SENSOR

Occupational Lung Disease Bulletin

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Deadly Consequences of Undiagnosed Work-Related Asthma (WRA): Michigan Case Study[1]

In 2005, a 50 year-old male suffered an asthma attack and collapsed at the adhesive manufacturer where he worked. EMS arrived at the scene within five minutes but were unable to revive him. He never regained consciousness and died at the hospital six days later. He had no family history of allergies and no asthma symptoms prior to beginning this job. He was a smoker. A review of his medical care revealed that he had 18 visits to health care providers regarding his asthma but had not received a diagnosis of occupational asthma or a medical recommendation to leave the job, despite his requests. His initial doctor visits began in January 2002, one month after he began working. He had four company medical screenings with a physician who documented decreasing FEV_1 levels over a three-year period, from 95% predicted to 73% predicted. However, this physician failed to note any problems or recommend change of work. The victim visited the emergency department five times and notes in his chart documented possible COPD or acute bronchitis and exposure to glue fumes at work. The victim had seven visits with his primary care physician, who documented poorly controlled asthma triggered by chemicals at work. The patient expressed a desire to leave his job and asked if there were any medical reasons to support this decision, but the physician did not diagnose WRA or urge job modification, instead referring him to a pulmonologist. Following medical advice, the victim visited a pulmonologist twice, who noted in the chart that the patient was exposed to isocyanates [known asthmagens] and wrote that the patient had "reactive airways disease which is likely occupationally-related, though I do stop short at this time of calling it occupational asthma." The pulmonologist recommended a clinical reevaluation and spirometry two months later. The patient died before he could return for this appointment.

Diagnosing Work-Related Asthma

Early diagnosis of WRA and removal of the individual from exposure to sensitizing agents is crucial to a patient's recovery. Studies have shown that patients promptly diagnosed with WRA and removed from exposure are more likely to recover than those who experience a delay in diagnosis and removal.[2,3] The Michigan fatality described in the previous section was a rare, tragic event associated with exposure to a known asthmagen. Less severe cases of WRA may become more severe if the WRA diagnosis is missed. According to a Massachusetts survey, persons with WRA had poorer asthma control and had higher rates of health care utilization than those with asthma unrelated to work. Specifically, those with WRA had asthma attacks and sought treatment in emergency departments nearly five times more than their counterparts with asthma not related to work.[4]

There are over 300 chemicals recognized in the peer-review literature that can cause asthma. Work-related asthma is the most common occupational lung disease in the developed world. Among adult patients with asthma, at least 15% is attributable to work.[5] Recent research indicates that the proportion of new-onset asthma associated with work may be even higher—29% to 33%.[6,7] Workplace causation and exacerbation should be suspected with every adult patient.

The following questions can be asked of patients to assist in diagnosing WRA:

What type of work do you do?
Identifying industry and occupation can help pinpoint potential exposures to asthma-causing agents commonly found in certain jobs.

Do you think your asthma may be related to your job?
Sometimes patients will be able to identify changes in products or processes associated with their asthma symptoms which will allow a focus on a particular chemical.

[1] Adapted from Dr. Kenneth Rosenman's powerpoint presentation entitled "Work-Related Asthma Fatalities in Michigan."

[2] Pisati G., Baruffini A, Zedda S. Toluene diisocyanate induced asthma: outcome according to persistence or cessation of exposure. *Br J Ind Med* 1993 Nov;50(11):1055.

[3] Nicholson PJ, Cullinan P, Newman AJ et al. Evidence based guidelines for the prevention, identification and management of occupational asthma. *Occup Environ Med* 2005;62:290-9

[4] Breton CV, Zhang Z, Hunt PR, *et al*. Characteristics of work-related asthma: results from a population based survey. *Occup Environ Med* 2006;63:411-415

[5] American Thoracic Society Statement: Occupational contribution to the burden of airway disease. *Am J Respir Crit Care Med* 2003; 167:787-97.

[6] Sama SR, Milton DK, Hunt PR, *et al*. Case-by-case assessment of adult-onset asthma attributable to occupational exposures among members of a health maintenance organization. *J Occ Environ Med* 2006. 48(4):400-407.

