MONASH University
Medicine, Nursing and Health Sciences

Changing Patterns of Occupational Respiratory Disease

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TOAST MARTINBOROUGH PHOTO GALLERY

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Table 2. Estimates for the prevalence of preventable chronic respiratory diseases (CRD)

CRD	Year of estimation	Prevalence	Ref.
Asthma	2004	300 million	(7)
COPD	2000	80 million	(8)
Allergic rhinitis	2006	400 million	(9–13)
Other CRD	2006	>50 million	(8, 14–20)
Sleep apnoea syndrome		>100 million	(21–24)

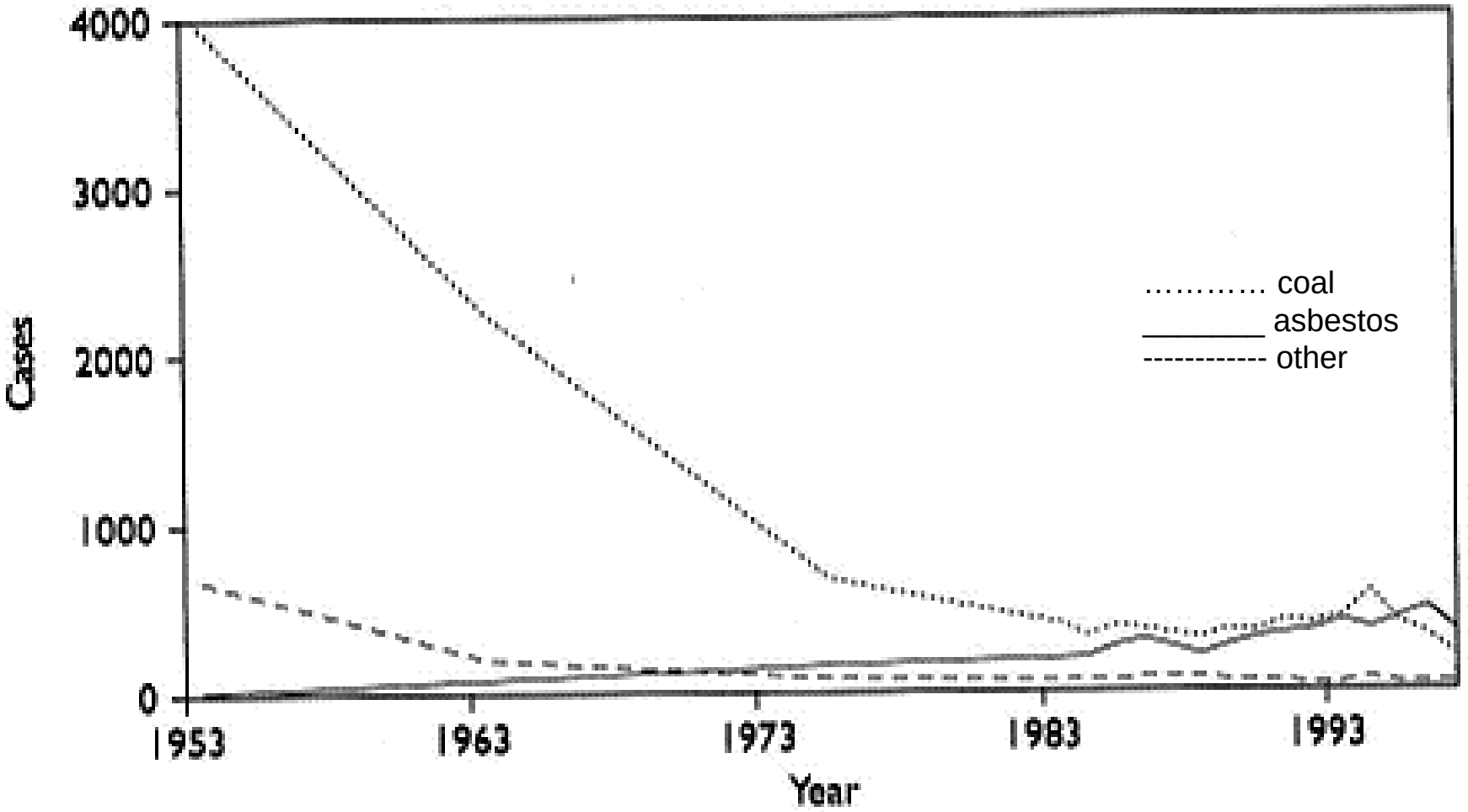
COPD, chronic obstructive pulmonary disease.

Bousquet et al. Global Alliance against Chronic Respiratory Diseases. Eur Respir J 2007; 29: 233–239.

