Cleaners' Occupational Injury Reduction Emphasis (CORE)

Previously known as the Washington State Janitorial Workload Study

Progress report to the Legislature

November 2024

SHARP Report #102-181-2024

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Acknowledgments

Executive Summary

This is the fifth 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 janitors' physical workload so it can be correctly assigned to reduce work-related injuries.

In late 2023, the study was renamed the Cleaners' Occupational Injury Reduction Emphasis (CORE) to reflect the goal of including all professional cleaners (e.g., commercial janitors, custodians).

The primary goals of this research remain to develop a method to calculate janitorial workload based on a combination of the work assigned, tools, and environment; and to explore both causes and interventions to mitigate risks for workplace injuries and illness to janitorial workers.

Previous components of the study and detailed methods are provided in the December 2023, December 2022, January 2022, and June 2020 reports to the legislature. Per the budget proviso, annual progress reports are mandated until 2025 or until the 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 janitor interviews and claims analysis**: Injured cleaners who have filed a workers' compensation claim are regularly contacted. Cleaners 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 be used to provide educational materials to reduce work hazards and prevent worker injuries. During this time period, the injured worker interview and protocol have been updated, and criteria by which claims are extracted for analysis have been refined. The most common injury types for janitors and cleaners are still work-related musculoskeletal disorders (MSDs) and falls.

2. **Develop and test a workload calculator**: All data collected in this study are used to inform, refine, and expand the workload calculator tool (developed earlier in the study) that can help employers, workers and their representatives determine safe workloads when creating worksite contracts and in-house cleaning schedules, or assigning appropriate staffing levels. A beta version of this tool was released and was made available as a free download to community partners for pilot testing. The current priorities for this project component are to solicit feedback from partners to improve the tool and develop an online version hosted on the L&I website. A field validation study is in the planning stages and

will be conducted to further refine the workload calculator. A detailed step-by-step user guide was created and launched to help community and research partners use the calculator. Research staff gave presentations on the calculator at academic and industry conferences.

3. **Laboratory evaluations**: A laboratory study on different cleaning tools (such as mop handles) is being prepared; protocol and questionnaires are being finalized. These evaluations will be conducted to provide users with alternative solutions to reduce workload and physical demands.

4. **Franchising**: The economic landscape influences contract details, work organization, and worker health and safety. Franchised organizational arrangements have spread in this industry, and may intensify pressures to reduce labor costs – leading to lower wages, higher turnover, and worker injury. Data on franchised janitorial firms was obtained, and is being analyzed to identify and confirm employment, wage, and injury patterns. Preliminary work from these data have been presented at the National Association of Government Labor Officials conference.

5. **Education and training documents**: The study regularly generates educational materials for janitors and employers to help identify hazards and distribute health and safety information. 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](). The quarterly newsletter and tip sheet are disseminated to over 4,000 subscribers.

6. **Additional cleaning environment selection**: There are many different environments where janitors work and have a myriad of combinations of tasks, equipment, and cleaning methods. Given constraints on research methods during the COVID-19 pandemic and the limited timeframe, this research initially focused on one type of environment — commercial office buildings — to develop this workload tool, which was created and released in preliminary (beta) form. Now that the workload calculator tool has been developed and released for pilot testing, the study can begin to address additional cleaning environments. During this study period, different categories of janitors and cleaners were assessed and the next group of interest was selected: custodians in K-12 public schools and universities.

Introduction

Background and Legislative Mandate

Janitorial work is considered labor-intensive with a demanding pace and high musculoskeletal and cardiovascular loads, 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 (MSDs), occupational respiratory disease, and traumatic injuries. The main factors that may influence these exposures are: work procedures (tasks); the environment; and tools and methods used. Other factors include: organizational and psychosocial contexts such as working hours, staffing adequacy, contract duration and stability, safety culture and climate, turnover, and other market and firm characteristics, policies, and practices. Janitors and cleaners (excluding maids and housekeeping cleaners) are a growing employment sector in Washington and nationally. The study's research explores both causes and interventions to mitigate risks for workers.

