

Adult-Onset Asthma: What Is The Role of Occupational Exposures?

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How Much of Asthma In Adults Is Due to Occupational Exposures?"

- Physician reports suggest that 1-5% may be occupational asthma.
- Community based case-control studies find as much as 58% of adult-onset asthma attributable to occupational exposures.
- Median of studies thus far suggest 15% of asthma in adults is work-related.

How Can We Measure Disease Burden Due to Occupation?

- Case-by-Case Method
 - Count all the cases (C_T), regardless of cause, and
 - Count cases (C_E) that are caused by the exposure.
 - Attributable (excess) fraction = C_E/C_T
- Risk-Based Method
 - Count cases among exposed and unexposed
 - Compute relative risk (RR)
 - Compute attributable (excess) fraction (AF) by standard epidemiologic methods

Case-by-Case Method

- Two variations
 - Surveillance method:
 - physician reported occupational asthma cases compared with population register of asthmatics.
 - Case-definition method:
 - Similar to infectious disease epidemiology
 - Applied to defined sets of cases.
- Simple calculation
- Difficult to identify cases caused by exposure than merely to identify exposure

Risk-Based Method

- Attributes *excess cases* among exposed subjects to the exposure
- $$AF_p = \frac{P(D) - P(D|\bar{E})}{P(D)} = \frac{P(E)(RR-1)}{P(E)(RR-1)+1} = P(E|D) \frac{RR-1}{RR}$$
- Can use data from community-based studies (but not from occupational cohorts)
 - Various designs possible: case-control, cohort, cross-sectional prevalence

Two Studies in One

- Interview adult-onset cases
 - Case-by-case, case-definition method of attribution
 - Case definition based on history of exposure and symptoms
 - Validation with physiologic testing
- Interview Controls
 - Identify exposures based on questionnaires
 - Validate exposures with work site visits
 - Risk-based method of attribution

Community-Based Study of Adult-Onset Asthma

- Harvard School of Public Health
- Fallon Clinic
- Fallon Community Health Plan
- Harvard Vanguard Medical Associates
- Harvard Pilgrim Health Care

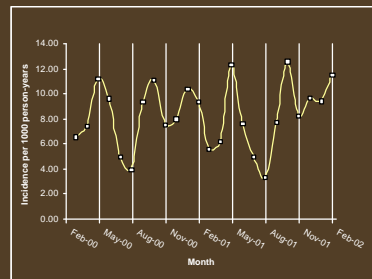
What is Adult-Onset Asthma?

- Asthma with first onset of respiratory symptoms after age 15.
- Asthma in remission, with no requirement for medical treatment, which recurs and requires medical intervention.

Study Outline

- Computerized HMO records
 - Monthly identification of at risk population, cases, and controls
- Chart Review of Clinic Records
 - Cases only
- Telephone Interview
 - Cases and controls
- Prognosis and Physiologic Studies
 - Cases only

Adult-Onset Asthma Incidence



Computerized Identification and Chart Review of Adult-Onset Asthma at Fallon March 2000 – February 2001

Asthma Status	n, (%)	Potential Cases	Excluded Cases	Confirmed Cases
No Prior Asthma	211 (28)	1 (<1%)	210 (45)	
Mild Intermittent, Inactive	279 (37)	20 (7)	259 (55)	
Mild Intermittent, Active	39 (5)	39 (14)	0	
Mild Persistent with Exacerbation	62 (8)	62 (22)	0	
Mild Persistent	31 (4)	31 (11)	0	
Moderate Persistent	7 (1)	7 (3)	0	
Weak Evidence	58 (8)	58 (21)	0	
No Evidence	35 (5)	35 (13)	0	
Insufficient Data	24 (3)	24 (9)	0	
Total	746	277	469	

Frequency That Exposures Were Mentioned in Medical Records March 2000 – February 2001

	Occupational Exposures N (%)	Home Exposures N (%)	Environmental - Outdoor Exposures N (%)
Cases where exposure noted	32 (7)*	53 (11)	61 (13)
Positive association noted	23 (5)	35 (7)	44 (9)

*Percent of all confirmed cases (n=469).