Occupational Lung Disease – changing spectrum

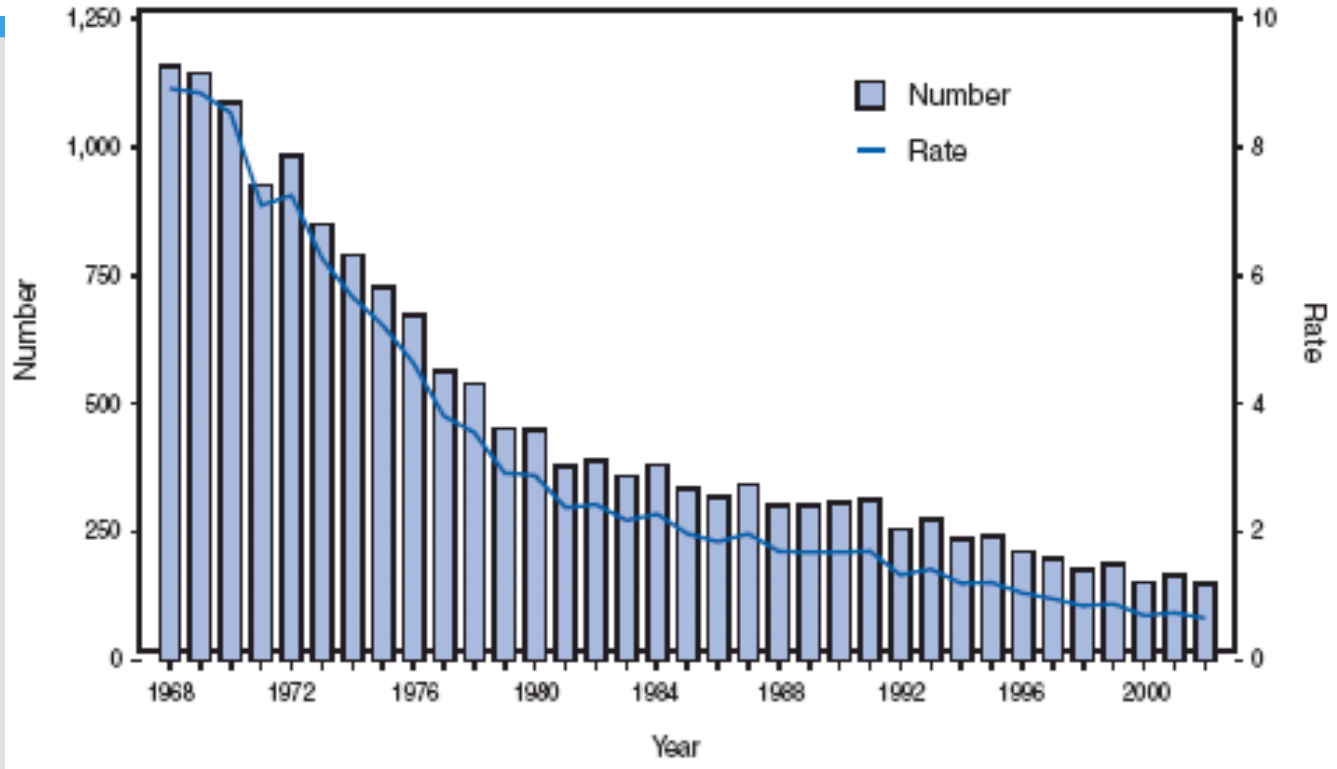
- Traditionally main focus on chronic respiratory diseases of longer latency
- Asbestosis, Silicosis, coal workers' pneumoconiosis, etc.
- These now well controlled in many developed countries

Pneumoconiosis cases in Great Britain diagnosed by Special Medical Boards, 1953-1997 [85,121].



Hendrik DJ, Sherwood Burge P, Beckett WS, Churg A. (Eds) *Occupational Disorders of the Lung: Recognition, Management, and Prevention* (2002) Harcourt, London, p20.

FIGURE 1. Number of silicosis deaths and age-adjusted mortality rate*, by year — National Occupational Respiratory Mortality System, United States, 1968–2002

