DHS | Putting Data to Work
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Work-related Asthma (WRA)

Introduction

Asthma poses a significant public health burden in the U.S. and in Oregon, where the asthma rate is higher than the national average.

This issue of "Putting Data to Work" provides partners with a scope of the problem summary, Oregon epidemiological data and basic information about the condition, resources, case summaries and prevention activities. It is essential that health professionals, industry and public health workers heighten their awareness of asthma in order to identify current cases and prevent future ones.

Scope of the problem

In 2005, an estimated 18 million adults in the U.S. (7.9 percent) and 274,000 Oregon adults (9.9 percent) reported ever having asthma.[1]

WRA is the most common occupational lung disease in developed countries.[2,3] Two recent studies among adult asthma patients found that 29-33 percent of adult-onset asthma came from workplace exposures.[4,5] The U.S. Occupational Safety and Health Administration estimates that at least 11 million workers in a wide range of industries and occupations are exposed to at least one agent known to be associated with WRA.[6] A recent study reported that the financial burden of WRA in the U.S. is approximately $1.6 billion.[7]

Asthma is a lung disease characterized by recurrent episodes of chest tightness, wheezing, cough and shortness of breath. It is associated with environment, genetics and other factors. In the illustration on the next page, the structure on the left side is a normal, healthy airway. In an asthma attack, the muscles around the airways tighten, causing less air to circulate. Swelling also narrows the airways, which can cause mucus to clog it, leading to the diseased airway pictured on the next page.[8]

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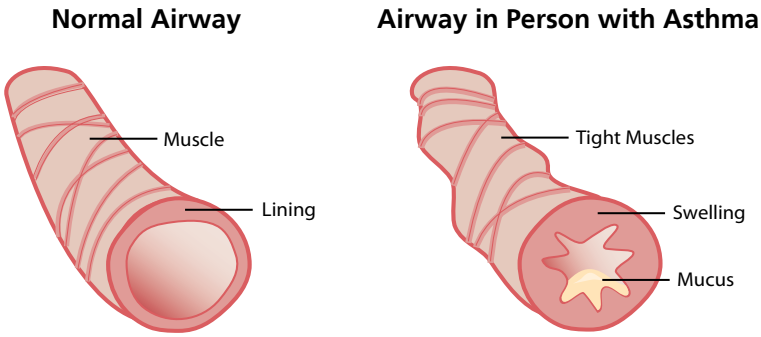
Substances or conditions in the workplace such as dust, chemicals and smoke cause or worsen work-related asthma (WRA). An estimated 15 percent of adult asthma is due to work-related exposures.[9] Although work-related asthma is preventable, there is no evidence that its incidence is decreasing.

ASTHMA



Epidemiological data

According to data from the Oregon Behavioral Risk Factor Surveillance System (BRFSS, a random-digit-dialed telephone survey that is administered annually to adults 18 years or older in each state), adult asthma prevalence in Oregon increased from 7.3 percent (approximately 188,000) in 1999 to 9.9 percent (approximately 274,000) in 2005.[1] In a 2005 BRFSS follow-up survey of those with asthma, 11 percent of currently employed respondents said chemicals, smoke, fumes or dust at their current job caused their asthma and 24 percent of respondents said those substances exacerbated their asthma. Health care providers told seven percent of respondents that their asthma was related to one or more of their jobs.

Description and diagnosis of WRA

Work-related asthma falls into three general categories:

» Immunologically mediated asthma resulting from exposure to sensitizers in the workplace (sensitizer induced);

» Asthma that results from acute exposure to irritants in the workplace (called reactive airways dysfunction syndrome or RADS);

» Pre-existing asthma exacerbated by workplace exposures (work-aggravated asthma).

More than 250 substances are known or believed to cause or exacerbate WRA.[10] Between 1993 and 1999 four states (California, Massachusetts, Michigan and New Jersey) conducted surveillance for WRA. Figure 1 shows the four states' distribution of agents most frequently associated with WRA. The study found that 20 percent of WRA cases were caused by miscellaneous chemicals not easily classified (e.g., perfumes, odors, glues). The next most common group was cleaning materials (11.6 percent), followed by mineral and inorganic dust (11.1 percent) and indoor air pollutants (9.9 percent).[11]

Anyone can be at risk for work-related asthma. The most important risk factor is exposure to the substance causing the asthma. Studies in high-risk industries have found that the higher the risk for exposure, the higher the WRA prevalence. However, even when multiple workers experience the same level of exposure, only a small proportion develop WRA, suggesting that latent factors in the worker may play a role.[12] A genetic predisposition to develop IgE antibodies to allergens (atopy) is the main factor that predisposes a person to develop asthma (especially WRA that is triggered by the immune system). In addition, the incidence of WRA varies within individual industries and in relation to the chemicals used in those industries.

