

Occupational Asthma: clearing the air

David Morrison no longer works in his chosen field as a machinist.

For seven years he was exposed to petroleum-based cutting fluids, used to cool his tools. The coughing, sneezing and excess phlegm he experienced at work were eventually diagnosed as occupational asthma.

Morrison says his chest feels heavy, his lungs are inflamed and he finds it extremely difficult to breathe. Irritants such as diesel exhaust or perfume make his situation worse. At age 53, like so many other workers, Morrison has been forced to leave his job and pursue another career.

Asthma is a chronic lung disease killing approximately 500 Canadians each year, according to the Canadian Lung Association. This common lung condition mostly occurs in childhood, but often starts or reappears in adult life. In Ontario, as many as one in five children and one in 10 adults suffer from asthma.

The air we breathe is contaminated with a range of hazardous chemicals. It's not surprising then asthma rates have quadrupled over the past 20 years making it one of the most prevalent chronic lung conditions in Canada. Recent studies also indicate exposure to toxic environmental agents account for up to 40 per cent of all asthma cases.

Sadly, there is no cure for asthma.

What is occupational asthma?

Studies in the U.S. and Japan show about five to 15 per cent of adult asthma cases are work-related. Inhaling fumes, vapours, gases, dust or other potentially harmful environmental substances while on the job causes many workers to experience a condition known as *occupational asthma*.

Occupational asthma is triggered by certain environmental agents in the workplace, which act as allergens or irritants. When workers inhale these harmful agents the airways of the lungs become aggravated over time making them extra-sensitive/twitchy (hyper-responsive) and inflamed (red and swollen).

It is difficult to breathe when airways are swollen because oxygen has trouble getting into the lungs and carbon dioxide has trouble coming out resulting in the following symptoms:

- wheezing;
- coughing;
- chest tightness; and
- shortness of breath.

Commonly, work-related asthma symptoms worsen throughout the workweek, improving with time away from the job and only recurring when the worker returns to the job. It may appear for the first time in previously healthy workers within months or even years of exposure. However, in the case of irritant-induced asthma effects can be seen within 24 hours of exposure to high concentrations of the substance.

Types of occupational asthma

There are two types of occupational asthma.

1. The most common type is asthma caused by sensitization to a substance that appears after a latency period of exposure. Once a person is sensitized/allergic to a particular agent/substance exposure to even low levels of that agent may cause an asthmatic response.
2. The second type of work-related asthma is *Reactive Dysfunction Syndrome (RADS)* which develops without a latency period. This type of asthma is associated with exposure to high concentrations of irritants.

Work exposures can also aggravate pre-existing asthma. Regardless, early recognition and control of exposures to asthma-causing agents are essential. Left unchecked, breathing problems may become permanent and continuous treatment will be needed. In severe cases asthma can be life-altering and even lead to death.

Early detection of occupational asthma also benefits co-workers as it warns the employer of a potential workplace hazard.

Who is at risk?

No job is immune from occupational asthma. It is the most frequently reported work-related respiratory disease in the world. In fact, approximately 300 to 400 lost time claims are reported each year in Ontario alone, according to the Workplace Safety and Insurance Board (WSIB).

Hundreds of occupations are at risk including bakers, healthcare workers, electronics workers, laboratory workers, animal handlers, grain handlers, foam manufacturers, welders, plastics factory workers, automotive parts manufacturing workers, painters, woodworkers, detergent manufacturing workers, hairdressers and pharmaceutical workers.

In most cases, the asthma-causing agent can be identified. Currently, there are over 250 substances of concern. They may be proteins from laboratory animals, flour, plants, and latex or, chemicals such as isocyanates, anhydrides, amines, fluxes, acrylates, formaldehyde, glutaraldehyde, biocides, or drugs such as penicillin, psyllium, spiramycin or tetracyclines.
(See over for Table.)

What is the law?

Under Ontario's *Occupational Health and Safety Act*, workers have the right to know about hazardous substances through the *Workplace Hazardous Materials Information System (WHMIS)*. WHMIS is a Canada-wide system that provides employers and workers information about the hazardous materials they work with on the job in order to protect their health and safety. This product information is provided by means of separate data sheets known as Material Safety Data Sheets (MSDS).

An MSDS contains detailed information on the following:

- health risks of exposure;
- the safest method of using or storing and disposal of the material;
- protective measures for workers who may be exposed; and
- emergency procedures.

The law requires all MSDS's to provide the following nine separate categories of information: hazardous ingredients, preparation information, product information, physical data, fire or explosion hazard, reactivity data, toxicological properties, preventive measures, and first aid measures.

The supplier or employer must also include any other hazard information of which workers should be aware. And, the employer must provide all workers with WHMIS training.

Exercising their right to know workers and their representatives can begin by studying MSDS's in the workplace to determine if asthma-causing substances may be present. This in turn will help them determine what measures should be recommended to the employer to eliminate or reduce hazardous exposures.

Isocyanates, powerful asthma-causing agents, are subject to Ontario Designated Substance Regulation. Employers must implement a specific control program including training for workers and medical monitoring of workers by a doctor of the worker's choosing.

Many asthma-causing agents like phthalic anhydride, methyl methacrylate, furfuryl alcohol and styrene are also subject to Ontario Regulation 833, amended to O. Reg. 177/05, which sets out specific occupational exposure limits (OELs). While the process for arriving at OELs has been criticized, among other things as being technically feasible rather than protective of health, nonetheless, they provide workers with another standard to help control if not eliminate the hazard.



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How is occupational asthma controlled?