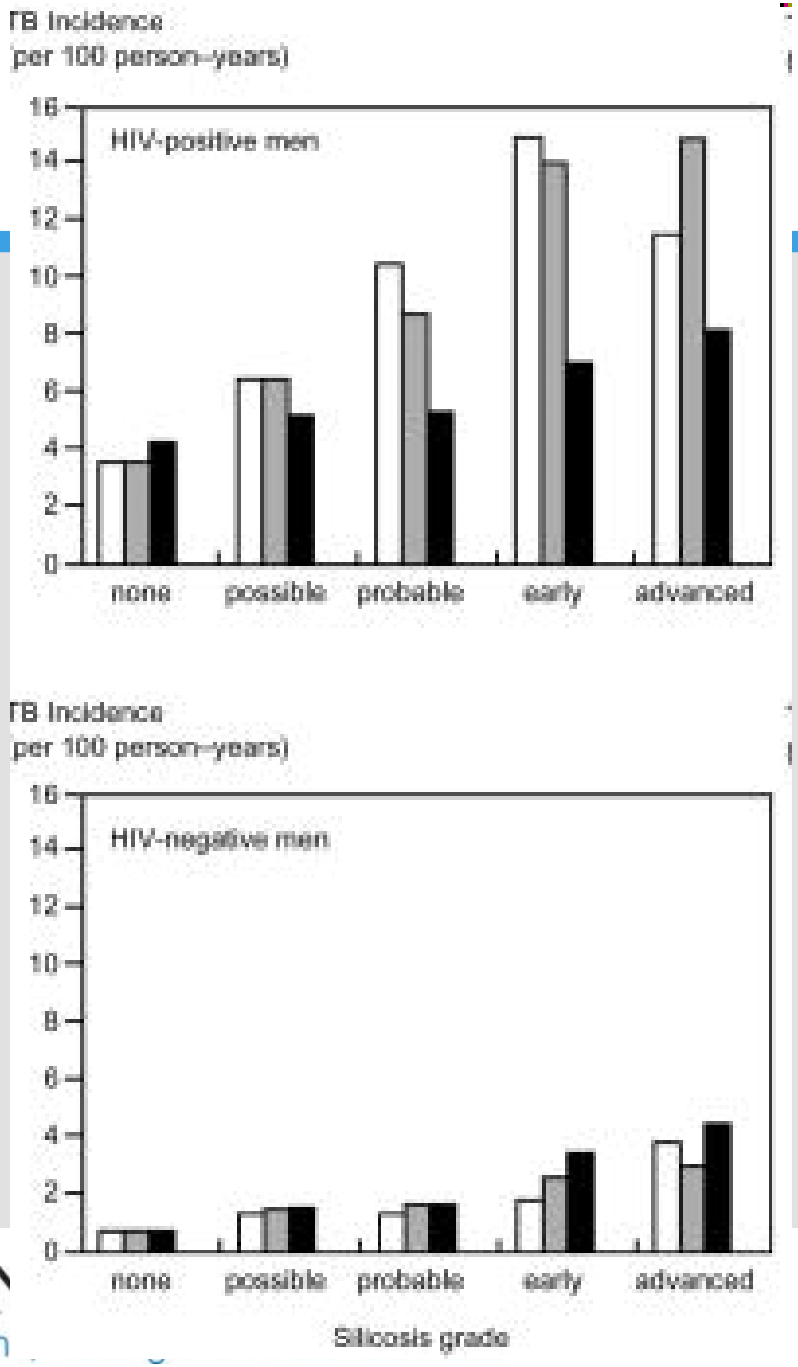


* Per million persons aged ≥15 years.

Bang K et al. Silicosis Mortality, Prevention, and Control --- United States, 1968—2002. MMWR 2005; 54(16): 401-405

Sequelae of silicosis

- Silicosis increases risk of pulmonary TB infection – silicotuberculosis
- This can be further exacerbated in those with impaired immune response – AIDS
- This a growing problem in South African Goldminers



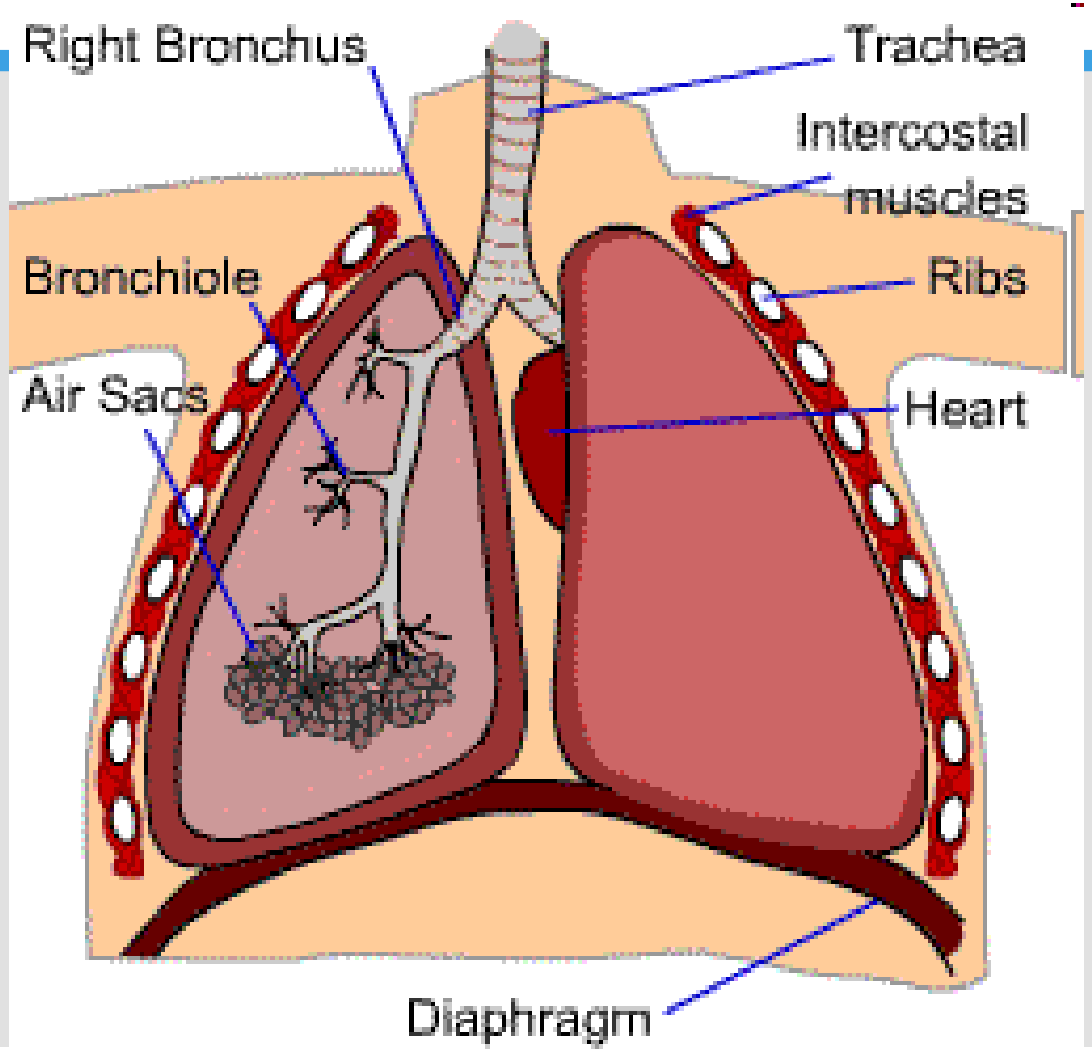
Corbett, E et al. HIV infection and silicosis: the impact of two potent risk factors on the incidence of mycobacterial disease in South African miners. AIDS 2000; 14(17): 2759-2768

