

Medical Surveillance

Use with the Formaldehyde Rule, Chapter 296-856 WAC

This helpful tool provides additional information for medical providers who supply medical surveillance for formaldehyde exposure.

The occupational health hazards of formaldehyde exposure are primarily due to its toxic effects after the following experiences:

- Inhalation
- Direct contact with the skin or eyes by liquid or vapor
- Ingestion

Specifics about occupational health hazards and the effects of formaldehyde exposure are outlined on this form under the following topics:

- Effects of exposure
- Surveillance consideration
- Employer obligations
- Physicians obligations



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EFFECTS OF EXPOSURE

Acute

- Inhalation:
 - Concentrations above 50 ppm can cause severe pulmonary reactions within minutes. These include pulmonary edema, pneumonia, and bronchial irritation.
 - Concentrations above 5 ppm readily cause irritation of the lower airway characterized by cough, chest tightness, and wheezing.
 - Formaldehyde gas can be a pulmonary sensitizer that can cause occupational asthma in a previously normal individual. Formaldehyde can produce symptoms of bronchial asthma in humans. The mechanism may be either sensitization of the individual by exposure to formaldehyde or direct irritation by formaldehyde in persons with preexisting asthma.
 - Formaldehyde is highly irritating to the upper airway, characterized by dry or sore throat, itching and burning sensations of the nose, and nasal congestion.
 - Upper airway irritation can occur over a wide range of concentrations, most frequently above 1 ppm. However, airway irritation has occurred in workers with exposures to formaldehyde as low as 0.1 ppm.
- Eye contact:
 - Concentrations of formaldehyde between 0.05 ppm and 0.5 ppm produce a sensation of irritation in the eyes with burning, itching, redness, and tearing.
 - Increased rate of blinking and eye closure generally protects the eye from damage at these low levels.
 - Tolerance can occur in workers continuously exposed to concentrations of formaldehyde in this range.
 - Accidental splash injuries of human eyes to aqueous solutions of formaldehyde (formalin) have resulted in a wide range of ocular injuries including corneal opacities and blindness. The severity of the reactions have been directly dependent on the concentration of formaldehyde in solution and the amount of time lapsed before emergency and medical intervention.



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EFFECTS OF EXPOSURE (CONTINUED)

Acute (continued)

- Skin contact:
 - Exposure to formaldehyde solutions can cause irritation of the skin and allergic contact dermatitis.
 - Symptoms include erythema, edema, and vesiculation or hives.
 - Exposure to liquid formalin or formaldehyde vapor can provoke skin reactions in sensitized individuals even when airborne concentrations of formaldehyde are well below 1 ppm.
- Ingestion:
 - Ingestion of as little as 30 ml of a 37% solution of formaldehyde (formalin) can result in death.
 - Gastrointestinal toxicity after ingestion is most severe in the stomach and results in symptoms which can include nausea, vomiting, and severe abdominal pain.
 - Diverse damage to other organ systems including the liver, kidney, spleen, pancreas, brain, and central nervous systems can occur from the acute response to ingestion of formaldehyde.

Chronic

- Long-term exposure to formaldehyde has been shown to be associated with an increased risk of the following types of cancer in humans:
 - • Cancer of the nose and accessory sinuses
 - • Nasopharyngeal and oropharyngeal cancer
 - • • Lung cancer



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SURVEILLANCE CONSIDERATIONS

Work History

- Because formaldehyde is a sensitizer, it is important to obtain work history on both prior occupational and non-occupational exposure to formaldehyde.

Medical History

- Respiratory
 - Include a comprehensive review of the respiratory system, for example, questions about:
 - Dyspnea on exertion
 - Shortness of breath
 - Chronic airway complaints
 - Hyperreactive airway disease
 - Rhinitis
 - Bronchitis
 - Bronchiolitis
 - Asthma
 - Emphysema
 - Respiratory allergic reaction
 - Other preexisting pulmonary disease
 - Obtain any prior history of symptoms from exposure to pulmonary irritants.
 - Obtain a complete smoking history.