[7] Vollmer WM , Heumann MA, Breen VR, *et al*. Incidence of work-related asthma in members of a health maintenance organization. *J Occup Environ Med* 2005; 47(12):1292-1297.

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Are your symptoms better or worse while on vacation or during weekends? Do your symptoms get better or worse throughout the workweek?
Patients with WRA frequently have symptoms that worsen throughout the work week and improve away from work. Over time, symptoms do not improve even during time away from work and reactivity may generalize to additional triggers.
Are you exposed to any chemicals, dust, fumes, or poor air quality?
Chemicals identified as known asthmagens are listed on the Association for Occupational and Environmental Clinics website: http://www.aoec.org/tools.htm. In addition, irritants on the job may exacerbate asthma.
Do any of your co-workers have similar symptoms?
If coworkers are also reporting symptoms, or the work duties have been reassigned due to complaints, this may indicate a problem chemical.

Once a diagnosis of work-related asthma is suspected, some clinicians refer their patients to occupational medicine physicians, whose clinics may be more familiar with follow-up procedures. To confirm the WRA diagnosis, (new-onset and work-aggravated asthma), the Department of Industrial Accidents provides the following criteria:[8]

- Diagnosis of asthma (new-onset or pre-existing)
  - reversible FEV_1=12% or 200ml with inhaled beta adrenergic agonist *OR*
  - baseline FEV_1=70%, improved by steroid trial =20% *OR*
  - methacholine or histamine challenge with #PC20<8mg/ml or equivalent
- Historical association between asthma symptoms and work

AND

At least one of the following criteria:
- Documentation of workplace exposure to category of agents or processes associated with asthma
- Work-related change in FEV_1 or in peak expiratory flow (PEF)
- Onset of respiratory signs and/or symptoms within hours after an acute high level occupational inhalation exposure to an irritant (RADS)

In some cases, it may be necessary for the individual with WRA to leave their job. In other cases accommodations can be made to make the workplace safer. Chemicals associated with asthma may be replaced by safer chemicals, hazardous processes may be isolated and ventilation and other engineering controls may be used to reduce concentrations in the air. Personal protective equipment, such as respirators and gloves may be used to prevent inhalation and dermal absorption until more permanent controls can be implemented. Administrative controls may also be used, including reassigning of sensitive individuals to shifts and locations separated from the product or process associated with their asthma.

You can consult with an industrial hygienist or receive a referral to an occupational medicine physician by calling the Occupational Health Surveillance Program at (617) 624-5681.

[8] Massachusetts Department of Industrial Accidents, Treatment Guideline Number 28. Diagnosis and Initial Treatment of Occupational Asthma http://www.mass.gov/dia/hcsb/tg28.pdf

Reporting WRA to the MA Department of Public Health

All cases of asthma related to work must be reported to the Massachusetts Department of Public Health (105 CMR 300.180). While new-onset asthma is most easily recognized, pre-existing asthma aggravated by work, and reactive airways dysfunction syndrome (RADS) are also reportable to MDPH.

Cases should be reported even if the association with work is only "suspected," but not confirmed.

Cases may be reported by:

Faxing or mailing the case report form **OR** relevant medical records to OHSP or reporting the case by telephone at 617- 624-5624 or after hours 800-338-5223.

The cases individually, and in aggregate, are used to identify industries, occupations and exposures that are associated with WRA. With patient permission, OHSP may conduct a workplace investigation to explore hazards and recommend modifications or refer the workplace to another agency for investigation. The patient's name is never released in connection with the referral or investigation and information from the investigation is provided to the reporting health care providers. Each patient also receives educational materials on topics including managing WRA, worker's compensation, and occupational health resources.

OHSP also undertakes broad-based efforts to reduce exposure to identified asthmagens such as latex, glutaraldehyde and formaldehyde. Reporting individual cases allows both data reports and individual case studies that can be used to promote change in the workplace and to promote development of policies and processes that can prevent asthma.

Work-Related Asthma Cases Reported to Massachusetts SENSOR

Oct 2006	Nov 2006	Dec 2006	Jan 2007	Feb 2007	Total (3/92 – 2/07)
1	4	0	0	4	1066

Remember, work-related asthma cases may be reported to SENSOR by phone, fax, or mail!