factors. J Occup Environ Med. 61(2):153-161.

Hagner, I. M., & Hagberg, M. (1989). Evaluation of two floor-mopping work methods by measurement of load. Ergonomics.32(4):401-408.

Søgaard, K., Fallentin, N., & Nielsen, J. (1996). Work load during floor cleaning. The effect of cleaning methods and work technique. European Journal of Applied Physiology and Occupational Physiology. 73(1-2):73-81.

State of Washington. Washington State Fiscal Information. (2018). 2018 Supplemental (revised 2017-19 Biennium) Operating Budget. ESSB-6032. Available at: http://fiscal.wa.gov/.

Progress Reports of Research Study Components

Janitorial work is physically demanding and is associated with significant chemical and biological exposures. Consequently, and when compared with other occupations, janitors have elevated rates of work-related injuries and illnesses, including musculoskeletal disorders, occupational respiratory disease, and traumatic injuries. The study's research explores both causes and interventions to mitigate risks for workers.

1. INJURED WORKER INTERVIEWS

Introduction

The Washington State Janitorial Workload Study's injured worker interview component identifies janitors who have filed and have open workers' compensation claims, and interviews them about their injury and work experiences. These confidential interviews supplement information that is in the administrative workers' compensation data. For example, workers can provide more detail surrounding the circumstances of their injuries (safety climate, training, hazards present in their workplace) and what could have been done to prevent them.

In-depth interviews are also valuable for workers to describe their experiences in their own words. Many workers with occupational injuries find it helpful to talk about their experiences and are grateful to share their stories to help prevent future injuries. The detailed information janitors disclose about their injuries, work organization, tasks, hazards, and health can be used to help generate and inform prevention materials.

Methods

Claims are extracted from Washington workers' compensation claim filings for the previous 30-60 days. For example, a Nov. 8, 2023, extract identified 61 claims filed by workers in the selected Janitorial Risk Classes between October and November 2023 (with injury dates ranging from April 2022 through October 2023). The risk classes included in every extract are "6602-03 Janitorial Cleaning Services, NOC[1]" and "6602-05 Janitors, NOC." This excludes subclasses devoted to contract window washing services (-02), residential janitorial workers (-04), pest control (-08), portable cleaning & washing (-10), and street/building decorating hanging of flags/buntings (-12).

Selection criteria include all claims filed and those that require further information to understand injury cause. Claims are selected for interviews if the researchers believe

[1] Not Otherwise Classified

there may be an opportunity to develop safety and health prevention materials based on the circumstances of the injury.

An average of 57 new claims per month meet these criteria. Periodically, the team reviews the claims list and selects a percentage for potential interviews. These janitors are contacted via letter, and then a staff member contacts them by phone. Currently, letters and calls are conducted in English. A language interpretation line is available for workers who prefer another language.

While injury description and claim information is used to inform prevention materials (by identifying a common hazard or exposure experience), personal identifiers are omitted to protect worker privacy. With worker consent, injury experiences can also be used to create injury narratives and hazard alerts for education and training.

Summary of research activity to date

As of Dec. 6, 2023, 33 interviews have been completed or partially completed (primarily in English). For these claims, the injury event types included:

- struck against stationary object;
- caught in or compressed by equipment or object;
- overexertion/repetitive motion;
- falls; and
- violence.

Almost half of the janitors (48%) consented to having their injury experiences used for an injury narrative or case history in the future.

Due to the resource-intensive nature of injured-worker interviews and low response rate, claims data are also periodically analyzed to identify common injuries occurring in janitorial services and inform research efforts.

From July 1, 2019, when this component of the study began (regularly downloading and analyzing claims), through Sept. 30, 2023, there have been 3,100 claims in the janitorial services industry (as defined by the above-mentioned risk classes). Of these claims:

- 29% were compensable (progressing to wage-replacement, disability, or death), 58% were medical-only claims, and 13% were rejected.
- Janitors who filed claims during this time period were mostly women (57%) and between 25-44 years of age (45%) when they filed.
- Of the approximately 900 compensable claims, the most common individual injury types were work-related musculoskeletal disorders (26%) and falls (22%).

Next steps

Janitor experiences in their own words help identify issues and inform prevention and intervention efforts. The injured worker interview process will continue through 2025, with expected changes to the interview instrument starting in 2024. Results will be analyzed on a rolling basis as interviews are completed. Injury descriptions and comments from janitors will be used to identify common hazards and issues faced by janitors in Washington, and to generate prevention materials and interventions. Efforts are underway to increase response rate by reducing the length of the interview, adding bilingual Spanish-speaking researchers, and updating the questionnaire to include more relevant questions regarding tools, equipment, and training that can be used to create effective educational and outreach materials. Additional methods to gather data around janitors' workplace hazards and experiences are also being explored, such as web-based surveys and focus groups.