Control much more complex than for silicosis alone

- Triad of factors, each with their own risk factors:
  - Silica exposure
  - Mycobacterium
  - HIV infection
- Requires a mix of public health and occupational health approaches for effective control
- Likely to be similar situation in other developing countries where these 3 factors occur

Occupational Lung Disease – changing spectrum

- With reducing incidence of pneumoconioses, disease of shorter latency and/or those affecting airways becoming more important
  - **occupational asthma,**
  - **inhalational injury,**
  - **alveolitis**


Right Bronchus
Trachea
Intercostal muscles
Bronchiole
Ribs
Air Sacs
Heart
Diaphragm

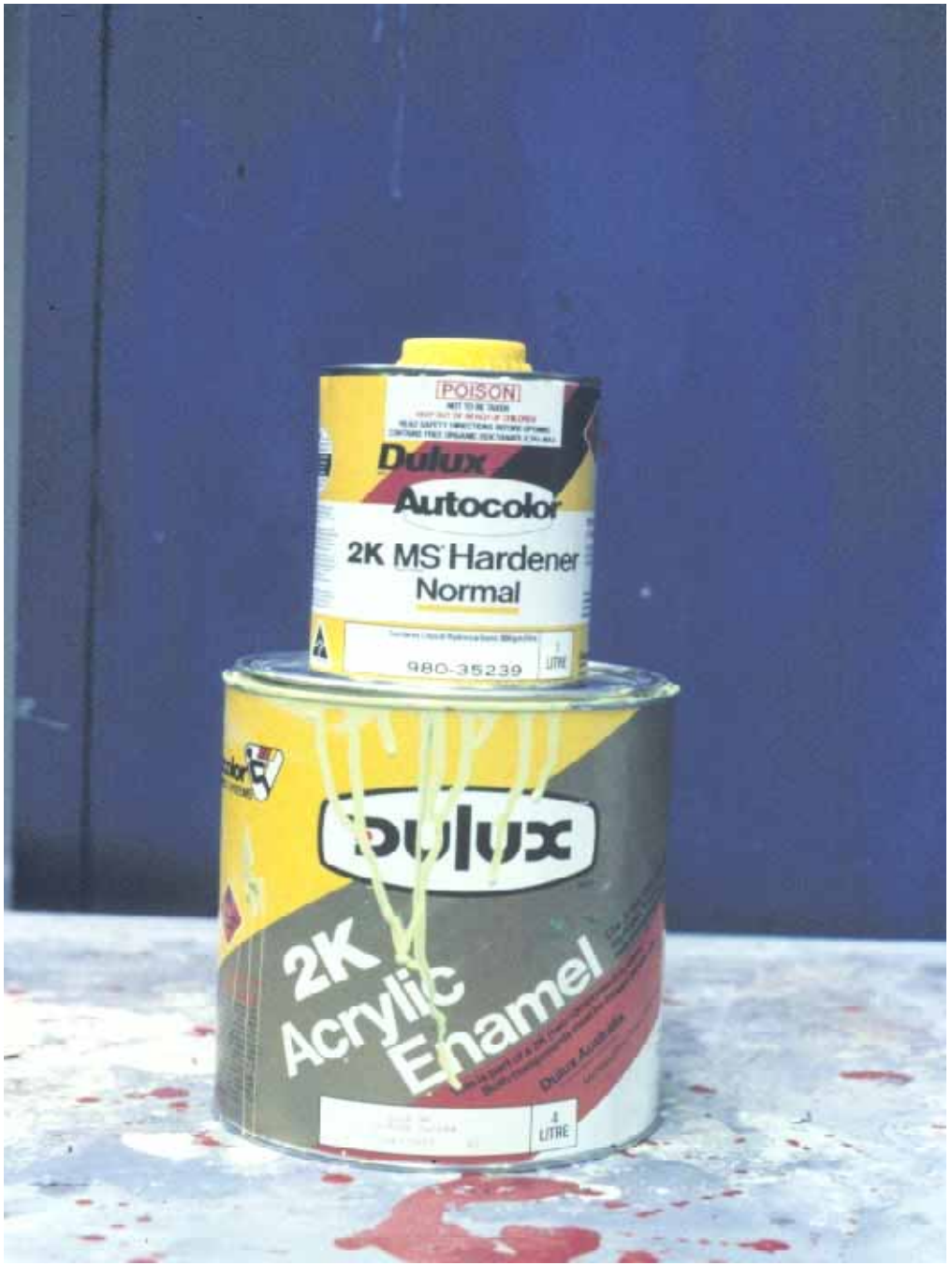
What Is Occupational Asthma?