In 2018, the Washington State Legislature provided L&I's SHARP program with funds to conduct research to address the high injury rates among 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 is directed to 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 in June 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" or "cleaners." In this report, the term "janitors" is used throughout to refer to all kinds of cleaning workers.

Study Overview & 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. Full descriptions of earlier study activities and formative research are included in prior reports. Previously, efforts were centered only on commercial office building cleaners.

Methodology

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

- worksite visits, where janitorial task observations enable the team to estimate biomechanical and physiological workloads;
- survey and interview data to learn about work organization, identify hazards and common injuries, assess psychosocial and safety climate perceptions, and collect more detailed data about the environmental and workplace characteristics in which the injury occurred; and
- laboratory studies to assess tools and methods.

Timeline

This work began in July 2018 and is expected to continue through 2026 or when the tools that assess risk factors for injury are fully developed and deployed. The team began by conducting focus groups to inform the work and conduct site visits, individual interviews, a statewide survey of injured workers, and an employer survey. The results of these activities informed the work of developing the workload calculator as well, which began in 2021. Currently, the study is gathering additional community partner feedback on the workload calculator tool and developing an online version of the tool. Additional workload assessments, laboratory studies, and expansion into school custodian work are forthcoming.

Figure 1. The CORE Study timeline (shaded area indicates completed work).
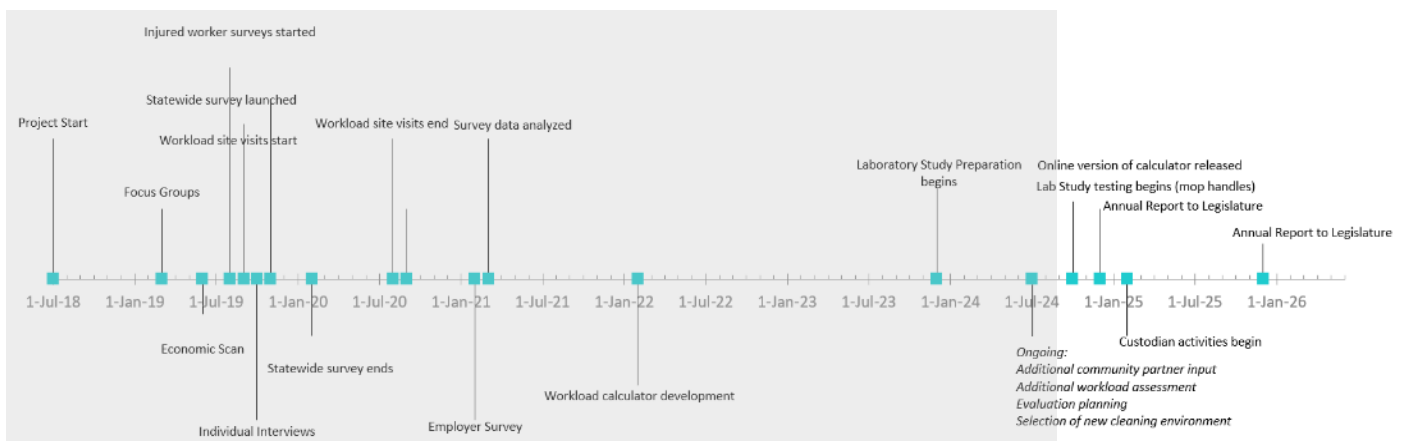
Progress Reports of Research Study Components

Administrative work accomplished during this study period included renaming the study to include all types of professional cleaners as the study broadens in focus. The project is now called Cleaners' Occupational Injury Reduction Emphasis (CORE). The study website, contact information, and communication templates have been updated accordingly.

Several study activities this year were exploratory (selecting a new cleaning environment to focus on; data analysis) and preparatory (lab study design).

1. INJURED WORKER INTERVIEWS & CLAIMS ANALYSIS

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. 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.

