

Long Term Follow-up of Work-Related Asthma Patients

We recently completed a project assessing the long-term health, quality of life and economic status of Michigan patients who had been reported with work-related asthma to the Michigan Occupational Disease Registry.

We randomly selected 553 patients with workrelated asthma from the 1,563 who had been reported from 1988-1998. We selected this time period to ensure that at least five years had elapsed since diagnosis. We were unable to locate 165, 37 had died and 44 refused to be reinterviewed. We interviewed 307; 104 had new onset asthma and had been exposed to a known occupational allergen, 116 had new onset of asthma but their exposure was not a known occupational allergen, 45 had had pre-existing asthma which was aggravated by their work, and 42 had new onset asthma after an acute exposure to an irritant (Reactive Airways Dysfunction Syndrome (RADS).

Table I. Basic Information from Follow-up Interview					
	Known Allergen	Not Known Allergen	Aggravation Pre-existing	RADS	All Combined
	104	116	45	42	307
Average Years Since 1 st Interview (range)	11.1 (5-17)	10.1 (5-16)	9.0 (5-16)	9.4 (5-15)	10.2 (5-17
Average (median) Verage Otest of Job to Orest	4.0	5.0		2.0	1.0
Average (median) Years Start of Job to Onset Asthma Symptoms	4.3 (1.7)	5.8 (2.9)	4.1 (1.2)	3.8 (1.8)	4.8 (2.0)
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Female	57%	50%	62%	40%	53%
White	89%	80%	71%	93%	84%
African American	7%	16%	24%	5%	13%
Current Cigarette Smoker at Time of Follow-up Interview	20%	9%	11%	14%	14%
Ctill Marking at Sama Employer	220/	250/	260/	100/	250/
	ZZ 70	23%	30%	19%	25%
Still Exposed to Original Substance(s) Causing Problem	12%	16%	24%	12%	15%
Still Having Respiratory Symptoms	79%	91%	96%	86%	87%
Still Taking Asthma Meds	62%	70%	98%	71%	71%

Basic data on the 307 interviewed are shown in Table I. On the average ten years had elapsed since they had been reported with work-related asthma. Fifty-three percent were women, 84% white. 13% African-American. 14% were smoking cigarettes, 25% still worked for the same employer although a smaller percentage, 15% continued to have the same exposure. Among the 46 still exposed, eight were working with metal working fluids (coolants), and four with isocyanates. There is well-documented evidence in the medical literature at least with the isocyanates that sensitized individuals do worse in terms of symptoms, medication requirements and pulmonary function results if they continue to be exposed after sensitization. limitation rating was 4.9 (4 = moderate limitations and 5.0 = some limitations. Table III shows how the limitation varies by different parameters. Remember the smaller the number the greater the reported self-limitation. The highest self-limitation was reported among individuals continuing to have respiratory symptoms who said their symptoms were worse (3.4, 3 = very limited).

One hundred fifty-five (47%) individuals had applied for workers' compensation; 111 had been awarded, 26 denied and eight were still pending. One hundred ninety-three (63%) reported out-of-pocket expenses for their asthma care in the past year; major reasons included

Table II. Reasons Work-Related Asthma Patients No Longer Working with the Same Employer					
	Known	Not Known	Aggravation		All
	Allergen	Allergen	Pre-existing	RADS	Combined
	81	87	29	34	231
Asthma Related	44%	50%	35%	53%	47%
Left because of Asthma	33%	41%	28%	35%	36%
Fired because of Asthma	10%	9%	3%	18%	10%
Medical leave for Asthma	1%		3%		1%
Non-Asthma Related	56%	49%	65%	47%	53%
Retired	27%	30%	24%	24%	27%
New Job	9%	8%	28%	15%	12%
Company Closed	7%	8%	7%	3%	7%
Fired	4%	3%	3%	6%	4%
Health Conditions	9%		3%		3%

Most individuals were continuing to have symptoms (87%) and requiring asthma medication (71%).