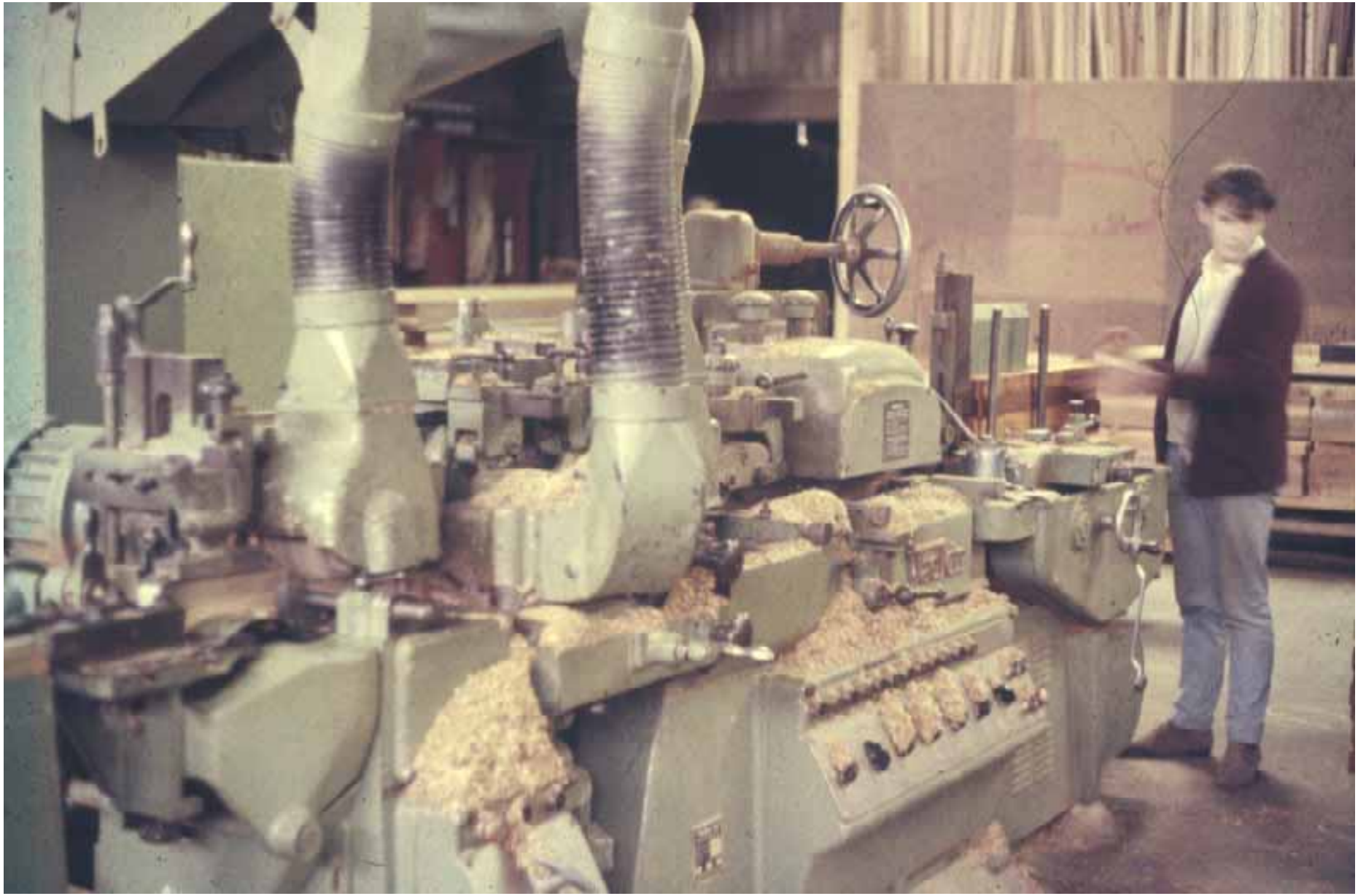
- Asthma defined as reversible airways obstruction
- Work Related Asthma (WRA) is asthma caused by exposure to sensitising agents and/or irritants in the workplace (American College of Chest Physicians Consensus Statement Chest 2008; 143(3): supplement)
- Work Exacerbated Asthma – (WEA) pre-existing asthma worsened by workplace factors, such as irritants, cold, exercise – also an important problem
- As asthma is common, it can be difficult to identify when someone has occupational asthma

What causes work related asthma?


