Hazards of Cleaning

Strategies for reducing exposures to ergonomic risk factors

By Rick Goggins

CLEANING WORKERS are found in every setting and the work that they do is essential in every industry. According to the Bureau of Labor Statistics (BLS, 2005), more than 4 million people are employed as cleaning workers in the U.S., many working in low-paying, temporary or part-time jobs, with little opportunity for training or advancement. Much of the work is performed in the evening or at night, and many of these workers also have another job, attend school or perform other duties during the day. These working conditions combine to create a high turnover rate—estimated to be as high as 300% (Valentine & C&MM Staff, 1998; SEIU, 2006).

Cleaning work creates exposure to many hazards, including wet floors, working on ladders, use of chemicals and motor vehicle accidents. Cleaning workers also are exposed to risk factors for musculoskeletal disorders (MSDs), such as lifting, carrying, awkward postures, repetitive motions and high hand forces. These exposures result in a high rate of injuries. According to Washington state workers' compensation data from the Department of Labor and Industries (DLI, 2006), cleaning workers have an annual incidence rate of 10.4 new injury claims per 100 full-time equivalents (FTEs), while the overall service industry sector in Washington has an incidence rate of 5.8 per 100 FTEs and the general industry incidence rate is 6.9 per 100 FTEs. By way of comparison, BLS (2005) reports a recordable injury incidence rate of 3.9 per 100 FTEs for janitorial services, which is less than the national incidence rate for all of private industry (4.6 per 100 FTEs). The large difference in numbers between Washington state and national injury rates may be explained by underreporting of injuries in BLS statistics (Leigh, Marcin & Miller, 2004).

A review of Washington state workers' compensation data (DLI, 2006) reveals that the largest single category of injury and illness claims among cleaning workers is overexertion, followed by struck by and against, and falls. Exposure to chemicals and motor vehicle accidents were also significant categories of interest (Figure 1, p. 22). Looking at severity of claims, overexertion and falls accounted for the most days of time loss, while many of the struck by and against claims appear to be of low severity, accounting for a relatively small percentage of all time loss days (Figure 2, p. 22). Overexertion claims, primarily MSDs, were reported as occurring in all phases of cleaning work, while many of the falls were reported as occurring while working on ladders, while sweeping or vacuuming stairs, or while mopping floors.

Each phase of cleaning work presents unique risk factors for MSDs. Fortunately, much attention has been focused on MSDs in cleaning work and new technologies offer opportunities to reduce the risk of injury. This article reviews risk factors present in common cleaning tasks and describes some solutions. Risk factors and some potential solutions are summarized in Table 1 (p. 23).

Dusting & Scrubbing

One risk factor introduced by dusting and scrubbing with cloths and brushes is awkward postures, especially reaching overhead, and bending, kneeling or squatting to clean at floor level. Another common awkward posture is bent wrists, often combined with repetitive motion and high grip forces. Cleaning workers often wear gloves to protect their hands; if the gloves are too loose or too tight, the amount of grip force used may increase.

Most awkward postures related to dusting and scrubbing are solved with the use of long-handled tools that allow access to high and low areas without bending and reaching. Angled or pivoting heads and adjustable handle lengths can also reduce awkward postures.

To avoid increasing grip force, the handles and cleaning heads should be as light as possible. Microfiber cleaning heads are a good option since they can be wrung drier than cotton or similar cloths, thus reducing their weight. For some wiping tasks, such as glass and mirror cleaning, a squeegee

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will do a better job and require fewer motions than a cloth. To reduce grip forces and repetitive motions in difficult or time-consuming scrubbing tasks, especially those at floor level, battery-powered scrubbers are available in a variety of handle lengths. Gloves should be sized to fit the workers' hands and should offer some tactile sensation.

Vacuuming

Vacuuming involves repetitive motions, typically of the dominant hand and arm. Heavier upright vacuums can require a considerable amount of grip force, as well as substantial effort to push and pull the vacuum. Housekeepers who carry the vacuum on a cart also must repeatedly lift and lower the device. Many older models have nonadjustable handles, making awkward postures such as wrist and back bending more likely. Noise also can be a factor with commercial vacuums. While the noise levels may not be high enough to create a hearing conservation concern, they certainly can be loud enough to elevate stress levels and cause an increase in muscle tension (Ising & Braun, 2000).

