



Review of Three Asthma Cases and MDI Exposure Data Associated with the Spray-on Truck Bed Lining Industry.

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I. Introduction:

Work-related asthma is the most commonly diagnosed occupational lung disease in the United States.¹ Diisocyanates are a leading cause of work-related asthma. Diisocyanates are used in a number of industries.² Recently, a series of worksite investigations in the State of Washington revealed methylene diphenyldiisocyanate (MDI) use and overexposures in the spray-on truck bed liner industry.³ MDI health effects, including work-related asthma, were identified in the employers' workers' compensation claim records.³

We present three work-related MDI asthma claims from the spray-on truck bed lining industry. The claims are accompanied by workplace exposure information. The case summaries may be used to help inform employers, workers, healthcare providers, and others involved with spray-on bed lining of the occupational asthma hazard in the industry.

II. Methods:

Medical Reports and Identification of Work-related Asthma Claims:

The names of known spray-on truck bed liner franchisers or manufacturers of spray-on polyurethane coatings (partial list at http://www.business.smartlook.com/Business/Automotive/Parts_and_Accessories/Trucks,_Vans,_and_Sport_Utility/Spray-In_Bedliners/) were matched to account business names within the Washington State Department of Labor and Industries' administrative databases. Claim medical records for identified accounts were reviewed if either the injured body part was coded as the 'respiratory system' (ANSI Z16.2 BP code = 850), or if both of the following criteria were met: the injured body part was coded as 'multiple body systems' (ANSI Z16.2 BP code = 850) and the injury type was 'inhalation of toxics' (ANSI Z16.2 Type code = 181). The claim medical record was a work-related asthma claim if it met the following accepted epidemiologic surveillance case definition for work-related asthma: 1. A physician's diagnosis consistent with asthma; and 2. An association of symptoms (cough, wheeze, and/or shortness of breath) to the work environment. An additional criterion for inclusion of the claim was exposure to diisocyanates. Claim medical records were used to summarize the clinical history.

Exposure Data: Exposure data from the WISHA visits as previously reported³ was matched to the employer of the claimant and summarized for presentation associated with this case.

Results:

Eight claimants in the truck-bed lining industry were identified as meeting the case definition for work-related asthma. Three claims with exposure information were selected for case presentation.

Case 1.

Medical Report: A 29 year-old male ex-smoker presented to the emergency room (ER) with complaints of chest discomfort and wheezing, alleging exposure to ‘fumes’ generated during the application of spray-on truck bed-liners. He reported increased frequency of episodes of shortness of breath and wheezing with exposure to ‘isocyanates’ over his eight months of work in the truck bed lining industry. The worker was diagnosed with asthma and treated symptomatically with inhaled bronchodilators, intravenous (IV) steroids and then discharged from the ER with instructions to follow-up with a pulmonologist. The claim file contained contradictory statements between the employer and the worker whether a respirator had been consistently worn.

The worker did not follow-up with the pulmonologist as planned. Additionally, the ER record indicated that the physician had failed to identify the possible etiology of his asthma despite the worker reporting to medical personnel that his asthma was due to ‘isocyanate’ exposure.

Exposure Information: A WISHA inspection was performed at the worksite several months later. The owner reported having made improvements to the ventilation system as well as requiring more frequent filter changes. Personal exposure to MDI was measured at levels from 0.045 – 0.111 mg/M3 for four applications (WISHA ceiling limit = 0.20 mg/M3). A supplied air respirator was used by the sprayer. Violations were issued over lack of respirator and chemical hazard training.

Case 2.

Medical Report: A 22 year-old worker employed in the truck-bed lining industry for 18 months developed the insidious onset of rhinorrhea and nasal congestion that occurred during the workweek and improved over the weekend. Dyspnea on exertion led to a restriction of his daily activities. A medical evaluation resulted in the diagnosis of asthma, with associated pulmonary function tests documenting reversible airflow limitation following treatment with inhaled bronchodilators. No workplace challenge testing was performed. The MSDS provided to the medical personnel revealed that the spray-on lining material consisted of 50 – 60% MDI and 5 – 20% diisooctyl phthalate. The patient was removed from the workplace.

Exposure Information: A WISHA referral-initiated inspection revealed that the work was being done in a tarp-enclosed application area with inadequate make up and exhaust air. A supplied air respirator was used during spraying though fit testing and other aspects of an effective respiratory protection program were absent. Personal air sampling of a sprayer found an MDI exposure level of 6.53 mg/M³ for one application (WISHA ceiling limit = 0.20 mg/M³). Violations were issued over inadequate engineering control, respirator program, and chemical hazard training.

One and one-half years after medical removal from the workplace, the patient was unemployed. He still had symptomatic asthma and was maintained on bronchodilators and inhaled steroids.

Case 3.

Medical Report: A 30 year-old man developed rhinitis, cough, wheezing, and shortness of breath four months after starting work applying spray-on truck bed-liners. On one occasion the employee reported to the ER but the physician failed to diagnose the patient with asthma. Symptoms persisted with daily episodes of shortness of breath, wheezing and nausea, occurring at mid-day after four to five applications. After four months of symptoms, which culminated in hospitalization for respiratory distress, the worker was diagnosed with work-related asthma from exposure to MDI. Although no workplace

challenge testing was performed, post-hospital testing resulted in a positive response to a non-specific respiratory irritant (methacholine). The patient was removed from the workplace.

Exposure Information: A WISHA complaint-based inspection of the worksite revealed that employees were spraying in an enclosed work booth with insufficient ventilation. Sampling of worker exposure to MDI found levels from 0.435 to 1.46 mg/M³ for eight applications (WISHA ceiling limit = 0.20 mg/M³). The removed worker had reported finding the chemical on his face at the end of a workshift despite the use of a full-facepiece, negative-pressure respirator. Respirator fit tests and training had not been provided. Violations were issued regarding inadequate engineering controls, the respirator program, and chemical hazard training.

One year after being removed from work, the worker was elsewhere employed as a manual laborer. He still had symptomatic asthma and was maintained on bronchodilators and inhaled steroids.

Discussion:

The three cases summarized above represent injury claims presented to the Washington State workers' compensation system for work-related asthma. There are many potential discussion topics related to each case. The reader is referred to several selected references for a discussion of asthma diagnosis⁴ and assessing asthma when it occurs in the workplace.⁵

The summaries support a conclusion that the health outcomes for these workers in the spray-on bed lining industry in the state of Washington were work-related, serious, caused by exposure to diisocyanates, and preventable. The summaries may assist in the education of healthcare providers, workers, employers and all involved in the spray-on bed liner industry.

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⁴ National Heart, Lung, and Blood Institute. Guidelines for the Diagnosis and Management of Asthma. NIH Publication No. 97-4051. Available at <http://www.nhlbi.nih.gov/guidelines/asthma/asthgdln.htm>. Accessed 7/20, 2004.

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