One of the leading WRA information resources is http://www.asmanet.com/asmapro/asmawork.htm#start. It includes information categorized by occupation or substance name; each occupation has information on specific jobs, agents, reported incidence, job conditions that have caused WRA, symptoms, diagnostic information and references.

Asthma is diagnosed by excluding other conditions and by procuring a history of recurrent symptoms such as coughing, wheezing, chest tightness and shortness of breath as well as reversible airflow obstruction revealed through a spirometry lung function test.[1,3]

WRA is challenging to diagnose because it is hard to differentiate environmental from occupational exposures, and because WRA looks and acts like other forms of asthma. However, diagnosis is vital since WRA is expensive to treat, preventable, and can be partially or completely reversed if early diagnosis coincides with adequate exposure control.[2]

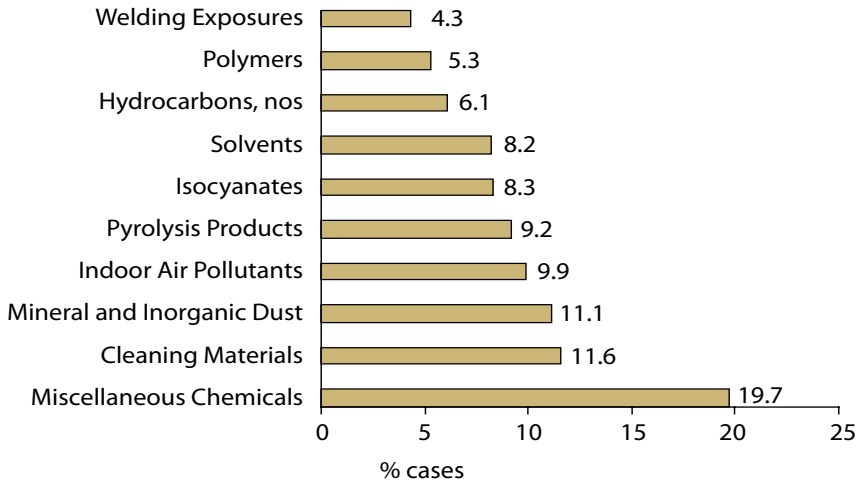
A physician can help identify WRA by asking about asthma symptoms and workplace activities. The diagnosis is supported by evidence of an association between airway obstruction and workplace exposure(s). A WRA diagnosis should be considered in all cases of new-onset or substantially deteriorating asthma symptoms in working adults.[3]

The OWIIPP program

The Oregon Worker Illness and Injury Prevention Program (OWIIPP) in the Oregon Department of Human Services, Public Health Division has been identifying and preventing work-related illnesses, injuries and deaths for nearly 20 years. Through funding from the Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health (NIOSH), the program conducts surveillance to identify patterns of illness and injury. OWIIPP also works with partners to address concerns related to priority conditions, populations, occupations and industries.

OWIIPP focuses on burn injuries, acute pesticide poisonings, work-related asthma, musculoskeletal disorders and other illnesses and injuries. The program is currently collecting data on 19 occupational health indicators, which are measures of work-related illnesses, injuries or factors associated with worker health. Examples include counting the number of work-related deaths and work-related pesticide poisonings. OWIIPP is also conducting work-related burn injury surveillance and working with partners to reduce the number of burn injuries in the workplace.

Figure 1. Distribution of agents most frequently associated with WRA for four states (California, Massachusetts, Michigan, New Jersey), 1993-1999.



Case summaries

CASE 1—SPRAY PAINTING (ASTHMA)

A 37-year-old male, self-employed car painter was admitted to the hospital with asthma symptoms. These symptoms had first developed five years earlier and were thought to be related to his occupation. He had been working in the same environment for more than 20 years.