Newer vacuum cleaners have several features that make them easier to use, including lighter-weight, adjustable handles, better filtration and lower noise levels. Quieter vacuums that filter dust rather than stir it up help to minimize disturbances to building occupants during daytime cleaning. These same attributes are beneficial to cleaning personnel as well.

Self-propelled uprights are also available. However, while this feature may reduce grip, push and pull forces, it may add weight to the vacuum, increasing issues with lifting. The increased weight may be one reason that self-propelled uprights are not more common in industry. Other reasons may include the effectiveness and durability of existing equipment, the additional cost of self-propelled models, and the fact that most self-propelled models are designed for and marketed to the household market.

Canister vacuums with long hoses offer more flexibility for moving under and around furniture. In addition, since most of the weight is in the canister, the vacuuming motion does not require as much effort.

Backpack vacuums offer even more flexibility, and newer models have reduced both weight and noise levels. Studies have shown that these vacuums increase productivity by as much as 100% while requiring the same amount of operator energy expenditure as upright vacuums (Denniston, Simon & Clark, 1998; Mengelkoch & Clark, 2006). Furthermore, in situations where stairways must be vacuumed, backpack vacuums leave one hand free to use the handrail.

Concerns about backpack vacuums can arise with overuse, such as when they are used to clean large, open areas. Using a backpack vacuum in such areas negates the mobility of the device and requires a larger capacity vacuum, which will be heavier. Covering a large surface area with a backpack, upright or canister vacuum will also result in a considerable amount of repetitive motions. Wide-area vacuums can help reduce repetitive motions when cleaning open areas such as hallways and lobbies.

Mopping

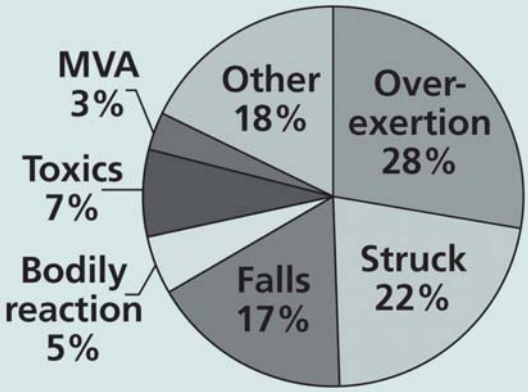
Traditional wet mopping presents several MSD risk factors, particularly heavy, awkward lifting. A typical mop bucket full of water can weigh at least 40 lb; dumping the dirty water often means lifting the bucket from floor level to a waist-level sink in a janitor's closet. Even a drain area at floor level can cause issues as workers must bend or squat to empty the bucket.

In addition, high hand forces are often seen when wringing out the mop head and when lifting and carrying the mop when the head is wet. High hand forces are also combined with repetitive motions during actual mopping.

Awkward postures can be an issue as well. A mop

Figure 1

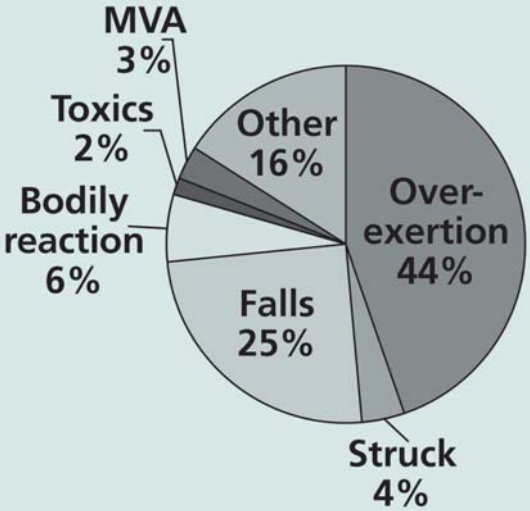
WC Claims for Cleaning Workers by Claim Type



Note. *Adapted from unpublished workers' compensation data for workers in Washington industrial class codes related to janitorial, housekeeping and custodial work, 2003, by Department of Labor and Industries, 2006. Olympia, WA: Author.*

Figure 2

Time Loss Days for Cleaning Workers by Claim Type



Note. *Adapted from unpublished workers' compensation data for workers in Washington industrial class codes related to janitorial, housekeeping and custodial work, 2003, by Department of Labor and Industries, 2006. Olympia, WA: Author.*

handle that is too long will lead to elevated shoulders, while one that is too short will lead to reaching and back bending. Furthermore, from a safety perspective, wet floors can be extremely slippery, especially in areas with grease, such as restaurant kitchens. In addition to the increased likelihood of slip and fall accidents, the lack of traction can affect the stability of the cleaning worker, increasing overall muscular effort.