Telephone Interview

- Detailed job descriptions all jobs in the last year
 - Classified into whitecollar, bluecollar, service jobs
 - Individually rated on 0-2 scale by industrial hygienists for exposure to sensitizers and irritants
- Home characteristics
 - Dampness, mold, water damage, humidifier, dehumidifier, pets, pests, pesticide applications
- Family, medical, and smoking histories

Characteristics of Interviewed Cases and Controls

	Cases n (% cases)	Controls n (% controls)
Job Class		
White Collar	242 (60)	963 (64)
Blue Collar	117 (29)	402 (27)
Service	46 (11)	136 (9)
Occupational Exposure *	232 (57)	763 (51)
Home Characteristics		
Central AC *	43 (11)	109 (15)
Any Adverse Condition †	334 (83)	546 (76)
Body Mass Index ‡		
18.5, <25 (normal)	135 (34)	306 (45)
30 (obese)	125 (31)	124 (18)
25, <30 (overweight)	125 (31)	230 (34)
<18.5 (underweight)	13 (3)	13 (2)

Multivariate model

	OR	95% Confidence		OR	95% Confidence	
		Low	High		Low	High
No Exposure to Irritants and Sensitizer	1.0					
Any Exposure	1.49	1.17	1.90			
Job Class: White Collar Worker				1.0		
Service Worker				1.42	0.95	2.11
Blue Collar Worker				1.33	0.98	1.80
Home Characteristics: Neither of Below	1.0					
Central Air Conditioning	0.63	0.42	0.94	0.61	0.41	0.91
Any Adverse Condition	1.78	1.28	2.47	1.82	1.31	2.53
BMI: Normal	1.0					
Obese	2.71	1.92	3.82	2.67	1.90	3.78
Overweight	1.50	1.09	2.07	1.49	1.08	2.06
Underweight	1.97	0.81	4.79	1.87	0.77	4.54
Sex: Male	1.0					
Female	2.21	1.84	2.66	2.23	1.84	2.72

Controlled for age, education, income, race, ethnicity, smoking, family history, childhood respiratory illness.

Attributable Fractions

	Est.	95% Confidence		Est.	95% Confidence	
		Low	High		Low	High
AF (Occupational Exposure)	20.0%	8.1%	31.9%	11.5%	1.1%	22.0%
AF (Housing Conditions)	36.9%	19.1%	54.7%	38.2%	20.8%	55.6%
AF (Obesity and Overweight)	33.6%	20.3%	46.9%	33.2%	19.9%	46.5%
AF (Preventable Factors Combined)	66.4%	53.0%	79.9%	63.4%	49.7%	77.1%

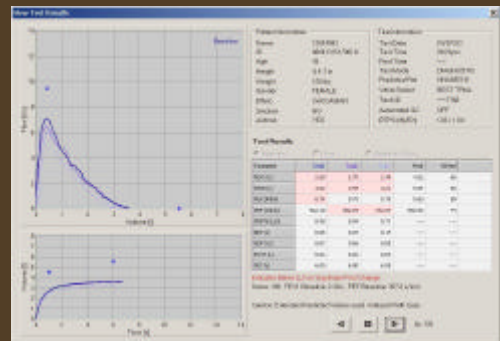
*Controlled for age, education, income, race, ethnicity, smoking, family history, childhood respiratory illness.

*Not controlled for ambient air pollution effects

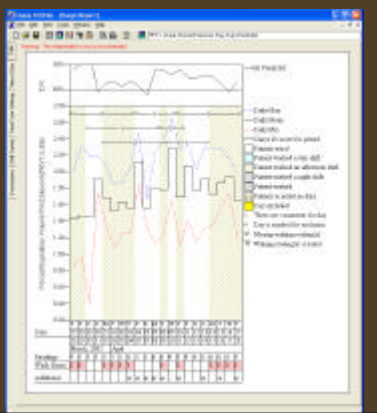
*Protective effect of central air conditioning may suggest that ambient air pollution is an important risk factor.



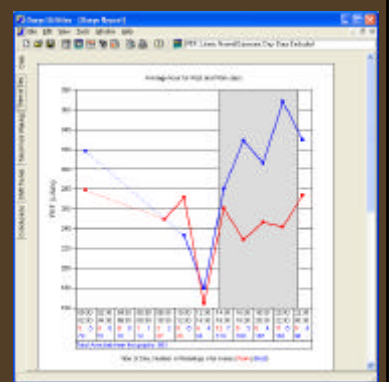
EasyOne Data



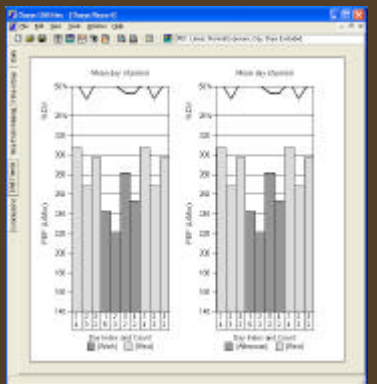
FEV₁



Average
by Hour
of Day
Over
Record



Mean
by Day
of
Period



Thank You!

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