

About the Author



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Occupational Asthma Management

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Introduction

Occupational asthma is defined as asthma that is caused by work exposures, accounting for approximately 10-15% of all new-onset adult asthma.¹ Typically, this is a new-onset of asthma in workers with no previous history of asthma. However, the diagnosis may also be made in individuals who had previous childhood asthma that cleared, then recurred as an adult due to work exposure. In contrast, work-exacerbated asthma is defined as asthma that is exacerbated but not caused by work exposures.

Occupational asthma can be caused by different mechanisms (**Figure 1**).² It is most often due to a workplace sensitizer, which is a high- or low-molecular weight agent that causes asthma from an immunologic response. Asthma symptoms do not occur on the first exposure. Instead, they require a period ranging from days to years for sensitization. Once sensitized, subsequent exposures, even to very low levels of exposure, will trigger asthma. When this response is due to high-molecular weight sensitizers, which are typically proteins or glycoproteins, it is associated with specific IgE antibodies. In addition, specific IgE-antibodies are also associated with the response to some low molecular-weight

sensitizers (chemical sensitizers) such as complex platinum salts and other metal salts. However, for most low-molecular weight sensitizers, the immune mechanism is unclear.

In most case series, irritant exposures are also recognized to cause occupational asthma,^{3,4} although this is less common than sensitizer-induced occupational asthma. The diagnosis is most clear when asthma onset occurs within 24 hours of a very high level of exposure to a respiratory irritant (also termed reactive airways dysfunction syndrome, [RADS]). However, lower-level exposures to respiratory irritants, especially if prolonged, have also been associated with irritant-induced asthma. This is often seen in occupations such as cleaning or working in paper mills with bleaching agents.

Management of occupational asthma consists of diagnosis and treatment.⁵ The diagnosis should be suspected in all adult workers with new-onset asthma, and they should be asked specifically about a possible association with their work.⁶ Helpful screening questions to ask include: a) whether the onset occurred shortly after an accidental exposure at work to irritating smoke, dusts, fumes, vapors, or gases, b) whether there was improvement in their asthma symptoms on days off or during holidays, and any worsening on

returning to work. If the answer is “yes” to either question, further details should be identified. This includes details of the work exposures, any associated work-related upper respiratory symptoms (which often precede sensitizer-induced occupational asthma symptoms), and the timing of temporal associations of symptoms. Published questionnaires may also help in raising suspicion of the diagnosis among those with asthma.⁷ Although the history of occupational asthma is key and sensitive, it is not sufficiently specific, and objective tests are needed for the diagnosis.

Since there are over 300 known workplace sensitizers that have been associated with occupational asthma, with new agents reported each year, and numerous potential workplace respiratory irritating exposures, information about the exposures at work is helpful but not sufficient to exclude a diagnosis of occupational asthma. Details of work exposure may increase suspicion of the diagnosis when the patient works in high-risk occupations such as bakeries, animal handling, and spray painting (with exposures to wheat or other grains, animal proteins, and diisocyanates, respectively). In addition, details of any accidental exposure to high levels of respiratory irritants,

shortly before the onset of asthma, are important in the diagnosis of irritant-induced asthma.

Patients can provide some details of the work exposure, including exposures that may result from adjacent workers in the same environment, e.g., who may be welding or using adhesives containing diisocyanates. Additional details can be obtained by asking the patient to request copies of safety data sheets from their workplace for review. Workers are entitled to copies of these documents, and it can be helpful to give the patient a note to request these, which they can present to the appropriate person at work.

The value of objective investigations for occupational asthma has been well detailed in several previous consensus documents and reviews.^{1,5,8,9} After asthma is objectively confirmed by spirometry or methacholine challenge, skin prick tests when feasible, or serologic tests for specific IgE antibodies are helpful in identifying potential sensitization to a workplace sensitizer. Demonstration of specific IgE, especially in combination with other diagnostic tests, has a high predictive value for identifying sensitization to agents such as wheat or rye in bakers,¹⁰ or animal allergens in laboratory animal workers.¹¹

