

## **EXPOSURE TO ENVIRONMENTAL CLEANING CHEMICALS IN HEALTHCARE SETTINGS**

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### **Statement of the Problem**

In recent years, research projects, booklets and articles have focused on the health effects of chemical exposures to nurses and other workers in the healthcare industry. These chemicals include pesticides, antimicrobial and environmental cleaning agents such as disinfectants and floor wax strippers. While the majority of the research projects focus on information related to asthma and reactive airway disease syndrome (RADS), neurological symptoms such as headache, dizziness and nausea, skin disorders such as rashes, blisters and burns and allergic sensitization may also result from exposure to these chemicals.

According to Health Care Without Harm, since 1980 asthma caused or significantly exacerbated by work exposures, has emerged as the most commonly reported occupational lung condition. The overall prevalence of adult asthma related to the work environment is unknown but recent studies estimate that occupational asthma accounts for 5% to 37% of all asthma. In the U.S. studies have estimated that 10% to 23% of new adult onset asthma is due to occupational exposures. Asthma ranks within the top ten conditions causing limitation of activity and costs our nation 16.1 billion dollars annually in healthcare, loss of work productivity and premature deaths.<sup>(1)</sup>

While the symptoms and disability are realized by the affected employees, the expense for treating asthma is shared with the employer through health insurance and Workers' Compensation expenses. Employees require and seek treatment for asthma and other breathing difficulties, whether they associate it with work related exposures or not. Additionally, the employer incurs expenses for sick time and for overtime for workers who remain on the job or replacement workers to fill in for those who become ill or disabled.

It is important to recognize the connection between work exposures and asthma as quickly as possible as delays in diagnosis result in poorer prognosis for the affected employee. Information to identify those exposures and symptoms is often close at

hand in a document known as a Material Safety Data Sheet (MSDS). The MSDS is required by the OSHA Hazard Communication Standard 1910.1200.

Manufacturers are required to identify the adverse health effects of the chemicals in their product on the MSDS. The MSDS for an industrial strength floor stripper commonly used in hospitals and identified by affected employee's states:

**Effects of Acute Exposure:**

**Eyes:** Corrosive. May cause permanent damage including blindness.

**Skin:** Corrosive. May cause permanent damage.

**Inhalation:** May cause irritation and corrosive effects to the nose, throat and respiratory tract.

**Ingestion:** Corrosive. May cause burns to mouth, throat, and stomach.

**Medical conditions aggravated by overexposure:** Individuals with chronic respiratory disorders such as asthma, chronic bronchitis, emphysema, etc. may be more susceptible to irritating effects. <sup>(2)</sup>

## **Workers, patients and visitors are at risk**

Nurses and other healthcare workers may be exposed to environmental cleaning chemicals on a daily basis as floors are stripped, finishes are applied and then buffed to maintain the "shine". These repeated exposures have the potential for workers to develop chronic inflammation or become sensitized to the product. Patients are also exposed at a time when their health and often their respiratory systems are already compromised. There is the potential for visitors to be exposed to these irritating and sensitizing products as well.

Another consideration when addressing exposure to toxic chemicals is individual susceptibility. This health concept refers to the fact that one person may have factors such as age, weight and gender or existing health conditions that would make them more susceptible to the chemicals when exposed. Unfortunately, many employers focus on individual susceptibility and fire sensitive people or decide that the problem is the employee and not the exposure.

From the stories of many nurses who have been made ill from exposure to environmental cleaning products, there seems to be little value in scheduling cleaning operations that utilize toxic products to weekends or night shifts or when known sensitized individuals are not on duty. Moving these toxic processes to the night and weekend shifts puts all those who routinely work these shifts at greater risk of developing symptoms and/or sensitization through repeated exposures. Often employees requiring accommodations are present when the cleaning

process takes place and suffer the adverse consequences of exposure that result in emergency medical treatment and lost work time.

## Products commonly used in healthcare

**Pesticides:** It is no longer acceptable to follow a program that states “we spray every Friday”. Pesticides by their very nature are meant to kill. Some do it by attacking the nervous system, while others attack the reproductive system or respiratory system of the pests they are meant to destroy. Some pesticides may be classified as carcinogens, teratogens or mutagens. Pesticide exposure has been associated with several neurological diseases in humans. Workers who apply pesticides are at highest risk. <sup>(1)</sup>

**Antimicrobial Cleaning Products:** Disinfectants and sterilizing chemicals composed of chloramine, hexachlorophene, glutaraldehyde, ethylene oxide, quaternary ammonium compounds (quats) and formaldehyde are commonly used in healthcare settings today. According to MSDS's and other sources, exposure can occur by inhalation and to a lesser extent by absorption of the chemicals through the skin. These chemicals are associated with asthma and neurological symptoms (headache, nausea and dizziness). <sup>(3)</sup>