2. WORKLOAD CALCULATOR DEVELOPMENT

Initial data processing and field data analyses were completed. A major accomplishment of this study period was the preliminary (beta) version of the janitorial workload calculator, which was developed and released to our business and community partners for pilot testing. Many presentations of the workload calculator have been performed at national and international conferences to both research and janitorial service audiences. The methods and development behind this calculator are detailed in previous progress reports.

The overall objective of the calculator is to assign tasks to janitors with managed workload, so their health will be protected while work productivity is optimized.

The current version of the calculator is spreadsheet-based and can be used to:

- design a new janitorial job;
- evaluate the workload of an existing janitorial job; and/or
- conduct a job risk evaluation for a janitor.

The calculator is currently intended to assess janitorial work performed in large commercial office buildings and may not be applicable to janitorial work in other settings at this time. The calculator evaluates risk at the job level, not the task level; and assesses the risk to back, shoulder, hand/wrist, as well as overall workload. The calculator assesses musculoskeletal workload from repetitive motions, awkward postures and forceful hand exertion, and cardiovascular workload. It also compares the

assigned task times with those of the ISSA[2] published standard work times (a cleaning industry reference). It does not assess risk of injury from chemical exposures, slips/trips/falls, and organizational factors. The calculator also does not predict the development of injuries, provide recommendations, or determine risk based on individual worker demographics. The cleaning tasks and tools included in the calculator are limited to those observed during its development stage.

Additionally, to help business and community partners effectively use the janitorial workload calculator, a reference guide is being developed to accompany the tool. The reference guide will describe the calculator's intended uses and limitations, and provide step-by-step instructions. This includes information on gathering the needed data and preparing to use the calculator, properly inputting the data for different task and tool combinations, and interpreting the resulting evaluation reports. The initial version of the reference guide will focus on using the current preliminary (beta) version of the calculator, and will be updated as needed to reflect future versions (such as the online version currently in development).

Figure 1 shows a screenshot of the current preliminary (beta) version of the calculator that is currently available for community partners. It shows the three role options provided for users to select, and includes a disclaimer and contact information.

Figure 1. Janitorial Workload Calculator Screenshot

[2] International Sanitary Supply Association. (2021). The Official ISSA Cleaning Times: the Cleaning Industry's Most Trusted Tasks, Tools, & Workloading Resource.

Next steps

The next steps in workload calculator development will be to transition it from an MS Excel program into a web-based program hosted by the agency. The online version of the calculator is being developed to include the capacity to expand it with additional field observations and task and tool combinations. A users' instruction manual will also be created, and a field data study to validate the calculator will be planned and conducted. A simplified data collection will also be developed so that other research entities may collect similar data in other janitorial settings to enhance the current calculator. Laboratory studies on different cleaning tool options will be conducted to provide users with alternative solutions to reduce workload.

3. EDUCATION AND TRAINING DOCUMENTS

Early in this formative work, a need for culturally and linguistically appropriate safety and health training resources for janitors was identified due to the diversity of the janitorial workforce. The SHARP research staff created and will continue to develop resources for janitors in multiple languages (English, Spanish, Russian, Vietnamese, Bosnian, Chinese [Traditional], Amharic, Somali, and Tagalog). The majority of publications developed to date cover COVID-19 pandemic-related safety and health information.

All published educational and training documents are available on the study website.

In addition to training documents, SHARP staff continue to publish new analyses of these data to further expand knowledge in the field. Below is a list of current publications, with additional ones in progress:

Publications

Anderson NJ, Smith CK, Foley MP. Work-related injury burden, workers' compensation claim filing, and barriers: Results from a statewide survey of janitors. Am J Ind Med. 2022 Mar;65(3):173-195. doi: 10.1002/ajim.23319. Epub 2021 Dec 13. PMID: 34897753; PMCID: PMC9300089.

Lee W, Yragui NL, Anderson NJ, Howard N, Lin JH, Bao S. The job demand-control-support model and work-related musculoskeletal complaints in daytime and nighttime janitors: The mediating effect of burnout. Appl Ergon. 2022 Nov;105:103836. doi: 10.1016/j.apergo.2022.103836. Epub 2022 Jun 28. PMID: 35777183.

Lee W, Lin JH, Howard N, Bao S. Methods for measuring physical workload among commercial cleaners: A scoping review. International Journal of Industrial Ergonomics. 2022 (90). doi: 10.1016/j.ergon.2022.103319.