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. 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). Due to the broad range of cleaning services, however,

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[1] Not Otherwise Classified

some proportion of the claims identified in these risk subclasses still do not meet study inclusion criteria. An average of 51 new claims per month are extracted from the workers' compensation (WC) system. Each month, the team reviews the claims and selects a percentage of those meeting study criteria for potential interviews. Claims are selected for interviews as staff capacity allows, and if the researchers believe there may be an opportunity to develop safety and health prevention materials based on the circumstances of the injury.

Interviewing injured workers is a time- and resource-intensive process. Once claims are reviewed and a portion selected for potential interview, the janitors and cleaners are contacted via letter informing them about the study, why they may be called, and their rights to refuse or consent to an interview. Following the initial mailing, a staff member contacts them by phone.

Currently, letters are sent in both English and Spanish, according to language preference if specified in the claim. Calls are conducted in English; a language interpretation line is available for workers who prefer another language. Language and availability may limit the number of janitors and cleaners who agree to be interviewed. (Many janitors and cleaners work the night shift and sleep during the day.)

Summary of research activity to date

As of Sept. 1, 2024, 34 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.

From Jan. 1, 2024, through Sept. 1, 2024, there were 517 claims received in the selected janitorial risk classes. However, some of these claims were not for commercial janitors and cleaners and did not meet the criteria for study inclusion (misclassified, or missing information). There were 39 claimants selected for attempted interviews during this time, and two completed interviews.

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 Aug. 31, 2024, there were 3,815 claims in the janitorial services industry (as defined by the above-mentioned risk classes). Of these claims:

- The majority were covered by the State Fund (89%); the remaining 11% were Self-Insured.
- 29% were compensable (progressing to wage-replacement, disability, or death), 56% were medical-only claims, and 13% were rejected; 2% were of unknown status at the time of the report (likely newer claims that had not yet been adjudicated).
- Janitors who filed claims during this time period were mostly women (57%), and between 25-44 years old (45%) when they filed.
- While claim coding for injury characteristics is not complete for all years, of the 1,102 compensable claims during this time period, the most common individual injury types were work-related MSDs (25%) and falls (24%).

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 2026, with expected changes to the claim extract methodology and the interview questionnaire and increasing the number of available interviewers starting in 2025. Refining the claims extract will enable the team to spend less time reviewing claims that do not meet inclusion criteria and therefore increase completion rate. As the project expands into other cleaning environment types, the data extract will be refined further to capture custodians using claims' coding and keywords. Additional efforts are underway to increase response rate by reducing the length of the interview, adding bilingual Spanish-speaking researchers, offering a small monetary incentive for participation, and updating the questionnaire to include more relevant questions regarding hazards 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.

Results will continue to 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 suggest interventions.

2. WORKLOAD CALCULATOR DEVELOPMENT

The workload calculator was developed earlier in the study and released in preliminary (beta) version. During 2024, it became freely available for download for research, business, and community partners in Washington state and nationally. The methods and development behind this calculator are detailed in previous progress reports. 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 cleaning tasks and tools included in the calculator are limited to those observed during its development stage. The calculator will be refined and expanded to include additional cleaning environments, tasks, and tools as the study continues.

Additionally, a user guide was published that describes the calculator's intended uses and limitations, defines the included tasks and tools, and provides 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. This initial version of the guide reflects the current preliminary (beta) version of the calculator. It will be updated as needed for future versions and to address user feedback.

Figure 2. Preliminary mock-up of the online workload calculator.
The current phase of calculator development is transitioning it from an MS Excel spreadsheet 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.

Next steps

During the next study period, the team expects to have the online version available for usability testing and public release. The user guide will be updated to reflect the new version.

There are several anticipated expansions of the calculator over the next several years:

1. Additional workload assessments may be completed and incorporated into the tool as the calculator is evaluated and additional observations of workers, tools, and tasks occur.
2. As businesses and other community and research partners use the tool, their feedback and requests will be addressed and used to refine the calculator.
3. As the project expands (see Additional Cleaning Environment Selection below) to additional cleaning environments, additional locations, tasks, and tools will be incorporated.

3. LABORATORY EVALUATIONS

Mopping is a common cleaning task for which cleaners have reported discomfort. Ergonomic cleaning equipment is available on the market; however, studies on the effectiveness of such equipment in reducing physical demand and workload are limited.