Risk factors related to mopping can be reduced by changing traditional wet mop equipment and techniques, or by switching to a newer cleaning system. For example, hoses can be used to fill buckets that are sitting on the floor, and bottom-draining buckets can be wheeled over a floor drain and emptied without lifting. Mop buckets with low sides allow wet mops to be lifted without having to raise the shoulders into an awkward position. High-leverage wringers require less force and can be used from a more upright position. Lightweight, telescoping handles can be adjusted to the appropriate length (somewhere near chin to forehead height) to reduce awkward postures as well. Some handles are curved and allow a swiveling motion, which makes it easier to use the proper figure-8 motion when mopping.

Microfiber Mops

Newer cleaning systems also can help reduce many risk factors while offering several more advantages. For example, microfiber mops use flat, rectangular mop heads that are lighter and easier to wring out. These mops require less water and less cleaning solvents; the small fibers are reported to be effective at reaching into small crevices and floor surface irregularities that would otherwise trap dirt. These mop heads are also easy to change, making them useful for infection control in hospitals and other healthcare settings.

The higher initial cost of the microfiber mops is typically offset by increased durability, ease of laundering and need for less cleaning solution. In addition, these mops offer another safety benefit—faster drying floors. When considering a switch to microfiber mopping, site management should evaluate more than one manufacturer's products since mop performance can vary. It is also important to remember that microfiber mops may not be appropriate for areas that are heavily contaminated with grease (such as kitchens) or blood (such as operating rooms). Heavy amounts of contaminants will clog the individual fibers, greatly reducing cleaning effectiveness (Sustainable Hospitals Project, 2003).

Vapor Steam Cleaning

Another option for cleaning hard surfaces is vapor steam cleaning. This technology is different from "steam mops" and similar products intended for household cleaning, as well as steam cleaners intended for carpets and upholstery. Commercial-quality vapor or "dry" steam cleaners use high-temperature, high-pressure boilers to create steam with a low moisture content. Such steam is effective at killing bacteria, mold spores and dust mites, helping

Table 1

MSD Risk Factors in Cleaning Tasks & Potential Solutions

Task	Risk factors	Potential solutions
Dusting and scrubbing	•Reaching •Bent back •Squatting •Kneeling •Bent wrists •Hand force •Repetitive motions •Loose-fitting gloves	•Long-handled tools •Angled tools •Lightweight cleaning heads (e.g., microfiber) •Squeegees for cleaning glass •Battery-powered scrubbers •Appropriately sized gloves
Vacuuming	•Pushing and pulling forces •Lifting •Repetitive motions •Grip force •Bent wrists •Bent back	•Lightweight canister, backpack or self-propelled upright vacuums •Height-adjustable loop handles •Wide area vacuums for hallways and large rooms
Mopping	•Lifting •Carrying •Hand force •Repetitive motions •Bent back •Elevated shoulders	•Hose to fill bucket at ground level •Bottom-draining buckets •Lightweight mop heads •Adjustable length handles •Microfiber mops, vapor steam cleaners or no-touch cleaning systems
Stripping and buffing	•Hand force •Bent wrists •Repetitive motions •Pushing and pulling •Vibration	•Ride-on or walk-behind floor machines •Equipment maintenance programs
Handling trash	•Lifting •Added force to overcome trash can suction •Carrying •Pushing and pulling	•Smaller trash bags •Vent holes or channels in trash cans •Side-opening trash containers •Locating dumpsters underneath loading docks •Mechanical trash dumpers
Moving furniture	•Lifting •Carrying •Push and pull forces to fold cafeteria tables	•Lightweight and/or wheeled furniture •Wheeled lifting devices such as desk lifts, table dollies •Friction-reducing aids such as air skids or furniture glides •Spring-assisted folding cafeteria tables

Note. *Adapted from* Musculoskeletal Health of Cleaners, *by V. Woods, P. Buckle & M. Haisman, 1999, Surrey, England: HSE Books; and* Working Safer and Easier: For Janitors, Custodians and Housekeepers, *by Cal/OSHA, 2005, Sacramento, CA: Author, Research and Education Unit.*

to clean while reducing both allergens and the need to use a lot of chemicals (Vojta, Randels, Stout et al., 2001; Barker, Stevens & Bloomfield, 2001; Wilson, Brasel, Carriker et al., 2004).

