*Project S E.N.S.O.R. News

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Construction Work and Respiratory Disease

There are potentially multiple respiratory hazards to workers in construction. Exposures in construction can cause or aggravate asthma, cause or aggravate COPD, cause infectious diseases such as coccidiomycosis, histoplasmosis or legionellosis, or cause lung cancer. There are approximately 159,000 construction workers in Michigan, 4.3% of the Michigan workforce. Many more individuals have worked in construction and have either retired or changed jobs.

Potential exposures to construction workers vary markedly by the type of construction an individual does: outdoor (i.e. roads, roofs, sewers, foundations) vs. indoor work (carpentry, spray-on insulation), new construction vs. renovation, residential vs. industrial and whether they are a general laborer or have special skills (i.e. painter or mason).

Asthma

Any construction worker with new onset asthma after beginning construction work or aggravation of asthma that predates construction work should be asked about possible work-related triggers. Table 1 shows the exposures and construction tasks associated with work-related asthma.

Four screening questions were recommended in the American College of Chest Physicians Consensus Statement (Tarlo SM, Balmes J, Balkissoon et al. Diagnosis and Management of Work-Related Asthma. American College of Chest Physicians Consensus Statement. Chest 2008; 134: Supplement 1s-41s) to be asked of **all** adult patients with asthma:

1) Were there changes in work processes in the period preceding the onset of symptoms?
2) Was there an unusual work exposure within 24 hours before the onset of initial asthma symptoms?
3) Do asthma symptoms differ during times away from work such as weekends or holidays or other extended times away from work?
4) Are there symptoms of allergic rhinitis and/or conjunctivitis symptoms that are worse with work?

The consensus statement recommended, that if the patient has positive responses to the above questions, particularly questions two or three, the diagnosis of asthma should be confirmed, and the age of onset, treatment and effectiveness of inhalers should be determined. It was recommended the provider should evaluate the patient for reversible airflow obstruction by performing spirometry with pre/post bronchodilator if abnormal on baseline spirometry or methacholine challenge testing if normal on baseline spirometry. Finally, it was recommended the provider should review the possible exposures and/or work conditions that trigger the patient's asthma symptoms.

Whether the patient's asthma is associated with work is most commonly determined by a work history with emphasis on assessing the temporal relationship between onset of the patient's asthma and changes in their respiratory symptoms with work and specific work activities. Additional testing, such as peak flows performed at and away from work for two weeks or more, or immunologic tests for certain sensitizers, when positive add greater diagnostic certainty. It was recommended to perform these tests, whenever possible, prior to advising the patient regarding employment.

Finally, it was recommended the provider consider referring the patient to a pulmonologist or occupational medicine physician familiar with work-related diseases for assistance with diagnosis and management, and protecting the patient's legal rights in the workers' compensation system.

Table 1. Exposures and Tasks in the Construction Industry that Cause Asthma		
EXPOSURE	**TASK**	**REFERENCE***
Acids	Cleaning, Etching	1
Aziridine, polyfunctional	Painting Parquet varnishing	2
Chromium	Welding Cement dust	3,4
Cleaning Agents Bleach Ammonium Chloride Compounds (Quats)	Cleaning water damage areas, Mold	5,6
Diesel fumes	Being around construction vehicles	7
Epoxy	Gluing tiles/ Carpeting	8
Formaldehyde Phenol-formaldehyde resin Urea-formaldehyde resin	Particle Board Applying lacquers/paint	9,10
Isocyanates	Spray-on thermal insulation installation Polyurethane application	11
Nickel	Welding Acetylene torch cutting	3
Methylmethacrylate	Reinforced concrete laying	12
Mixing acid and bleach or ammonia and bleach	Cleaning	13,14
Polyethylene Terephthalate/ Polybutylene Terephthalate	Polyester coating application	15
Soldering Flux Alkyl ethyl ethanolamine Amino ethyl alcohol/Polypropylene glycol Colophony Zinc Chloride/Ammonium chloride	Electrical soldering	16,17
Triglycidyl Isocyanurate	Powder painting	18
Welding Fumes	Welding	3
Wood Dust Ash California Redwood Eastern and Western Cedar Oak	Cutting wood	19-23

***References available on the www.oem.msu.edu website as an Appendix to this newsletter.**

The Association of Occupational and Environmental Clinics (AOEC) has a useful and easily accessible list of causes of work-related asthma at: http://www.aoecdata.org/ExpCodeLookup.aspx.