MOTOR PAINTING

Hexamethylene di-isocyanate





Animal handlers

Electronics technicians
- colophony resin

Grain handlers

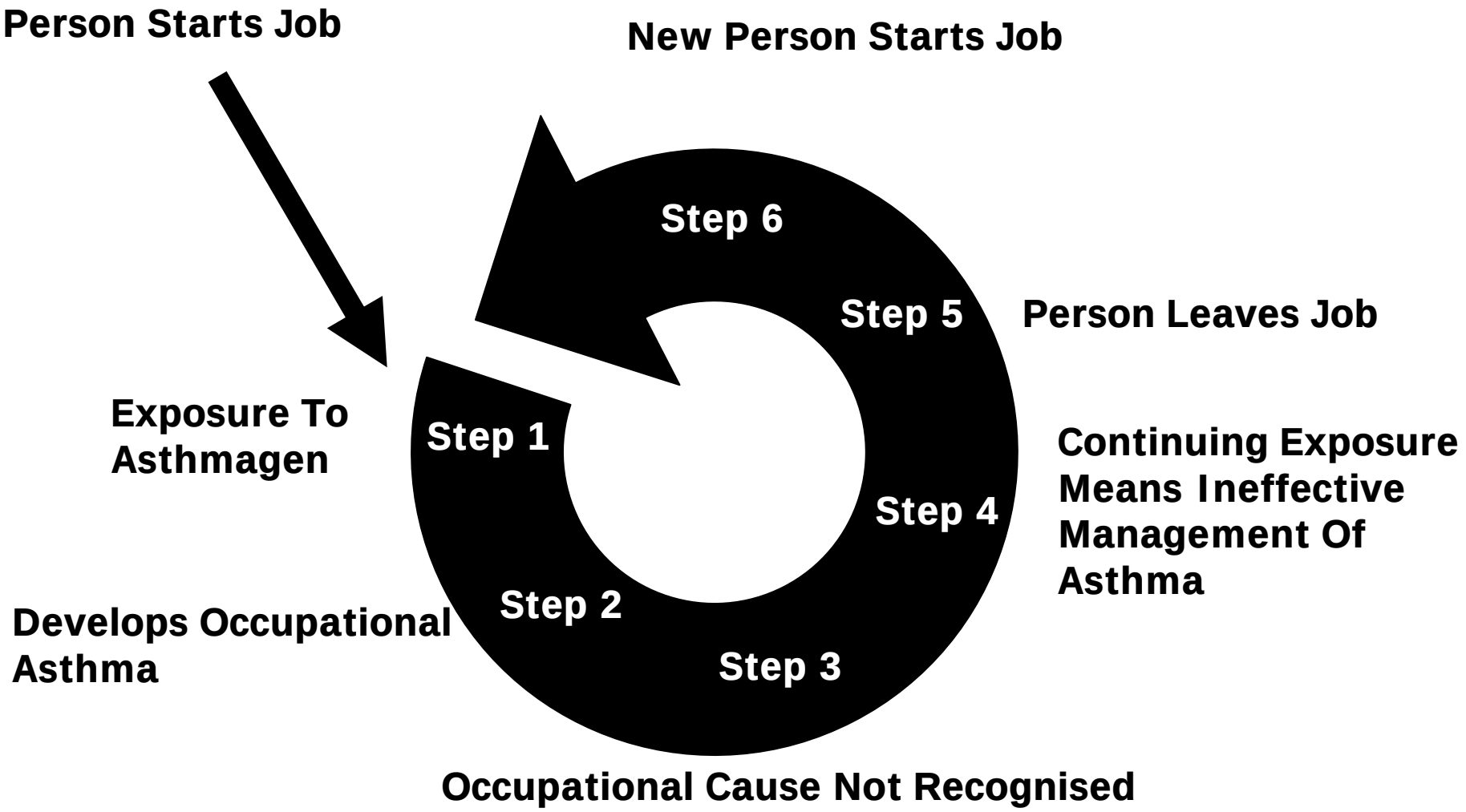
Major Agents causing occupational asthma

- Isocyanates - polyurethane foam, paints
- Pot room asthma - aluminium production
- Colophony resin - electronics industry
- Grain dust - farming
- Animal handlers - animal houses, laboratories
- Wood dusts - timber industry, construction
- Antibiotics and other drugs - pharmaceutical
- Enzymes - washing powder manufacture
- Glutaraldehyde - sterilising agent in hospitals
- etc……some hundreds across many industries

Impact on the individual

- Diagnosis of asthma may be missed
- If asthma diagnosed, occupational aspect often missed
- Therefore, treatment may be ineffective
- Continued exposure leads to worsening of symptoms
- Usually results in removal from exposure & job change
- Many are highly skilled and retraining needed
- Often reduction in income and job satisfaction
- Barriers to a successful compensation claim:
  - Diagnosis not definitive
  - Relationship to work difficult to prove, lag period from first exposure, initial symptoms at night

Cycle of exposure/occ asthma



How Common Is Occupational Asthma?

- Poor quality data sources in most countries
- Workers' compensation data seriously underestimate the extent of Occupational Asthma
- Estimated at 9-15% of all adult asthma (Blanc & Toren 1999)
- Australian Institute of Health and Welfare report (2008) estimates between 1,000-3,000 new cases per year in Australia
- Best estimates of incidence from surveillance programs involving doctor notifications

Occupational lung Disease Surveillance Programs

- Data collected by physician notifications
- SWORD in the UK – almost 20 years of data
- Finnish program
- PROPULSE in Quebec, Canada
- State-based schemes in the USA
- SORDSA in South Africa
- Acknowledged limitations in such schemes