**Environmental cleaning agents:** Floor strippers, floor polishing chemicals, toilet and glass cleaners are comprised of multiple chemicals and may include chlorine bleach, ethanalamines, glycol ethers (e.g. 2 butoxyethanol and, sodium hydroxide). These chemicals are associated with respiratory and neurological symptom and a splash to the eyes and/or skin could result in tissue irritation and burns. The MSDS for one of these products used in healthcare settings warns of corrosion that could result in blindness if a splash to the eyes should occur. <sup>(4)</sup>

**VOC's:** Many of these products contain a classification of chemicals known as volatile organic compounds (VOC's). VOC's, which are derived from petroleum products, vaporize quickly at room temperature. VOC's are inhaled in varying concentrations from different products. Ventilation (frequency of air exchanges) in place at the location of use, as well as the manner in which the product was prepared, mixed or diluted (or not) and applied will influence the amount of chemical in the air and the exposure to staff and bystanders. VOC's that are inhaled into the respiratory tract are absorbed by the bloodstream and move quickly to the brain. <sup>(1)</sup>

**Fragrances:** Fragrances in healthcare settings exist from a variety of sources. These range from personal hygiene products used by staff and patients to those fragrances added to environmental cleaning and disinfecting products. Many hand

sanitizers contain fragrances and are an additional source of VOC's. The health effects from fragrances are similar to those described above for other products including contributing to or exacerbating asthma, respiratory irritation and/or neurological symptoms. <sup>(1)</sup>

## Alternatives Exist

As a concern and interest in preventing occupational and environmental exposure to chemical toxins becomes widespread, the manufacturers and distribution companies for environmental cleaning products are offering broad ranges of products for their customers. Changing to safer products may simply involve an open discussion and trial of new products with the current chemical supply company, rather than locating a new chemical supplier and changing to a new product line. The need to change to new supply companies has often blocked this type of quality improvement process in the past.

**Alternatives to Pesticides:** A process known as Integrated Pest Management (IPM) begins with steps that should be taken to remove the attractions for pests and pathways for pests before chemicals are used. Such steps include: improved sanitation practices, (empty refuse containers more frequently), structural repairs (holes in the wall) to block the pathways for entrance and the use of non chemical pesticide devices, such as vacuuming crumbs and utilizing traps. Chemical pesticides have a place in this process but only as the last resort. Pesticides should only be applied in hospitals by those who have been specifically trained to do so. <sup>(1)</sup>

**Alternatives to Antimicrobial Cleaning Products:** All antimicrobials have a measure of hazard associated with them. This is evident by reviewing the MSDS that accompany the products. By their nature disinfectants and sterilants are developed to destroy living organisms. While few safer alternatives exist, educating and training workers in the safest application and handling, utilizing proper dilution as well as appropriate personal protective equipment when working with these chemicals can reduce exposure and adverse health effects. In many cases, cleaning is needed but antimicrobial products are not and the total amount of antimicrobials used can be reduced.

**Alternatives to Environmental Cleaning Agents:** Safer cleaning chemicals exist and are in use today in many environmentally conscious healthcare facilities. These products have chemical properties that do not cause or aggravate asthma or other respiratory conditions; they do not cause blindness if splashed into the eyes; they do not pollute the waterways when they are discharged in wastewater. <sup>(1)</sup> Micro fiber mops and cleaning cloths are recognized by the U. S. Environmental Protection Agency (EPA) as a meaningful alternative to conventional floor cleaning

with wet mops and buckets. This process eliminates the ergonomic hazard of lifting heavy water buckets and the EPA emphasizes that it dramatically reduces the amount of water and chemical products required for routine cleaning of hospital rooms. Microfibre mopping processes have been associated with a reduction in frequency of slips, trips and falls because of the reduction in the amount of water that remains on the floor.<sup>(6)</sup>

**Fragrance - Free Environments:** Fragrances can cause symptoms in those individuals with asthma and chemical sensitivity.<sup>(1)</sup> Prominent signage stating a “fragrance - free facility” and the availability of supportive information promotes the concept of voluntary compliance with a fragrance-free environment. Even voluntary compliance is associated with a marked decrease in the amount of fragrance use among individuals. Most vendors of environmental cleaning products provide a line of fragrance-free products and personal hygiene products for patient care are available without fragrance. Several hospitals and other facilities in Massachusetts have taken the step toward becoming a fragrance free environment. Their signage simply states “Men and women are asked to refrain from using personal fragrances when working or visiting in this building.”

## Association Position

MNA believes that health care facilities should:

- evaluate the environmental cleaning and antimicrobial products they currently use by reviewing the adverse health and environmental effects noted on the MSDS. They should begin to use alternative products with less potential for adverse health effects and environmental pollution. This is the most important strategy for protecting the health of nurses, other healthcare workers and patients, as well as the environment
- include a person with expertise in occupational health and safety on any committee or group that selects environmental cleaning products, antimicrobials and/or pesticides.
- provide hazard communication training that meets the following requirements of the OSHA Hazard Communication Standard 1910.1200 (h) (3) Training and Education - (must) contain at least (ii) the physical and health hazards of the chemicals in the work area and (iii) the measures for workers to use to protect themselves from these hazards and follow the requirements of the Standard 1910.1200 (g)(8) MSDS to be readily available. The process to access MSDS should be posted and available at all times.<sup>(7)</sup>
- develop and communicate methods for reporting any symptoms that workers and patients experience when environmental cleaning products are in use. Medical evaluation and treatment should be provided as necessary.