In order to prevent occupational asthma employers must eliminate or limit worker exposure to asthma-causing agents. This can be accomplished at the source, along the path and, as a last resort, at the worker.

At the source

The most effective way to prevent occupational asthma is to *eliminate* asthma-causing substances altogether. A substance such as chromium for example which is both an asthma-causing agent and a carcinogen should be given priority when determining control strategies.

This can often be achieved by changing work processes. For instance, isocyanates can be eliminated from painting vehicles by using heat ovens to harden the paint instead.

However this is not always possible or feasible. Therefore the next best measure is *substitution*. Studies have shown substituting hazardous materials with a less harmful one can substantially reduce or eliminate the risk of occupational asthma.

For example, healthcare workers substituting latex rubber gloves with nitrile or neoprene gloves (which do not cause an allergic reaction) have greatly reduced the risk of workplace sensitization. Also nurses working in chronic-care hospitals have virtually eliminated their risk of occupational asthma by administering psyllium in pill form instead of in powdered form.

Medical radiation technologists who process x-ray film have begun substituting chemical film processing with a digital process which is safer for those processing the images and will decrease the risk of occupational asthma.

The European Union is eliminating certain toxic substances such as chromium in the manufacturing of automobiles, electric and electronic goods. This ban has forced manufacturers to seek out safer substitutes. With the implementation of vehicle take-back legislation automotive manufacturers are also increasingly using fasteners instead of epoxy glues (another asthma-causing agent) so they can recycle and reuse auto parts more easily.

It is worth noting in some cases the substitute material or process can itself be harmful. In those instances when it is difficult to find safe substitutes, at least in the short term, other strategies such as *isolation* may be necessary.

Isolating workers from the process with the use of enclosed systems, barriers, hoods, or booths is yet another way to control harmful exposures.

Along the path

Another method of controlling exposure to dusts, vapours and gases is by using proper ventilation systems. Local exhaust systems that take the toxic air away from the worker's breathing zone can be successful in controlling worker exposure to asthma-causing agents.

For example, some solvents and chemicals used in nail salons are known to cause asthma and are also suspected reproductive toxins. Proper ventilation is necessary to minimize exposure levels. To accomplish this, salons can use downdraft tables (with a hood that pulls the air down and away from the worker) as working surfaces.

Workers in auto-body repair shops are highly exposed to isocyanates. Spray painting creates fine mists or droplets of paint suspended in the air for a short period of time, increasing the risk of inhalation and eye exposure. To reduce exposure paint should be mixed in a separate, well-ventilated paint booth. This reduces the number of workers exposed. Exhaust from the paint booth should be safely discharged so it can't re-circulate into the shop.

At the worker

The least effective controls are those at the worker and should only be used as a last resort until more effective measures are implemented. Controls at the worker include the following:

- personal protective equipment (proper and adequate selection and maintenance of dust masks, air-purifying respirators, gloves and goggles);
- proper handling procedures, and avoidance of spills;
- good housekeeping practices;
- regular workplace inspections (by the health and safety committee or representative) to identify asthma-causing substances; and
- relocating the worker to another part of the workplace.

Keep in mind, relocating or changing jobs is a last resort. Where reassignment does occur, individuals may continue to suffer from occupational asthma even after removal from exposure to hazardous substances.

No matter what control methods are implemented they should be combined with education and training. Educating workers to recognize the signs and symptoms of occupational asthma and to seek immediate medical attention is vital to control this chronic disease. Workers need to become familiar with the substances they are exposed to and to pass this information along to their physicians. (Wherever possible workers should seek out occupational health professionals.) Armed with this knowledge they can assist their workplace representatives in seeking out safe alternatives and help to clear the air for the benefit of all workers.

NOTE: Thanks to staff of Windsor's Occupational Health Clinics for Ontario Workers (OHCOW) for their assistance in preparing this bulletin.

The Workers Health & Safety Centre provides comprehensive training programs to identify, assess and control a variety of hazards that give rise to occupational asthma. To learn more contact a Workers Centre near you. Also, for those requiring a related medical assessment or further information on this issue be sure to contact the OHCOW at www.ohcow.on.ca.



RESOURCE LINES

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Examples of Workplace Agents that Cause Occupational Asthma

Occupation	Potential Sensitizers
Health care workers	Natural rubber latex in gloves. Glutaraldehyde used in sterilization of endoscopy equipment and development of x-ray film. Penicillin and other aerosolized or powdered medications.
Woodworkers	Dusts from red cedar and other woods. Phenol formaldehyde resins in particleboard. Diisocyanates in glues.
Automotive Workers	Diisocyanates or epoxy compounds in spray paints. Diisocyanates in manufacture of polyurethane foam and glues.
Electronics Workers	Colophony or amines in soldering flux. Acrylic glues.
Welders and other metal workers	Metal dusts or fumes (e.g. nickel, cobalt, chromium). Coolants containing pine products or other sensitizers.
Food processors and animal workers	Food or animal protein allergens (e.g. egg processors exposed to egg proteins, bakers exposed to wheat and fungal amylase).
Farmers or gardeners	Animal, plant, insect and fungal allergens.
Cleaners and laboratory workers	Enzymes or cleaning agents.

Taken from the Canadian Centre for Occupational Health and Safety (CCOHS) website section, "OSH Answers: Occupational Asthma".

For a more complete list of reported asthma-causing agents visit the following www.asmanet.com. No list of work-related substances that cause asthma is ever complete. Agents are constantly added as new materials and processes are introduced into the workplace.