Laboratory studies on different cleaning tools and methods will be conducted to provide employers, janitors, and community partners with alternative solutions to reduce workload and physical demands. The study team is in the preparatory stage of developing a laboratory study on mopping.

The aim of this activity is to investigate the effects of different mop handles on muscle activation, energy expenditure, and comfort for shoulder and lower back during mopping tasks. The study's findings will be important in determining mopping equipment associated with reduced postural load on cleaners.

In this study, 20 voluntary participants with no diagnosed MSDs will be recruited. The participants will perform mopping under three different conditions (open floor, furniture obstacles and low clearance furniture obstacles) and with three different mops (curved handle mop, flat mop, and fringe mop). These three configurations represent common conditions that cleaners encounter, such as in schools or health care facilities. Participants will mop 500 square feet for each condition. The dependent variable measurements will include: (1) muscle activity; (2) hand grip forces; (3) pressure applied to mop base; (4) heart rate; (5) steps; (6) perceived exertion; and (7) questionnaires to gauge experience with the mops.

Protocol and questionnaires are being finalized, and pilot testing will begin soon.

4. FRANCHISING

The economic landscape influences contract details, work organization, and worker health and safety. Franchised organizational arrangements have spread in this industry, and may intensify pressures to reduce labor costs – leading to lower wages, higher turnover, and worker injury. Data on franchised janitorial firms was obtained, and is being analyzed to identify and confirm employment, wage, and injury patterns. Preliminary work from these data have been presented at the National Association of Government Labor Officials conference. In that research, franchised janitorial firms in Washington state are compared to traditionally organized firms on such measures as wage rates and workers' compensation claims rates. Workers employed by franchised firms had lower wage rates, lower total earnings, and higher turnover. They also had higher workers' compensation claims rates for injuries leading to more than three lost workdays. Analysis of these claims is ongoing, and results should be published next year.

5. EDUCATION AND TRAINING DOCUMENTS

Early in this formative work, the 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). Publications include regular communication about the project and information on safety topics (informed by workload assessments, injured worker interviews, and research and community partner input). Past issues included topics such as: common chemicals that cause irritation; effective safety leadership and communication; hazard communication pictographs; and tips for preventing injuries from needlesticks.

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

In addition to education and training documents, SHARP staff continue to publish new analyses of existing study data to further expand knowledge in the field. A list of study publications is included in Outputs and Outcomes below.

6. ADDITIONAL CLEANING ENVIRONMENT SELECTION

There are many different environments where janitors work and a myriad of combinations of tasks, equipment, and cleaning methods. Given constraints on research methods during the COVID-19 pandemic and the limited timeframe, this research initially focused on one type of environment — commercial office buildings —

to develop the workload calculator. Now that the workload calculator tool has been developed and released in preliminary (beta) form, the study can begin to address additional cleaning environments. Preliminary work began during this study period to characterize potential additional cleaning types and assess needs, and start activities in the chosen area.

When looking at Bureau of Labor Statistics (BLS) data for employment in Janitorial and Cleaning Occupations (2022), the leading employment category was "Services to Buildings and Dwellings" – which includes commercial office buildings. This group is already being addressed in the study, and common tasks/tools are included in the calculator. The second-largest category of cleaning employment was "Elementary and secondary schools; state, local, and private." Using BLS data and employment data from the Washington Office of Superintendent of Public Instruction (OSPI), it is estimated that there are approximately 6,000-8,000 people employed as custodians in K-12 public schools in a given year.

Preliminary analysis of Washington workers' compensation (WC) data suggests more than 4,700 claims filed by custodians from Jan. 1, 2012, through Dec. 31, 2023. Custodians were identified using a combination of Washington State Risk Classification (RC) system codes, Standard Occupational Classification (SOC-2000) system codes, and keywords found in the claims data that provide the claimants' job title and duty description.

Custodians in the WC data appear to be primarily employed in self-insured entities (87%) and are mostly male (60%). The majority are 45 to 64 years old (71%). These characteristics differ from commercial office building cleaners and may have unique injury prevention and intervention needs.