Table II shows that 47% of the 231 (75%) of the patients who were no longer working with the same employer had left because of their asthma. Two hundred twenty-four (97%) of these individuals were continuing to have asthma symptoms requiring treatment. In the past year, they averaged four visits a year to either a primary care doctor, allergist or pulmonologist, 0.9 emergency room visits with some individuals having up to 12 visits, 1.4 urgent care visits with some individuals having up to ten visits and 0.5 hospitalizations with some individuals having up to four hospitalizations.

The Juniper Quality of Life Mini-Questionnaire was used to assess the effect of asthma on the patient's life over the two weeks prior to administration of the questions. The overall copays (86%), medicine not covered by insurance (28%), costs exceeded the maximum allowed by the insurance company (9%). Seventy percent of the 193 with out-of-pocket expenses in the past year had greater than \$200 in costs including 30% with greater than \$800 in out-of-pocket costs. Twenty-two percent said they had to cut back on family expenses to make ends meet and another 29% had to do without some things because of their asthma costs and effect on wage earning.

Despite the prolonged period since the diagnosis of work-related asthma and that 85% were no longer exposed to the substance(s) that had caused their work-related problem, 87% were still having respiratory symptoms and 73% had seen a health care provider for their asthma in the previous year. The patients rated their limitation from asthma as "some". Individuals experienced ongoing out-of-pocket medical expenses and 51% had to make cut backs or do without some things because of medical expenses and reduced earnings. These ongoing effects on medical symptoms, quality-of-life and economic well-being have been previously reported in the medical literature. For example, two recent articles on the ongoing nature of work-related asthma despite cessation of exposure are:

Brant A, Zekveld C, Welch J, Jones M, Newman Taylor A, Cullinan P. The prognosis of occupational asthma due to detergent enzymes: clinical, immunological and employment outcomes. Clinical and Experimental Allergy 2006; 36:483-488.

Labrecque M, Khemici E, Cartier A, Malo JL, Turcot J. Impairment in workers with isocyanate-induced occupational asthma and removed from exposure in the Province of Quebec between 1985 and 2002. J Occup Environ Med 2006; 48:1093-1098.

The best predictors of who will recover from workrelated asthma after cessation of exposure are shorter duration of exposure before onset of symptoms and shorter duration of exposure after onset of symptoms. Medical screening and awareness by health-care providers and the workers themselves cannot reduce the initial time period but are essential to reduce the duration of time from onset of symptoms until medical intervention and cessation of exposure. Awareness of patient's exposures should be routinely considered in all adults with asthma. As always we remain interested in being notified about known or suspected cases of work-related asthma. Kenneth Rosenman, MD is happy to discuss diagnostic issues and provide you assistance on patient care issues. He can be reached at our toll free number, 1-800-446-7805.

Table III. Degree of Quality of Life Limitation using Juniper Quality of Life Mini Questionnaire (smaller the number greater the self-reported limitation)

Overall	4.9
Male	5.1
Female	4.7
White	4.9
African-American	4.4
Known Allergy	5.1
Not Know Allergen	4.7
Aggravation	5.0
RADS	4.7
Current Smoker	5.2
Non-Smoker	4.9
Ex-Smoker	4.7
Still Working at Same Company	
Yes	5.2
No	4.7
Still Exposed	
Yes	4.8
No	5.4
Currently Taking Asthma Meds	
Yes	4.5
No	5.9
Filed for Workers' Compensation	
Yes	4.5
No	5.2
Breathing Problems Still Present	
Worse	3.4
Same	4.4
Less	5.2

Table IV. Impact on Family Resources to Pay for Care						
	Known	Not Known	Aggravation	PADS	All Combined	
	Allergen	Allergen	FIE-EXISTING	KAD3		
	104	114^	45	42	305^	
Cut Back Sharply and Still Can't Make Ends Meet	6%	6%	7%	7%	6%	
Cut Back Sharply and Able to Make Ends Meet	13%	21%	13%	10%	16%	
Have Had to do Without Some Things but Getting By	29%	32%	18%	31%	29%	
No Financial Impact	51%	41%	62%	52%	49%	
*Unknown for 2 individuals.						

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