

The Burden of Work-Related Asthma in Michigan

Since 1988, Michigan has received funding from the National Institute for Occupational Safety and Health for the development and continuation of a work-related asthma (WRA) surveillance and workplace intervention program. Other states have intermittently conducted WRA surveillance, but Michigan is the only state to track WRA for the entire 31 years. Furthermore, Michigan is the only state where the surveillance program is part of a regulatory program to conduct enforcement inspections at the workplaces of the WRA index cases. A report on the 3,634 confirmed cases of WRA identified over 31 years in Michigan was recently published (Reilly MJ, Wang L, Rosenman KD. The Burden of Work-Related Asthma in Michigan, 1988-2018. *Annals Am Thoracic Soc* 11/4/19 online. DOI: <https://doi.org/10.1513/AnnalsATS.201905-401OC>).

KEY FINDINGS WERE:

Overall, the incidence of cases have decreased over the 31 years. The cumulative incidence rate of WRA decreased from 3.5 during 1988-1997 to 2.0 cases per 100,000 Michigan workers during 2008-2018 ($p < 0.01$). Surveillance systems in other countries have also reported a downward trend in WRA.

There were decreases in cases from specific exposures to well-known causes of WRA such as isocyanates and metal working fluids, with the largest decrease in the cumulative incidence rate in the manufacturing sector (11.6 to 5.6 cases per 100,000 workers ($p < 0.01$)) (Figure 1). This decrease was consistent with improved workplace engineering and controls such as enclosure of work processes, product substitution and use of personal protective gear.

Figure 1. Cumulative Incidence Rate of Work-Related Asthma per 100,000 workers, Overall and by Industry Reported as Source of Exposure for Confirmed Work-Related Asthma Cases --Michigan, 1988-2018

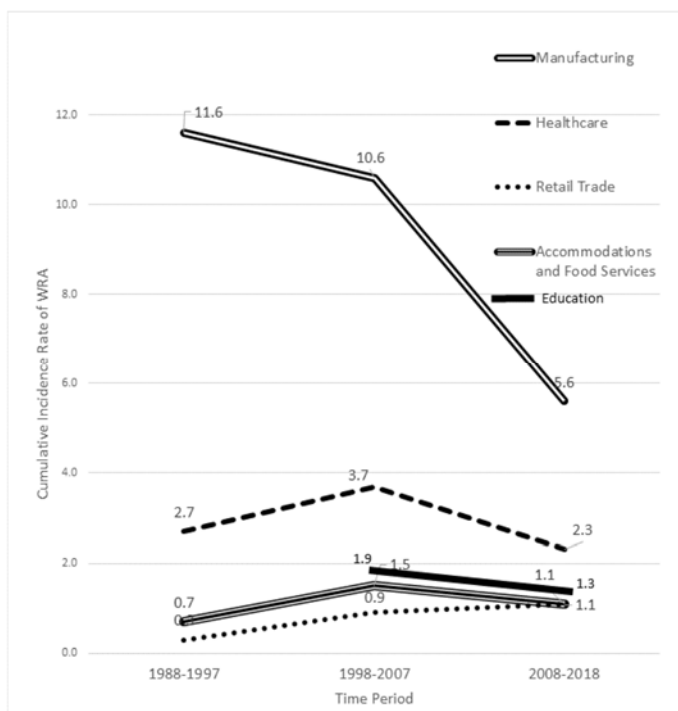


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However, for cleaning products, which are found across all industries, generally with less standardized work practices than those applied in a manufacturing setting there was an increase over time in the number of cases and percentage of cases associated with cleaning products from 5% to 20% (p<0.01).

The type of WRA reported has changed over time with an increase in the incidence rate of work-aggravated asthma and a decrease in new onset WRA and Reactive Airways Dysfunction Syndrome (RADS).

Sixty-six percent had had an emergency department visit, with a median of two and an average of five visits, and 35% had a WRA-related hospitalization, with a median of one and an average of four hospitalizations. Despite the morbidity of WRA, only 49% had applied for workers' compensation.

Nine individuals died from an asthma attack from a workplace exposure (Table 1). The decedents ranged from 19 to 77 years. Five were men. Five worked in manufacturing and one each worked in construction, agriculture, food services, and automotive repair. Four were exposed to isocyanates, and one case each was exposed to secondhand cigarette smoke, milk tank cleaning agents, construction chemicals, mold machine release spray, and welding fume.