Note; Massachusetts employers are required by law (MA 105 C.M.R 300.180) to report all cases of suspected or diagnosed occupational asthma which are believed to have been caused or aggravated by factors in the individual's workplace to the MDPH, Occupational Health Surveillance Program. (See the [Confidential Report of Occupational Disease and Injury](#) form) [www.mass.gov/dph/ohsp](http://www.mass.gov/dph/ohsp).<sup>(8)</sup>

- associate the symptoms noted on the MSDS that are related to environmental cleaning chemicals with the symptoms reported by nurses and others when they experience these adverse health effects in the presence of environmental cleaning chemicals.

## Summary Statement

Data recently released by the Massachusetts Department of Public Health Sentinel Event Notification for Occupational Risk (SENSOR) program indicate that healthcare was the industry most frequently identified among confirmed cases of work-related asthma. (29% of all cases, 1993-2006) and nursing was a frequently reported occupation accounting for over 13% of all confirmed cases of occupational asthma. Occupations such as health aides and health technicians were also high on the list of those affected. The leading causative agents were cleaning products and poor indoor air quality.

Health effects, associated with cleaning products include dermatitis, respiratory distress, headaches, dizziness, nausea and increase incidences of occupational asthma. As more and more workers become sensitized, there are also significant increases in lost work days and associated costs in compensation claims and replacement workers. Patients also suffer from exposures to the same chemicals and disruptions in staffing.

For many cleaning products or chemicals used in healthcare there are safer more environmentally friendly and cost-competitive alternatives. It is in the best interests of the organizations, patients and the workers to continually identify and evaluate new products and alternatives to find the "best" product available that meets all of the requirements of the given cleaning regimen or task while still providing a safe and healthy environment.

Healthcare organizations should be leaders in the movement to safer working environments. Each institution should have clear policies and directives that minimize the use of hazardous agents, inform all workers about potential health effects and how to respond if they believe they are suffering symptoms of exposure, and continuously improve their programs and products.

## References and resources

- (1) Risks to ASTHMA Posed by Indoor Health Care Environments – A Guide to Identifying and Reducing Problematic Exposures, Health Care Without Harm – Autumn 2006 [www.noharm.org](http://www.noharm.org)
- (2) Johnson Wax Professional – Material Safety Data Sheet – Bravo Heavy Duty Low Odor Stripper - 01/29/03  
Cleaning for Health, An INFORM Report, September 2000 [www.informinc.org](http://www.informinc.org)
- (3) Feinberg, Culver, Sutherland, Musnikow, Cleaning For Health, An INFORM Report, September 2000, [www.informinc.com](http://www.informinc.com)
- (4) Health Care Without Harm - Fact Sheet - Cleaning Chemical Use in Hospitals [www.noharm.org](http://www.noharm.org)
- (5) Department of Veterans Affairs, Program Guide 1850.2 Integrated Pest Management October 5, 1998
- (6) U. S. Environmental Protection Agency, Using Microfiber Mops in Hospitals Environmental Best Practices for Health Care Facilities, November 2002 [www.epa.us](http://www.epa.us)
- (7) U.S. Department of Labor, OSHA General Industry Standards 29 CFR 1910 – Hazard Communication Standard 1019.1200
- (8) Sentinel Event Notification System (SENSOR) for Occupational Risk – Massachusetts SENSOR is funded by the National Institute for Occupational Safety and Health
- (9) Massachusetts Department of Public Health, SENSOR Occupational Lung Disease Bulletin, July 2007, [www.mass.gov/dph/ohsp](http://www.mass.gov/dph/ohsp)

### Additional Resources

MNA On Line Continuing Nursing Education Program – Fragrance Free, Creating a Safe Healthcare Environment, [www.massnurses.org//nursing-resources/continuing-education/mna-ce-online](http://www.massnurses.org//nursing-resources/continuing-education/mna-ce-online)

Sarah Boseley, “Cleaning chemicals linked to asthma in young children” Guardian, August 26, 2004 [www.guardian.co.uk?uknews/story/0,3604,1290880,00.html](http://www.guardian.co.uk?uknews/story/0,3604,1290880,00.html) or [www.healthsentinel.com/news.php?event=news\\_print\\_item&id=160](http://www.healthsentinel.com/news.php?event=news_print_item&id=160)

Sensor Occupational Lung Disease Bulletins available at [www.mass.gov/dph/ohsp](http://www.mass.gov/dph/ohsp)  
Massachusetts Department of Public Health, multiple occupational lung disease  
topics addressed