The painter was diagnosed with occupational asthma induced by isocyanates [substances known to cause and exacerbate asthma] and advised to change his job or avoid the use of polyurethane paints. He continued to work as a car painter and treated his asthma with medications such as bronchodilators and steroids.

Six years later, he was wearing a mask and spraying a car with two-component polyurethane paint when he developed severe, prolonged asthma. Despite medication, his symptoms continued, especially at night. He returned to work, sprayed the polyurethane paint and developed severe asthma requiring emergency treatment. He died in the ambulance en route to the hospital. The manufacturer reported that the paint contained small amounts of isocyanates.[14]

CASE 2—SPRAY-ON TRUCK BED LINING (ASTHMA)

A 30-year-old man developed rhinitis [inflammation of nasal passages], a cough, wheezing and shortness of breath four months after starting work spraying truck bed liners. On one occasion, the worker reported to the emergency room but was not diagnosed with asthma.

Symptoms persisted with daily episodes of shortness of breath, wheezing and nausea. These symptoms occurred at midday after four to five bed liner applications. After four months of symptoms, which culminated in hospitalization for respiratory distress, the worker was diagnosed with work-related asthma from exposure to isocyanates. After hospitalization, the worker was documented with nonspecific bronchial hyperreactivity by methacholine challenge testing.

The worker was removed from the workplace. One year later, the worker was employed elsewhere as a manual laborer. He still had symptomatic asthma and was maintained on bronchodilators and inhaled steroids.[15]

Prevention recommendations

Work-related asthma is avoidable with primary, secondary and tertiary prevention. Primary prevention activities seek to eliminate the risk of WRA before it actually occurs. Secondary prevention activities include screenings to detect WRA so that prompt interventions to control the disease and minimize its impact can occur. Finally, tertiary prevention activities help lessen the impact of WRA.[13] Table 1 provides a visual approach to prevention activities and examples.

TABLE 1

Type of Prevention	Activity	Example
Primary	Eliminate exposure	• Replace sensitizing substances with safer alternatives • Conduct pre-employment screening to reduce susceptible worker population* • Limit number of exposed workers
	Reduce exposure	• Wear personal protective equipment (PPE) such as respirators • Provide engineering controls • Monitor workplace
Secondary	Detect disease	• Supply routine medical screenings • Conduct skin testing for specific IgE antibodies • Monitor workplace
	Shorten disease duration	• Detect early through screenings + remove workers from exposure = good outcome**
Tertiary	Prevent permanent damage	• Use pharmaceutical interventions, including inhaled corticosteroids and bronchodilators

* Note that screenings may identify workers at high risk for WRA, but they present problems due to inefficiency as well as ethical and legal issues.[7]

** This is provided that workers have had symptoms for less than one year and have relatively normal lung function test values.[7]

Conclusion

Work-related asthma is preventable. Cases must be promptly identified in order to stop exposure and improve chances for recovery. WRA has long-term health consequences that can affect future employment. The following key individuals and groups particularly need increased awareness of work-related asthma:

» Health care providers

» Labor and management health and safety specialists

» Researchers

» Health care organizations

» Public health policymakers

» Industrial hygienists

» Any others interested in disease prevention[3]

Additional resources

» American Academy of Allergy, Asthma & Immunology (AAAAI): Topic of the month: January 2006: Show occupational asthma who's boss. Available at URL: http://www.aaaai.org/patients/topicofthemonth/0106/#prevent.

» American College of Allergy, Asthma & Immunology (ACAAI). Public education: occupational asthma. Available at URL: http://www.acaai.org/public/advice/occAsth.htm.

» Asmapro: A web server for occupational asthma. Available at URL: http://www.remcomp.fr/asmanet/asmapro/asmawork.htm.

» Bernstein DI, Chan-Yeung M, Malo JL, Bernstein IL, editors. Asthma in the workplace. 3rd edition. New York: Informa Healthcare. 2006.

» Canadian Centre for Occupational Health and Safety (CCOHS). Occupational safety and health answers: occupational asthma. Available at URL: http://www.ccohs.ca/oshanswers/diseases/asthma.html.

» National Institute for Occupational Safety and Health (NIOSH). Asthma and allergies. Available at URL: http://www.cdc.gov/niosh/topics/asthma/default.html.

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