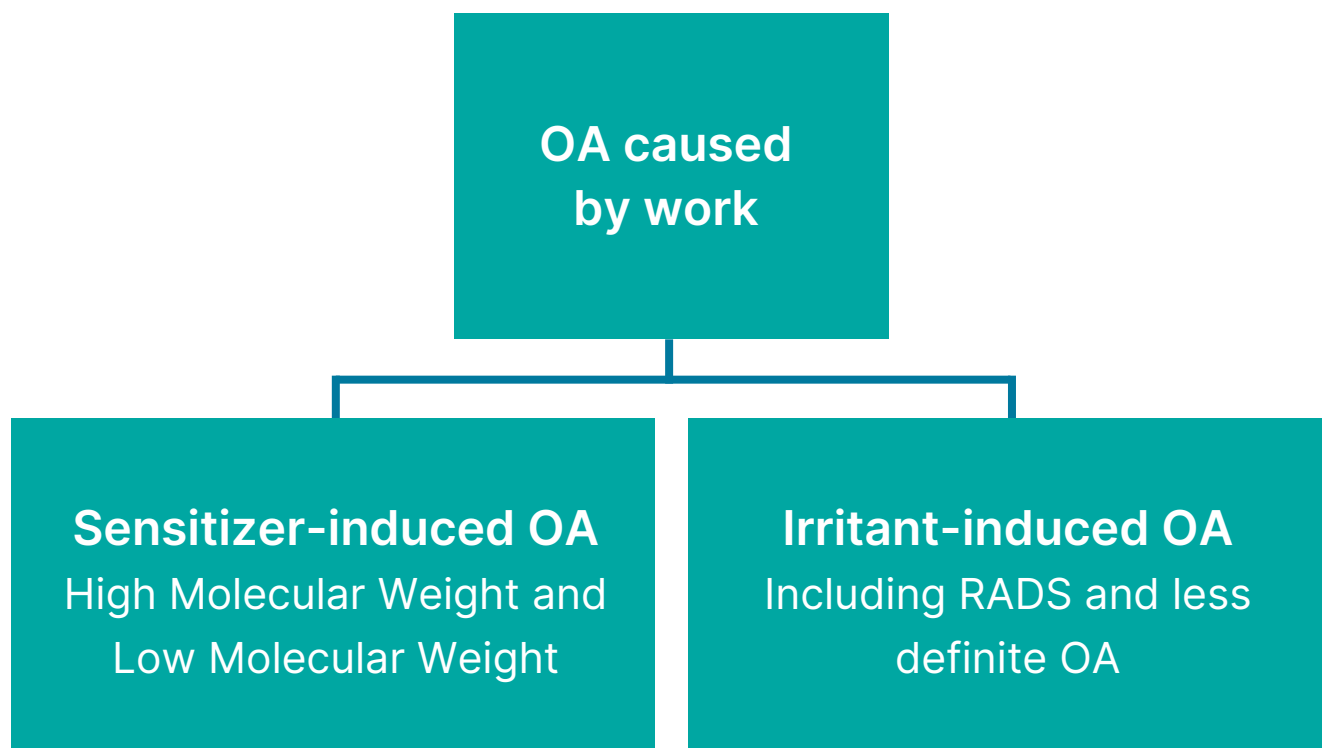


Table 1. Potential mechanisms involved in occupational asthma; courtesy of Susan M. Tarlo, MD, BS, FRCPC
Abbreviations: **OA:** occupational asthma; **RADS:** reactive airways dysfunction syndrome.

Objectively investigating possible sensitizer-induced occupational asthma, and assessing the association of asthma with work, includes recording serial peak flow readings four times a day in triplicate, with symptom scores and bronchodilator use during periods while both working and off work. Conducting methacholine challenges both at the end of a typical work period and after several days off work (as during a holiday) can add to diagnostic certainty. In addition, induced sputum cytology and/or exhaled nitric oxide if available can support the diagnosis. Specific inhalation challenges are considered the gold standard for diagnosis and are particularly helpful if other tests are inconclusive.⁵

In patients suspected of having irritant-induced occupational asthma, the most helpful information for the diagnosis is from the history of the implicated irritant exposure(s), the timing of asthma onset after the exposure, confirmation that asthma did not precede the exposure, and objective confirmation of the diagnosis of asthma. In some patients, the development of irritant-induced asthma may be followed by exacerbation of asthma at work. These can then be assessed further by monitoring of serial peak flow readings, symptoms, and bronchodilator use, as described above.

Management of the patient starts during the investigation period, including the appropriate management of asthma, and any associated rhinoconjunctivitis. This includes controlling non-occupational relevant environmental triggers, and using pharmacotherapy, similar to the approach for other patients with asthma and rhinoconjunctivitis. Good communication with the patient is essential to explain the purpose for further investigation of possible occupational asthma and the possible outcomes, since a confirmed diagnosis may lead to recommendations for work modifications and, in many cases, a claim for workers' compensation support. When occupational asthma is suspected, it is important to initiate investigations early, while the patient is still employed and working, since these investigations cannot be performed if the worker leaves their job, resulting in an uncertain diagnosis.