WRA in MI, 1988-2018

• TOP INDUSTRIES



• TOP EXPOSURES

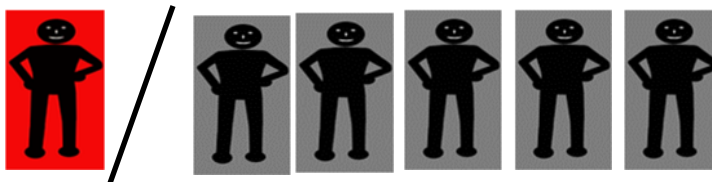


Table 1. Summary of Nine Work-Related Asthma Deaths, Michigan, 1988-2018

Year	Age at Death	Sex	Exposure	Industry/Occupation	Asthma Type	Years With Asthma	FEV1 on Last Baseline Spirometry Done Before Death
1998	67	F	Mold Machine Release Spray	Rubber & Plastic Parts Manufacturing/ Machine operator	OA	16	59% of Predicted
2003	45	M	Isocyanates	Auto Detailing/ Truck bed liner sprayer	OA	1	None
2004	19	F	Second Hand Cigarette Smoke	Restaurant/Waitress	Aggravated	16	None
2004	75	F	Chlorine, HCL & Phosphoric Acid	Agriculture/Farmer Cleaning Milk Tanks	Aggravated	Unknown	84% of Predicted
2005	50	M	Isocyanates	Adhesive Manufacturing/ Production worker	OA	4	97% of Predicted
2006	77	F	Toluene Diisocyanate	Auto Seat Manufacturing/Machine operator	OA	26	33% of Predicted
2007	54	M	Welding Fumes, Chemicals	Plastic Car Parts Manufacturing/ Welder	Aggravated	37	36% of Predicted
2013	21	M	Construction	Construction/ Laborer	Aggravated	Child	None
2015	43	M	Isocyanates	Rubber & Plastic Parts Manufacturing/ Casting room machine operator	OA	1	None

WRA cases were useful for targeting workplace enforcement inspections. The confirmed cases worked in 2,601 facilities. Michigan OSHA inspected 806 of those facilities. During the inspections, 10,493 co-workers of the index cases completed a confidential respiratory questionnaire; 1,622 (15%) reported being bothered at work by daily or weekly chest tightness, shortness of breath or wheezing, or having new-onset asthma since beginning to work at the facility. Symptomatic co-workers decreased over time from 18% to 12%.

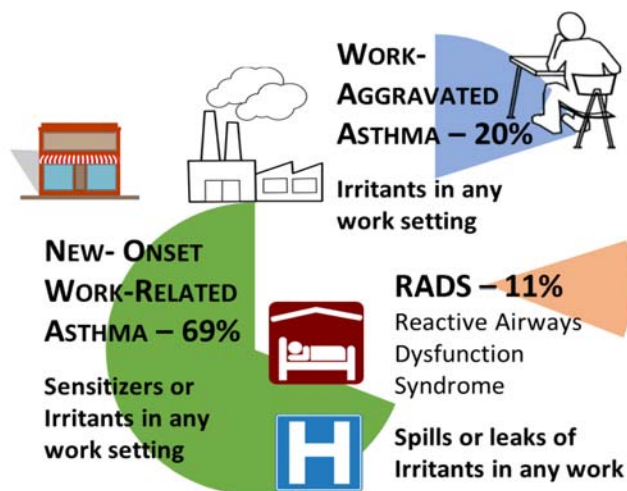
One of Every Six Co-Workers of the Reported WRA Cases had Daily or Weekly Breathing Troubles at Work.



Over 300 workplace substances have been identified to cause new-onset asthma and the list continues to grow^{1,2}. Other substances can aggravate pre-existing asthma, causing increased morbidity and medication requirements. Work-related asthma (WRA) comprises both new-onset and work-aggravated asthma³. An estimated 15-55% of all adult asthma is related to work^{4,6}. New-onset WRA is divided into asthma which typically develops after months to years of low-level exposure to a known asthma-inducer (occupational asthma (OA)), and asthma which develops from a one-time high-level acute exposure to an irritant, Reactive Airways Dysfunction Syndrome (RADS). WRA from chronic exposure to low-to-moderate levels of irritants has also been described. Work aggravated asthma (WAA) occurs when an individual with pre-existing asthma has an increase in respiratory symptoms and/or need for medications from workplace exposure(s).

Guidelines emphasize consideration of WRA in all adults with asthma to increase early diagnosis and removal from exposure to increase the likelihood of reversing the condition⁷. Since health care practitioners may overlook WRA, OSHA has developed a fact sheet for workers/patients to share with their doctors about the diagnosis of WRA⁸.

Types of WRA Reported in Michigan, 1988-2018



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As always, Kenneth Rosenman, M.D., is happy to discuss with you any patient diagnostic and/or management issues. He can be reached at 1-800-446-7805.

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S E.N.S.O.R.

News

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In this issue: V31n1: The Burden of Work-Related Asthma in Michigan

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S Remember to report all cases of occupational disease!

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The Project SENSOR News is published quarterly by Michigan State University-College of Human Medicine with funding from the National Institute for Occupational Safety and Health and is available at no cost. Suggestions and comments are welcome.

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