Lee W, Lin JH, Howard N, Bao S. Physiological responses, trunk posture, and work pace in commercial building cleaning in Washington State: An observational field study. J Safety Res. 2023 Sep;86:107-117. doi: 10.1016/j.jsr.2023.05.013. Epub 2023 May 26. PMID: 37718037.

Lin JH, Lee W, Smith CK, Yragui NL, Foley M, Shin G. Cleaning in the 21st Century: The musculoskeletal disorders associated with the centuries-old occupation - A literature review. Appl Ergon. 2022 Nov;105:103839. doi: 10.1016/j.apergo.2022.103839. Epub 2022 Jul 7. PMID: 35809429.

Additional manuscripts in progress

Manuscript working title:

Janitorial Cleaning Tasks and Physical Demands in Various Building Types: Results from the Washington State Janitorial Workload Survey

First author:

Ninica Howard

Working abstract:

Highlights

- The majority of survey respondents worked in commercial office buildings.

- The duration of vacuuming was associated with work-related injury in the past year and musculoskeletal symptoms in the past week.
- The reported physical difficulty in performing a cleaning task was more often significantly associated with injuries in the past year than with duration or frequency of the cleaning task.

Introduction: Janitors perform cleaning tasks in most brick-and-mortar structures, facing workloads that pose a high risk of work-related musculoskeletal (MS) disorders. The aim of this study was to identify and characterize the janitorial workforce, cleaning tasks performed, their occupational exposures, and MS symptoms and injuries by building types.

Methods: Cleaning tasks and their associated workload demands (task duration, frequency and intensity) of Washington janitors were characterized. Survey responses from 627 janitors working in 10 different building types were analyzed. The relationships between workload demands of the cleaning tasks and injuries in the past year and MS symptoms of the upper body, lower body and back during the past week were examined.

Results: Most of the janitors (48.5%) worked in commercial office buildings. Across all building types, a greater proportion of participants completed all the cleaning tasks in a single area (84.7%) rather than a single task in multiple areas. Dusting was the most common cleaning task (89.6%), with a mean daily duration of 142.9 minutes (SD=185.6). No significant associations were found between task frequency (daily, weekly, monthly or longer) of the cleaning tasks and injury in the past year however, MS symptoms in the past week was significantly associated with frequency. All but three cleaning tasks showed significant associations between physical difficulty in performing the tasks and MS symptoms in the past week. The duration of vacuuming was significantly associated with injury in the past year.

Conclusions: The results of the survey may reflect the practice common to the janitorial industry where workers perform multiple tasks rather than a single task. Differences in task demands among building types may create a disparate risk of injury.

Practical Application: The settings of janitorial work are not monolithic. Interventions must be specific to each cleaning setting to be the most effective.

Manuscript working title:

Compendium of physical ergonomics exposures to hand, shoulder, and low back during routine janitorial activities

First author:

Jia-Hua Lin

Working abstract:

Janitorial services are an essential part to keep workplaces functional. Janitors consider the job labor intensive, and that workload is increasing in recent years. The most impacted body parts are hand/wrist, shoulder, and back in this population. This paper reports a compendium of physical ergonomics exposure assessment using three observational methods. The composite Strain Index (COSI) for hand/wrist, Manual Task Risk Assessment (ManTRA) for shoulder, and Recommended Cumulative Recovery Allowance (RCRA) for shoulder and back, were chosen for their capability to capture the complex and dynamic nature of all tasks performed in a janitorial job. Forty-six unique cleaning task-location-tool combinations received assessments, and the risk scores from the three methods are compiled into a compendium. This information can help practitioners to estimate the risk for a job, or designers to plan jobs for a team of janitors so the risks can be mitigated with careful task assignments.

Next Steps

Tasked specifically by the Washington State Legislature, the SHARP Program has developed a multitiered systems approach to understanding the workload and workplace physical and mental exposures that may put janitors at risk of a work-related injury. The SHARP program is currently analyzing collected data, developing and refining the janitorial workload calculator tool, continuing injured worker interviews, and creating multimodal educational information for janitors and employers.

Overall, the goal to develop, test, and release a workload calculator to keep janitorial workers safe and create a harmonized tool for janitorial companies to bid for contracts is partially complete, with a preliminary tool released for testing and feedback. The study continues to develop and launch an easy-to-use online version of the workload calculator tool for our business and community partners. The current phase of the study aims to develop a plan to expand the calculator and sustain this tool as the industry changes. Additionally, the workload calculator addresses only physical exposures and does not address other important safety and health issues raised by janitors such as safety culture and supervisor and employee training.

Future work will focus on holistically addressing the industry's needs, including expanding and refining the workload calculator, conducting additional field and laboratory testing and assessments as necessary, and creating training and safety programs and other education and training materials in multiple languages that could significantly reduce injuries within the janitorial industry.