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SURVEILLANCE CONSIDERATIONS (CONTINUED)

Medical History (continued)

- Skin disorders
 - Previous exposure to formaldehyde and other dermal sensitizers.
 - A history of skin disorders including:
 - Skin irritation
 - Previously documented skin sensitivity
 - Other dermatologic disorders
- Atopic or allergic diseases
 - Identify individuals with prior allergen sensitization.
 - A history of atopic disease and allergies to formaldehyde or any other substances.



Note:

- Keep the findings of the medical and work histories in a standardized form for comparison of the year-to-year results.
- Comparison of the results from previous years with present results provides the best method for detecting a general deterioration in health, when toxic signs and symptoms are measured subjectively.



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SURVEILLANCE CONSIDERATIONS (CONTINUED)

Physical Examination

- Mucosa of eyes and airways:
 - Be alert to evidence of this irritation.
 - A speculum examination of the nasal mucosa may be helpful in assessing possible irritation and cytotoxic changes, as may be indirect inspection of the posterior pharynx by mirror.
- Pulmonary system:
 - Perform a conventional respiratory examination, including inspection of the thorax and auscultation and percussion of the lung fields.
 - Pulmonary function testing should be used whenever the physician feels it's appropriate.
 - In cases of alleged formaldehyde-induced airway disease, other possible causes of pulmonary dysfunction (including exposures to other substances) should be ruled out.
 - A chest radiograph may be useful in these circumstances.
 - In cases of suspected airway hypersensitivity or allergy, it may be appropriate to use bronchial challenge testing with formaldehyde or methacholine to determine the nature of the disorder.
 - Such testing should be performed by, or under the supervision of, a physician experienced in the procedures involved.



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SURVEILLANCE CONSIDERATIONS (CONTINUED)

Physical Examination (continued)

- Skin:
 - The physician should be alert to evidence of dermal irritation or sensitization, including:
 - Erythema and inflammation
 - Urticaria
 - Blistering
 - Scaling
 - Formation of skin fissures
 - Other symptoms.
 - Note the presence of other dermal diseases.
 - Skin sensitivity testing carries with it some risk of inducing sensitivity, and therefore, skin testing for formaldehyde sensitivity should not be used as a routine screening test.
 - Sensitivity testing may be indicated in the investigation of a suspected existing sensitivity.
 - Guidelines for such testing have been prepared by the North American Contact Dermatitis Group.
 - If necessary, other medical examinations or tests should be performed as indicated:
 - When workers are exposed in an emergency, focus the examination on the organ systems most likely to be affected.
 - If a severe overexposure requiring medical intervention or hospitalization has occurred, the physician must be alert to the possibility of delayed symptoms. Follow-up nonroutine examinations may be necessary to assure the patient's well-being.



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EMPLOYER OBLIGATIONS

- Employers are required to provide the physician with all of the following:
 - A copy of Chapter 296-856 WAC, Formaldehyde
 - A description of the affected employee's duties as they relate to formaldehyde exposure
 - An estimate of the employee's exposure including duration, for example, 15 hours per week, or three 8-hour shifts, full-time
 - A description of any personal protective equipment, including respirators, used by the employee
 - The results of any previous medical determinations for the affected employee related to formaldehyde exposure, to the extent that this information is within the employer's control.



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PHYSICIAN OBLIGATIONS

- Provide the employer with a written statement:
 - Containing an opinion regarding all of the following:
 - Whether the employee has any medical condition that increases their risk of impaired health from exposure to formaldehyde or the use of respirators
 - Any restrictions that should be placed on the employee's exposure to formaldehyde or use of respirators
 - The use of protective clothing or equipment such as respirators. If the employee wears a respirator as a result of his or her exposure to formaldehyde, the physician's opinion must also contain a statement regarding the suitability of the type of respirator assigned.
 - Containing no specific medical information or findings.
 - That indicates the employee has been told:
 - The results of the medical examination and
 - About any medical conditions that require further explanation or treatment