In Canada, work-related injury or disease is potentially compensable by Workers Compensation Systems, which operate independently in each province. Most workers in Canada are eligible to submit a claim for support through their provincial system, though the details vary somewhat between provinces. Each system's

website provides information and access to the necessary application forms.

In the example of the Ontario Workplace Safety and Insurance Board (WSIB), applications can be initiated by the patient, a physician (with the patient's permission), or the employer. Each party uses a slightly different form, but all forms indicate the contact details for the worker and employer. After an initial form is submitted to WSIB by one of these three parties, the other two are sent a form from WSIB to complete. The physician's form in Ontario (Form 8) also asks for the date and site "of the work-attributed injury" and the work-related diagnosis. With the patient's permission, the physician's consultation notes can also be included. Other information requested includes the results of investigations, medications prescribed, work ability, and any work modifications needed. The patient (claimant) is also asked to provide a signed release for WSIB to obtain their medical reports and investigations.

Each compensation claim generates a claim number that is sent to the patient. The physician should obtain this number from the patient to include it on all subsequent communications with the compensation board for that claim.

Decisions on claims are made by the compensation system, with claims accepted if the work-related condition is deemed to be more probable than not, or at least 50% likely. The physician reports are considered in the process, though the claim decision is made by the compensation board. In Ontario, an additional medical assessment may be requested, and additional medical investigations may be needed. If a claim is denied, an appeal process is available for the patient with submission of additional supporting information. If the claim is again denied, further appeals can be made in Ontario to the Ontario Workplace Safety and Insurance Appeals Tribunal. Additional advice may be provided to the patient via occupational medicine clinics.

If a workers' compensation claim is initiated but has not yet been decided, a decision needs to be reached with the patient about whether to continue their current work, pending their claim decision. If the patient has clear and objective medical evidence of sensitizer-induced asthma, and there is a potential work area in the same company without exposure to that sensitizer, this alternative could be a better option. A written note (without specific medical information, and with the patient's permission) may then be given to the patient by the physician to request modified work

if feasible. Employers are responsible for providing accommodations for their workers if possible. If that is not an option, a decision on whether the patient continues working in the same area with the sensitizer until the compensation claim decision is reached (if possible with enhanced respiratory protective equipment and optimized asthma medications), or stops work and applies for short-term or long-term disability, and/or looks for a different job, will depend on discussions with the patient and the severity and control of their asthma. Factors that may influence work decisions include the possibility that the modified work might be paid at a lower rate, the compensation claim may be denied, and even if a claim is accepted, leaving the workplace may result in loss of other benefits (e.g., dental plans, or non-respiratory medication coverage).

Patients with acute irritant-induced asthma can often continue their current work with pharmacologic management of their asthma, if the high-level irritant exposure is not repeated, and if lower exposures do not exacerbate their asthma. Those with presumed subacute or chronic irritant-induced asthma, similarly, may be able to continue their current work preferably with some modifications to reduce work irritant exposures.

The best outcome for those with sensitizer-induced occupational asthma is to completely avoid the exposures that caused their asthma.¹² The outcomes are best with an early diagnosis, early removal from further exposure, and milder asthma at the time of removal from exposure. A majority of patients experience improvement after removal from exposure, although complete clearing of asthma occurs only in a minority, approximately 20% in some series.¹³ Recent studies suggest the outcome is worse for irritant induced asthma.^{14,15}

Support for patients with an accepted claim for occupational asthma includes: partial compensation for loss of earnings due to occupational asthma, coverage for the costs of medications needed to treat their asthma, and compensation for non-economic loss (disability) due to their asthma (usually determined once maximal medical recovery is achieved). If a job change is necessary to avoid exposure to the causative work agent, workers might receive support for retraining.

Prevention and identification of occupational asthma in other workers should also be considered once the diagnosis is reached in a patient. In Ontario, the Ministry of Labour has a surveillance

program for diisocyanates in the workplace, which includes monitoring diisocyanate levels in the air, regular respiratory questionnaires, and spirometry for workers with potential exposure, with further assessments if abnormalities are detected. This program has been associated with a temporal reduction in rates of occupational asthma from isocyanates in Ontario.¹⁶ Similar programs are not mandated for other causes of occupational asthma, however, an Ontario Ministry of Labour work visit can be requested by the worker or physician, especially if the patient is aware of co-workers with similar symptoms. This may lead to changes in the workplace to protect the workers.

Summary

In summary, occupational asthma should be suspected in all cases of adult-onset asthma among workers and should be promptly and thoroughly investigated. Upon diagnosis, patients should receive appropriate medical treatment for asthma and any necessary work modifications. In addition, patients should be assisted in pursuing potential workers' compensation when appropriate.

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