Dry steam penetrates well to clean into crevices, but dissipates heat quickly. As a result, by the time the steam is several inches from the cleaning head, it has cooled enough to be safe in case of accidental contact. The low moisture content and the fact that the steam warms the floors as it cleans also means that floors will dry quickly, reducing the likelihood of slip and fall incidents (Hoverson, 2006; Cleanlink, 2006).

When considering vapor steam cleaners, key factors include long hoses and a variety of attachments, which will help reduce awkward postures and increase flexibility. For areas such as kitchens where grease is a concern, steam cleaners with a built-in vacuum may help to clean effectively while reducing slipperiness. Continuous-fill units will further improve productivity, since water can be added without having to cool down the machine.

Commercial vapor steam cleaners can be expensive, but this is offset somewhat by the reduced use of cleaning chemicals. The lack of chemicals can also lead to a negative perception related to the lack of a chemical odor. Many people associate the chemical odor with an area that has been cleaned. When that odor is not present, customers may complain, believing an area has not been cleaned.

"No-Touch" Cleaning Systems

"No-touch" cleaning systems may also help to reduce multiple risk factors. A typical system might include a single cart with the following:

- water tank that can be filled and emptied with a hose to eliminate lifting;
- metered sprayer for applying cleaning solution;
- indoor power washer for washing the cleaning solution down to the floor;
- wet/dry vacuum for cleaning/drying the floor.

These systems can reduce lifting, awkward postures and repetitive motions related to mopping and scrubbing, while allowing standardization of the cleaning chemicals used. Some systems also include training materials that can help to standardize cleaning processes.

Cost Justifying Solutions

Finding the appropriate solutions is only the first step in putting them into practice. Like many industries, the cleaning industry operates on thin profit margins and equipment purchases must be carefully considered for their costs and benefits. Some of the solutions discussed in this article have measurable productivity benefits that by themselves may justify the purchase cost. The safety, health and ergonomics improvements that new technologies can bring should also increase productivity, while reducing workers' compensation and other costs of accidents and injuries. The increased effectiveness of advanced cleaning technologies provides an additional selling point that can be used when bidding on contracts.

Some solutions, such as changes to facilities, additional floor drains, improved janitor's sinks and side-opening trash receptacles, may be the responsibility of the customer, not the contract cleaning service. Implementing these solutions may require negotiation with a customer. Some companies may respond favorably to the argument for better safety and health, even for contract employees, based on a sense of moral and ethical duty. It may also help to justify the changes based on controlling labor costs or improving the quality of the cleaning, which would also benefit the health of building occupants. In a competitive environment with contracts often going to the lowest bidder, it will certainly help to establish a good relationship with a customer before suggesting such changes, and to focus the discussion on the mutual benefits that will be realized.

Stripping & Buffing Floors

Stripping and buffing floors have long been a concern for injury, largely because of the design of the machines used. A typical rotary buffer has narrow handles that place the arms and wrists in an awkward position. Older machines typically produce a lot of torque, especially when starting up. This torque is transferred to the operator's arms, requiring a considerable amount of grip force to control the buffer. Buffing also requires repetitive side-to-side motions that can place the shoulders in awkward positions.

Buffing machines also produce vibration, and the grip force required to operate them means that most of the vibration is transmitted to the operator's hands and arms. This is a particular concern with older machines, where loose and out-of-balance parts can lead to excessive vibration. In addition, buffing machines are heavy and awkward to lift. Stripping and buffing activities also create slippery floors, making falls more likely.

A self-propelled floor machine (available in walk-behind and ride-on models depending on the floor area to be cleaned) is one solution. A self-propelled machine may not require as tight a grip, depending on control mechanisms, which will reduce vibration transmission. Regular equipment maintenance and special procedures for removing defective equipment from service can also help to reduce vibration, even when hand-operated models are used. Non-slip overshoes specifically designed for stripping work are also available to prevent slips.