An additional rationale for selecting this cleaning environment is the interest and efforts of community partners in the educational section who have requested access to the workload calculator. School districts, colleges, and universities all face resource constraints and workload challenges. The workload calculator may be a valuable tool for these employers.

Outputs and Outcomes

Following is a list of educational materials, publications and other products that are a result of this project and funding.

Education and Outreach Materials

- Calculator User Guide. A companion document for the workload calculator tool was published in 2024. The guide provides descriptions, definitions, and detailed instructions for using the tool and interpreting results.

- Quarterly newsletters and tip sheets are sent to a mailing list of 4,022 subscribers in eight languages. Community feedback has been positive, with some tip sheets being distributed widely by community partners and through agency outreach events.
    - Newsletters include project updates, news, and announcements, as well as a section focusing on hazards and the results of data analysis. The Spring and Summer 2024 issues focused on "Chemical Exposures" which was motivated by monthly review of claims and included data from the statewide survey, links to outside resources on chemical hazards, and information on safe labeling and storage of chemicals.
    - Tip Sheets are one-page documents that focus on low-text, highly visual displays of information. The Spring and Summer Tip Sheets were on chemical container labeling (Spring) and universal hazard symbols (Summer).
    - In January 2024, the Fall 2023 Tip Sheet on needlestick injuries was picked up by [Safety+Health magazine](#) and shared with its 91,000+ subscribers.

Research and Community Partners

- Researchers meet with interested academics, industry leaders, and community members to discuss their needs and receive feedback on study activities and products. During 2024 this included:
    - school districts, colleges, and universities;
    - businesses;
    - local labor organizations (Washington and nationally); and
    - the International Sanitary Supply Association (ISSA), a worldwide cleaning organization.

- Researchers have shared their progress through publications in academic journals, and through presentations to business and community partners, professional associations, and industry and trade association conferences, including:
    - "Development of Janitors' Workload Calculator." JaniCon (July 2024), an industry event with workshops on a range of topics relevant to the professional cleaning industry. *Audience (virtual): cleaning industry professionals, business owners.*

- "Franchising in the Janitorial Services Industry: Effects on Working Conditions." National Association of Government Labor Officials annual conference, Portland, Oregon (July 2024). *Audience: ~50 directors or leaders of state departments of labor.*
    - "Evaluation of physical workload on shoulders using surface electromyography sensors in janitor backpack vacuuming tasks." The American Society of Civil Engineers (ASCE) International Conference on Computing in Civil Engineering, (July 2024) Pittsburgh, Pennsylvania.
    - "Shoulder Muscle Activities in Backpack Vacuuming Tasks." Human Factors and Ergonomics Society annual conference, Phoenix, Arizona (September 2024). *Audience: ~50, ergonomists (academic and industrial)*

- Before making the program freely available for download, 23 individuals and groups reached out to the study directly to receive the calculator. Those include: janitorial and cleaning businesses, school districts and colleges, unions, employment agencies, and national cleaning organizations. In addition to Washington state, requests have come from across the nation, including California, Ohio, Arizona, Illinois, and New York. Feedback has been generally positive.

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.

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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.

Lin JH, Bao S, Howard N, Lee W. Compendium of physical ergonomics exposures to hand, shoulder, and low back during routine janitorial activities. Int J Ind. Ergon. 2024 (99) 103544. https://doi.org/10.1016/j.ergon.2023.103544.

Additional manuscripts in progress

First Author: Ninica Howard. Janitorial Cleaning Tasks and Physical Demands in Various Building Types: Results from the Washington State Janitorial Workload Survey. *Submitted, in process.*

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. SHARP is 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. L&I staff are continuing to develop an easy-to-use online version of the workload calculator for business and community partners that will enable expansion of the calculator into additional cleaning environments and new task, tool, and location data, and to adapt to industry changes.

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 into the school custodial cleaning environment; expanding and refining the workload calculator; updating the injured worker interview questionnaire and protocol; 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. Results from the CORE project can provide insight and tools for business and community organizations to keep Washington safe and working.