SABRE Project in Australia

Surveillance of
Australian
workplace-**B**ased
Respiratory
Events

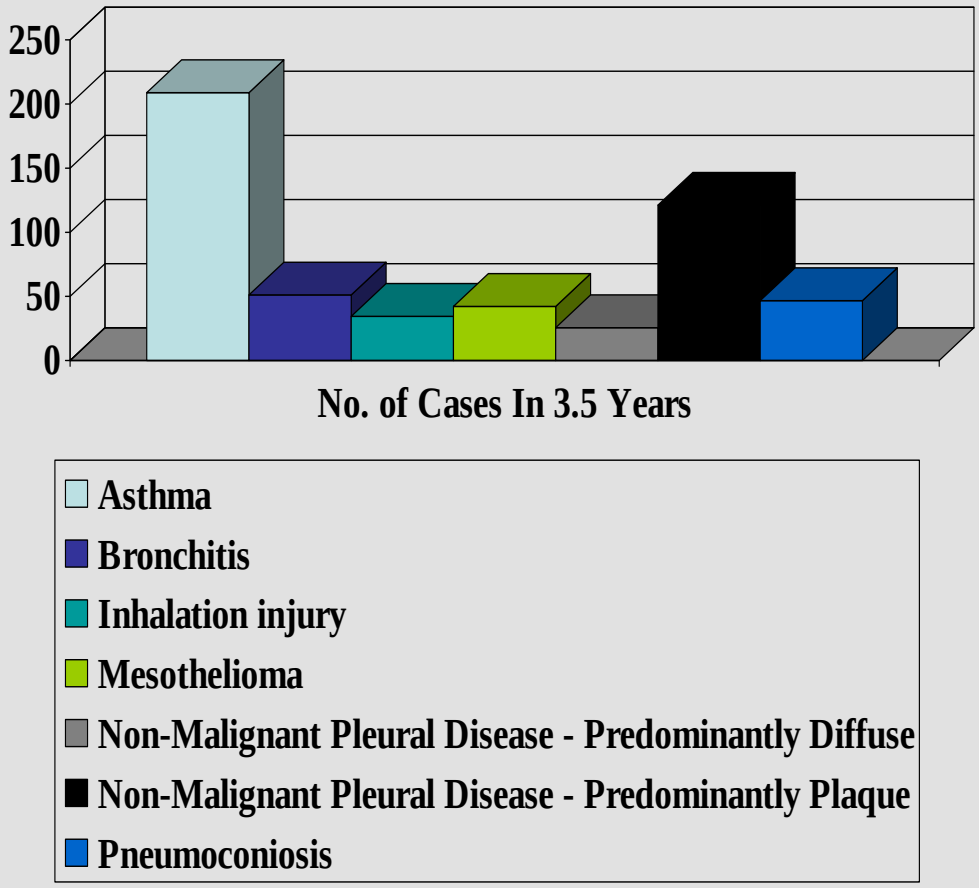
OBJECTIVES OF SABRE

- Collect notifications of cases and the causal agents of work related respiratory disease and inhalational injury in Victoria, Tasmania & NSW
- Determine frequency of these conditions and to look at patterns in time and place
- Identify causal agents, both previously known and newly suspected
- Feasibility of a national notification scheme

METHODS

- Occupational and Respiratory Physicians recruited via two professional societies
- Participating Physicians asked to return a notification form every month, whether they had seen case(s) or not
- Information on diagnosis, likely cause, age, gender, smoking status, job, etc