Handling Trash

Removing trash often involves lifting the same bag of garbage multiple times, from trash can, to cart, to dumpster or compactor. Large trash bags can weigh as much as 60 lb—particularly in settings such as restaurants and cafeterias where dense food and liquid waste can make even smaller bags hazardous to lift. Additionally, lifting a full bag out of a trash can can create a vacuum, which makes removal even more difficult.

Small trash cans require repetitive bending, while larger, deeper trash cans require lifting with the hands over the shoulders in order to clear the sides of the can. Lifting above shoulder height is also common when transferring bags to dumpsters or compactors. Moving trash carts can require high pushing and pulling forces, especially over ramps or other inclines.

Several short-term fixes can address these problems. These include steps to lighten the load, such as using smaller trash bags or tying knots in the bottom of the bags to reduce their volume; an empty box or foam block in the bottom of the trash can will take up the excess volume. Another solution is to tie off a large bag when it becomes half full, leaving it in the bottom of the trash can, then place an empty bag over it. This creates two lighter lifts instead of one heavy one.

Suction in trash cans can be reduced by drilling vent holes several inches up on the sides of the cans, leaving a small area at the bottom for fluids to collect without leaking onto the floor. Some trash cans have vertical grooves on the inside to vent air. In addition, relocating dumpsters or compactors so that they can be accessed from above, such as at a loading dock, can reduce awkward lifting.

Longer-term solutions include replacing large trash cans with lower-volume cans or using side-opening trash containers, which eliminate lifting over shoulder height to empty them. A more systematic solution involves the use of large, wheeled totes, such as those used by many municipalities and private refuse and recycling companies. Several totes can be hooked together into a train, then moved using a powered tug. Portable or fixed powered tote dumpers are available for emptying the trash into dumpsters without the need to lift by hand (OHSAH, 2003).

Moving Furniture

Cleaning workers often must move furniture. The lifting, carrying, pushing and pulling involved creates a high potential for injury. For example, school custodians often must fold long cafeteria tables to clean around them. During summer months, they may need to move not only student desks and chairs, but also the more substantial desks used by teachers and administrators.

Table 2

Examples of Psychosocial Factors in Cleaning Work

Psychosocial factors	Examples from cleaning work
Work overload and time pressure	School custodians having to deep clean an entire school during the summer months. Hotel housekeepers expected to clean 16 to 18 rooms per day, regardless of how messy the rooms are.
Lack of influence or control over day-to-day work	Day shift often leaves big messes for the night crew to clean up. Cleaning tasks, methods and schedules set by management and supervisors without consulting workers.
Monotonous work	Cleaning the same area, in the same way, day after day.
Lack of respect/appreciation for effort put into job	Evening and nighttime cleaning crews essentially anonymous to daytime staff. May only get feedback when there is a problem.
Poor reward-to-effort ratio	Median annual salary for cleaning workers is around $18,000 for a physically demanding job with few intrinsic rewards.
Lack of supervisor or coworker support	A lot of cleaning work is done in relative isolation.
Lack of support at home	Evening and night-shift work may mean little interaction with family members.
Lack of training or preparation to do the job	Training is typically limited to shadowing an experienced cleaning worker.
Too little or too much responsibility	A cleaning worker with too small of an area to clean may finish early and worry about being laid off, while one with too large an area to clean may have to take shortcuts and worry about poor performance appraisals.
Ambiguity in job responsibilities	Supervisor may stress getting the job done quickly, while customers may complain if the cleaning job is not thorough.
Poor or too little communication	Issues in communicating with cleaning workers who have limited English language skills. Lack of timely feedback for workers on evening and nighttime crews.

Note. *Adapted from "The Psychosocial Side of RSIs," by I. Szlapetis and J. Burton, 2004,* Accident Prevention*, 50(6), pp. 14-15.*

Domestic cleaning workers and housekeepers in nursing homes also may have to move larger pieces of furniture. Maintenance and facilities staff in residential care or assisted-living facilities may have to help move appliances such as stoves and refrigerators. While not everyday activities, the physical demands of such work added to the other demands of cleaning tasks can lead to injury.