The AOEC listing also includes other known occupational and environmental exposures. To look at just asthmagens click on "Display All Asthmagens".

A more recent article on diagnosing work-related asthma is Vandeplas O, Suojalehto H, Cullinan P. Diagnosing Occupational Asthma. Clin & Exp Allergy 2016; 47:6-18.

Infectious Agents

Table 2 shows infectious disease hazards for construction workers. Examples of a recent outbreak of histoplasmosis and one of coccidioidomycosis in construction workers are:

Histoplasmosis outbreak associated with the renovation of an old house-Quebec, Canada, 2013 MMWR. 2014; 62:1041-1044.

Sondermeyer Cooksey GL, Wilken JA, McNary J, Gilliss D, Shusterman D, Materna BL, Vugia DJ. Dust exposure and Coccidioidomycosis Prevention among solar power farm construction workers in California. Am J Public Health 2017; 107:1296-1303.

Table 2. Infectious Diseases Reported in Construction Workers

Infectious Disease	Source of Exposure
Coccidioidomycosis	Outdoor construction work
Histoplasmosis	Chimneys/roofs/attics with pigeon or bat dropping
Legionellosis	Cooling towers, potable water distribution system and hot water heater workers.
Lyme Disease	Outdoor construction work
Tularemia	Outdoor construction work
West Nile Virus	Outdoor construction work

COPD and Cancer

Chronic exposure to the many exposures in construction work over many years of work can also lead to the development of chronic obstructive pulmonary disease (COPD) and/or lung cancer in both smokers and non-smokers. The combination of cigarette smoking with work exposures increases the risk of developing both COPD and lung cancer as compared to individuals who just had construction work exposures or non-construction workers who did not smoke. The medical literature of increased risk of COPD in construction is based on studies of the increased risk in individuals occupationally exposed to dusts and fumes and not specified to specific substances. (American Thoracic Society. Occupational Contribution to the Burden of Airway Disease. Am J Resp CritCare Med 2003; 167:787-797).

Exposures at construction sites include known lung carcinogens: asbestos (historically spray-on insulation and installation, now during renovation or demolition); diesel fumes (construction vehicle exhaust); chromium (stainless steel welding fumes and cement dust); polycyclic aromatic hydrocarbons (asphalt road construction and roofing); other cancers that are increased in construction workers are skin and lip cancer (outdoor construction – UV radiation) and pharyngeal cancer (wood dust).
(Rushton L, Hutchings S, Brown T. The burden of cancer at work: estimation as the first step to prevention. Occup Environ Med. 2008; 65:789-800).

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*Project SENSOR News

Michigan State University
College of Human Medicine
West Fee Hall
909 Fee Road, Room 117
East Lansing, MI 48824-1316
Phone (517) 353-1846

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*PS *Remember to report all cases of occupational disease!*

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(517) 353-1846
MSU-CHM
West Fee Hall
909 Fee Road, Room 117
East Lansing, MI 48824-1316

Michigan Law Requires the Reporting of Known or Suspected Occupational Diseases

Reporting can be done by:

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www.oem.msu.edu

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ODREPORT@ht.msu.edu

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(517) 432-3606

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1-800-446-7805

Mail
Michigan Occupational Safety & Health Administration (MIOSHA)
Management and Technical Services Division
P.O. Box 30649
Lansing, MI 48909-8149

Reporting forms can be obtained by calling 1-800-446-7805