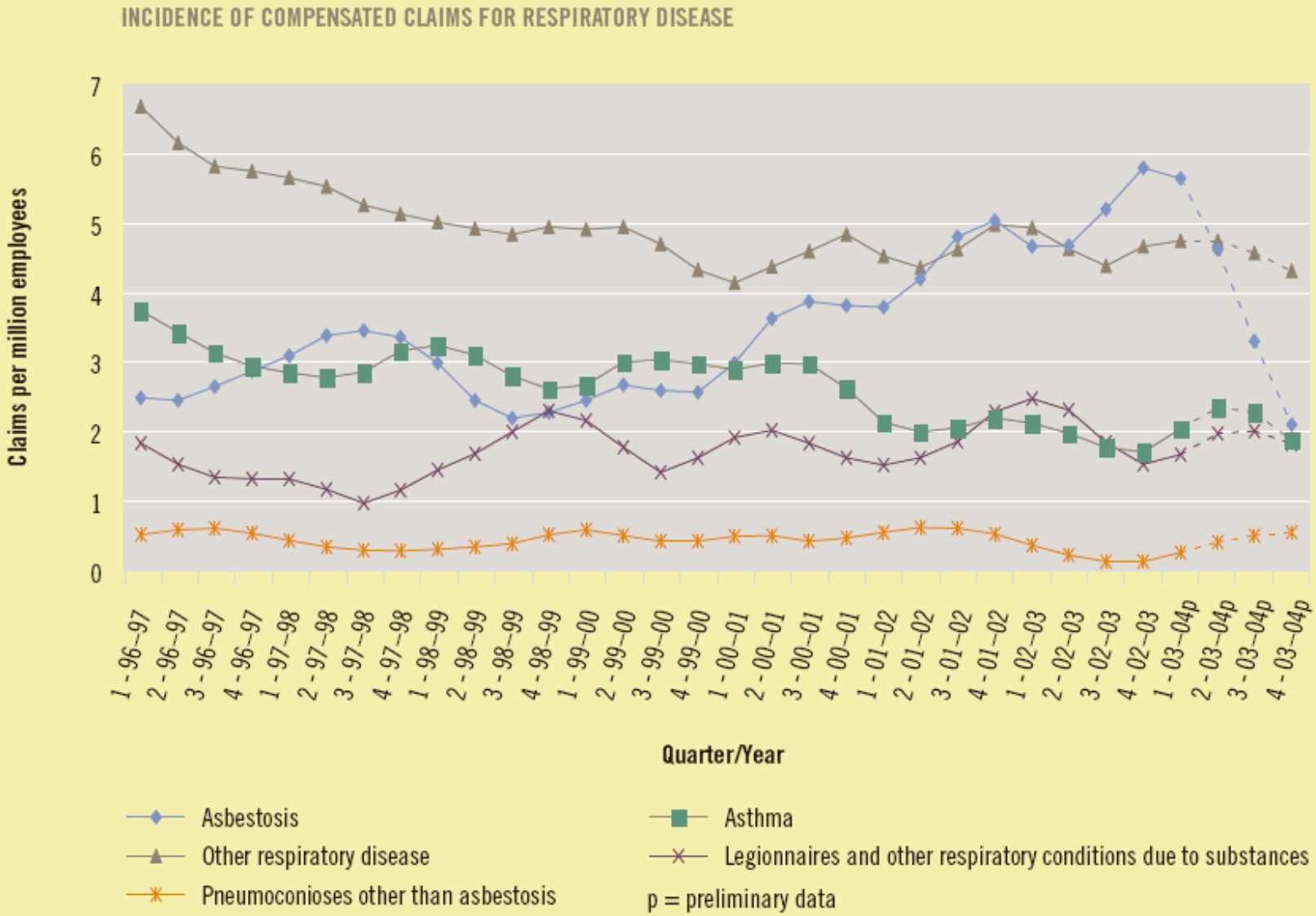
Male SABRE Notifications Victoria 1998-2001 (Elder et al *Occ Med* 2004; 54: 395-399)



Incidence rates of occ asthma for different countries

Scheme	Rate/Million Workers/Year
SABRE	**31**
SWORD	**37**
SHIELD	**43**
PROPULSE	**79 (males only)**
FINLAND	**153**

Figure 10: Respiratory Diseases (Details of specific indicators)



Incidence rates of occ asthma for different countries

Scheme	Rate/Million Workers/Year
SABRE	**31**
Aust workers' comp	**8**
SWORD	**37**
SHIELD	**43**
PROPULSE	**79 (males only)**
FINLAND	**153**

Economic burden occupational asthma

- At individual level, about a 50% reduction in income (Gannon et al, 1993)
- At population level, difficult to estimate due to incomplete and poor quality data inputs
- Population economic burden estimates need to include costs of retraining, health care usage, compensation costs, loss of productivity, disability measures (DALYs), etc
- Estimated cost in the USA US$1.6 billion per year (Leigh et al, 2002)
- Our estimate in 2005 $17 million per year in Vic

Prevention measures occupational asthma

- Better workplace information. 50% of a sample of asthmagen Material Safety Data Sheets didn't mention Occ Asthma (Frazier et al 2001)
- Keep workplace exposures below accepted occupational exposure limits
  - challenge due to large number of industries/jobs for occ asthma
- Recent paper (Quint et al, 2008) found major problems with consistent regulatory response to Occ Asthma prevention in the US. No OELs for many asthmagens in many states of the US.

Occupational exposure limits (OELs) for workplace chemicals in Asia Pacific

Hazard	% Countries with an OEL	Range of OELs
Asbestos Chrysotile Crocidolite	 **87%** **87%**	 **0.1-5 fibres/ml** **0.1-5 fibres/ml**
Crystalline Silica	**67%**	**0.1-10mg/m^3**

Other emerging areas

- Chronic Obstructive Pulmonary Disease (COPD) – fixed airflow obstruction
  - Chronic bronchitis
  - Emphysema
  - Bronchiolitis
  - Chronic asthma
- Smoking greatest contributor, but impact reducing as smoking rates decline
- Many known occupational causes, but impact underestimated and newer exposures, eg biological dusts (Matheson et al. Chronic Obstructive Pulmonary Disease and biological dust exposure. *Thorax* 2005; 60: 645-651.)
- Emerging technologies – nanoparticles?


SURVEILLANCE OF
OCCUPATIONAL DISEASE
AND INJURY

Notifiable Occupational Disease System

- Voluntary reporting scheme whereby health professionals and other individuals can notify a health-related condition that is suspected to arise from work.
- Notification card implicitly restricts data collection to those occupational diseases included in the legislative definition of “serious harm”
- Anybody can make a notification.
- NODS currently has low potential to contribute to the surveillance of occupational disease. Key problems include:
  - **poor diagnosis and under-reporting of occupational diseases to DoL**
  - **a system design that does not lend itself well to the aggregation of data for surveillance purposes**
  - **a low state of readiness of the data for integration with other data sets**
  - **work practices that are intended to support efficient investigations and are not always consistent with the recording of high-quality surveillance data.**
  - **NODS notifications tend to contribute to the prevention of the recurrence of harm through the identification of individual cases rather than aggregated data.**