Solutions to these hazards are very straightforward. In some cases, physical demands can be reduced by switching to lighter-weight furniture or furniture on wheels, as many hotels and nursing homes have done. For schools, spring-assisted folding cafeteria tables, or tables with benches that flip onto the table make it easier to clean around them. Lightweight folding tables are also available for conferences and banquets. Specialized pieces of wheeled equipment are available for moving tables, desks, stacks of chairs and heavier items such as appliances. Other solutions, such as glides and air skids, work by reducing friction between the object and floor, allowing it to be slid rather than lifted and carried.

Reducing the Amount of Cleaning Needed

The amount of cleaning work required can also be reduced through systematic approaches. For example, larger floor mats or cleanroom sticky mats at entrances can help to reduce the amount of dirt tracked into a building. Air filters can help to reduce the amount of dust on surfaces. No-touch bathroom fixtures, such as motion-activated faucets and towel dispensers, can reduce the frequency with which these items need to be wiped down. Installation of windows made of specially coated "self-cleaning" glass can reduce the frequency of cleaning as well. In areas where trash is typically made up of lightweight materials, such as an office, having centralized trash receptacles instead of a trash can in every cubicle, will reduce the bending and reaching required for trash collection.

Macroergonomics & Psychosocial Factors

The focus of this article has been on what is often referred to as microergonomics, the practice of identifying individual physical risk factors and appropriate solutions. However, to be truly effective at preventing injury and improving working conditions for cleaning professionals, one also must consider larger issues such as organizational design and management, and psychosocial factors. Numerous studies have indicated that psychosocial factors (summarized in Table 2) can play as large a role in the reporting of MSDs as do physical risk factors (National Research Council, 1999). While an effective ergonomics process involving management commitment and employee involvement can help address

Ergonomics Solutions & Ideas

In recent years, the cleaning industry has begun to focus on ergonomics and safety in response to the relatively high rate of injury among cleaning workers. This has resulted in increased demand for industry-specific safety and ergonomics information, as well as cleaning tools with ergonomic features. Currently, however, no criteria exist for labeling a guideline or a product "ergonomic," so it may be difficult for the cleaning community to find suitable products and information.

For example, a web search using the keywords cleaning and ergonomics returns more than 1 million results, with no indication of the validity or quality of the information that the websites contain. Washington State DLI offers a free web service, the Ergonomics Ideas Bank, a searchable database containing hundreds of ideas for ergonomics solutions categorized by industry and risk factor. All entries in the database have been reviewed by a group of ergonomists to make sure they address MSD risk factors. The databank has an industry category specifically for janitorial, housekeeping and cleaning work. Many of the tools and concepts described in this article are available in the bank, which is located at www.ergoideas.lni.wa.gov.

some conditions that result in psychosocial factors, the nature of cleaning work necessitates a more concerted effort to address the root causes of these problems (Woods & Buckle, 2006).

Cleaning for Health

Several cleaning initiatives have proven effective in addressing both physical and psychosocial risk factors. One such initiative is "cleaning for health" rather than cleaning for appearance. Cleaning for health stresses the importance of improving indoor air quality by reducing airborne and surface dust, controlling water use to reduce mold growth, and reducing the use of toxic cleaning chemicals in order to improve the health of both building occupants and cleaning workers.

These goals are accomplished through increased training of cleaning staff, improved work methods and replacing harsher chemicals with green cleaning products. The emphasis on the importance of the cleaning process to everyone's health, safer working conditions, better defined job responsibilities and increased training helps to improve cleaning workers' job satisfaction.

Cleaning-for-health initiatives also may involve educating building occupants about the changes in methods so they do not assume that a lack of chemical odor means the facility has not been cleaned. This provides an opportunity to increase awareness among building occupants of the work performed by cleaning staff—and may lead to the occupants being more considerate.

Team Cleaning

Team cleaning is an alternative to zone cleaning. In zone cleaning, a worker is responsible for a given area, such as one floor of an office building, and, therefore, dusts, vacuums and cleans that entire area. With team cleaning, three or four "specialists" perform the work, each focusing on one part of the process. Typically a light-duty specialist will dust surfaces, followed by a vacuuming specialist, a restroom specialist and a utility specialist, who will finish any cleaning tasks necessary and inspect the final result. Potential advantages of this approach include greater efficiency, higher quality, better ability to standardize equipment and chemicals used, and reduced costs.

With the implementation of proper equipment and training, balanced workloads among team members and shared accountability, team cleaning also could help to reduce psychosocial factors by providing a social support network among team members and helping to reduce the monotony of the work.

Team cleaning can reduce psychosocial factors if it is implemented with ergonomics in mind. However, if physical and psychosocial risk factors are ignored in planning the work, it may actually make matters worse.

Experience also suggests that increased specialization can lead to overexposure to the same physical risk factors and a reduction in the overall meaningfulness of the work. In addition, allowing team members to help determine how work is divided, how to accomplish cleaning tasks and break schedules could give them more control over their work. However, since these decisions are typically left to the cleaning supervisors or managers, some benefits of a true team approach are not realized.

Cooperative Cleaning

Cooperative cleaning provides opportunities for teamwork without the downsides of specialization. It has been used successfully by custodians in schools to help with the additional demands of summer cleaning (British Columbia School Safety Association, 2004).

In cooperative cleaning, pairs or teams of custodians work together to, for example, clean each custodian's school in turn so that extra help is available for tasks such as moving furniture. Teams also are able to rotate more frequently out of tasks with high physical demands, such as scrubbing or buffing floors. Teams can share equipment, making it more cost-effective to provide labor-saving devices such as floor machines or wide-area vacuums. The team approach provides both a social network and an opportunity to share experience and work techniques. Workers in cooperative teams have reported higher job satisfaction and improved morale as well (British Columbia School Safety Association, 2004).

Daytime Cleaning

Daytime cleaning—where much of the work occurs during normal business hours—is another strategy that may improve psychosocial factors. Daytime work greatly reduces problems related to shift work, such as disruption of circadian rhythms and lack of interaction with family members and friends. It also allows for enhanced communication between building occupants and cleaning workers. Occupants better understand the work performed by the cleaning staff and may even help out by cleaning up after themselves more or taking their trash to a central collection point. Cleaning staff learn how the facility is used and better understand occupants' priorities for cleanliness. Daytime cleaning can also save on energy costs since the building's lights can be turned off at night.

Providing proper equipment is critical to success with this strategy. Powered equipment, such as vac-

uum cleaners, must be as quiet and compact as possible, and techniques used to clean floors should not leave much water behind.

Employee Involvement

Employee involvement in the ergonomics process helps to address psychosocial issues and increases the likelihood of success in reducing MSDs. While shiftwork and language barriers can add to the challenges of involving cleaning workers, they do not make it impossible. An honest attempt to seek their opinions will be perceived as someone placing value in their opinions. Workers can help to identify physically demanding tasks and they may also be aware of solutions.

Workers should be involved in discussions about the design of equipment, tools and methods in order to develop specifications for future purchases. Asking employees to identify and implement solutions increases the effectiveness of solutions and reduces resistance to change.

Cleaning workers should be involved in planning new or remodeled facilities as well. They can provide input on the location and size of cleaning equipment storage, floor drains, sinks and electrical outlets, as well as information on types of surfaces that are easier to clean and maintain, furniture location (to reduce the need to move it) and other issues that affect their daily work.

Language & Cultural Issues

Cleaning work is often an entry-level position, one generally thought not to require much training. As a result, it often attracts recent immigrants who may not have strong English speaking, reading and writing skills. Cleaning work also does not require a high level of education, so literacy levels may vary among workers. Workers may also come from different cultures where the types of cleaning equipment used and the approach to workplace safety and health differ from their current work environment. Collectively, these factors create additional challenges for employee involvement, training and communication with cleaning personnel, and may add to feelings of isolation, lack of support and lack of appreciation.

Since workers may not be literate even in their native language, bilingual written training materials alone may not be sufficient. Therefore, it may be necessary to provide on-the-job training and mentoring by experienced, bilingual peers. Developing cultural awareness and sensitivity among management and supervisors can also help to avoid conflict and improve communication.

Conclusion

Cleaning work can be a thankless, physically demanding job that poses many MSD risk factors. Solutions, including new techniques and equipment, are available for individual risk factors. Even greater benefits can be achieved through more systematic changes that include consideration of macroergonomics and psychosocial factors. ■

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