

Respiratory Hazards and the role of Occupational Health



Respiratory Hazards and the role of Occupational Health

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December 2nd 2009

Occupational Lung Disease

- Asthma
- Extrinsic Allergic Alveolitis
- COPD (Chronic Obstructive Pulmonary Disease)
- Occupational lung cancer
- Bronchiolitis Obliterans
- Occupational affects on the lung lining (Pleura)

CRITICAL INTERVENTION!!!!

- Eliminate
- Reduce
- Control
- Educate
- Supervise
- Design it out
- Health Surveillance
- PPE

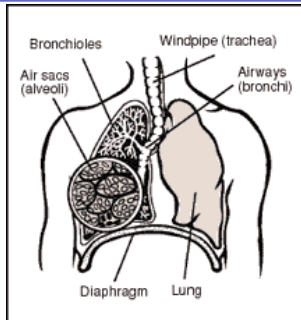
H&S & Occupational Hygiene

Core Control lies with you and the employer

Exposure

- The lungs and skin (including nose and eyes) are the organs of first contact for most environmental exposures
- The lungs are a wet surface and are critical to external respiration and cellular function.
- The wetness of the surface is designed to catch foreign bodies and the cilia (fine undulating hairs) move debris up to be coughed out of the lungs

The Lungs



Causes

- Vapours
- Fumes
- Dusts
- Fibres
- Chemicals
- Any organic substance

Irritants

Damage can be rapidly fatal ie chlorine & Hydrogen Sulphide - as the wet surface allows rapid absorption of poisons and the alveolar cells are very thin and any swelling interferes with gas exchange

Allergens

Any organic substance!

Asthma

Work Aggravated (WAA)

Occupational (OA)

Work Aggravated ASTHMA

Pre-existing condition which is made worse by occupational exposures to irritants or allergens:

- Refuse Operatives
- Cleaners
- Police Officers
- Health Care Staff
- Sewage Workers
- Bakers etc etc

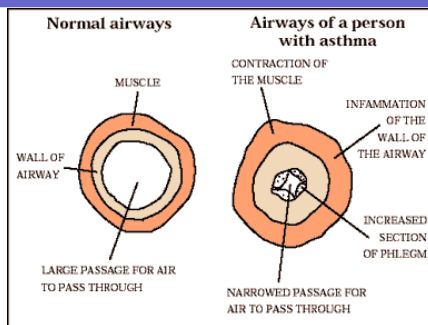
Asthma - Prevalence

- 1 in 10 new cases in population may be work related
- 5 million suffers in UK
- Common onset any age but mainly in children
- Sensitive hyper responsive bronchioles which spasm in response to:

What Causes the Hyper response

- Exercise – particularly in cold air
- Irritants – tobacco smoke, fumes, dust
- Emotion – anger, anxiety, happiness!!
- Allergens – House dust mite, cat dander, pollens
- Pollution – diesel fumes
- Medications – Ibuprofen, aspirin, beta blockers
some eye drops
- Upper Respiratory Tract Infections (URTI)

The Airways



Occupational Asthma

- No Previous history of asthma
- Gets better on Holiday or away from work
- Gets worse over working week
- There is something to be exposed to!
- Irritant acute response, allergen latency over many years

The level of exposure reflects the level of risk

Asthma - Symptoms

Both WAA and OA have similar symptoms:

- Reduced expiratory air flow
- Shortness of breath
- Wheezing
- Tight feeling in chest
- Often worse at night
- Runny nose
- Inflamed eyes

At Risk Occupations

- Food Processing – Bakers, Flavourings
- Electronics - Soldering Flux
- Paint spraying & Plastics
- Natural latex Rubber
- Wood Dusts, Forestry Workers, farm workers
- Welders, metal workers
- Cleaners, dental workers, waiters, nurses
- Etc etc etc

OA Prevention

Design out, eliminate etc
 Pre employment evaluation (crucial)
 Health Surveillance –
 The most sensitive tools are:
Questionnaires
Lung Function testing
Serial peak flow measurement

Diagnosis - Investigate

Proper diagnosis – Serial Peak Flow
 History
 Skin prick testing
 Challenge testing

Respiratory Physicians

Royal Brompton

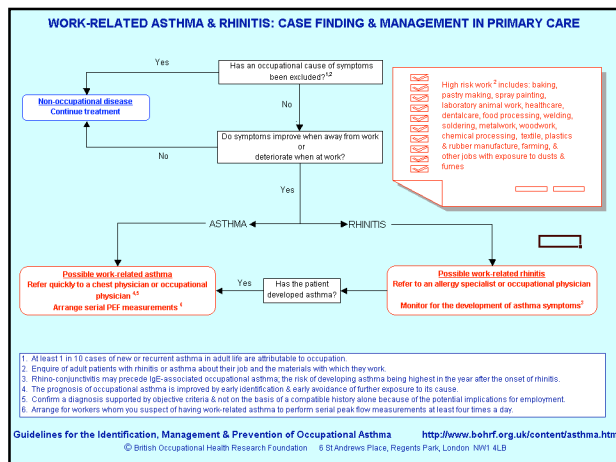
Occupational Asthma Outcomes

The damage can be controlled in some people with treatment and if caught early

Remove from substance and attempt to redeploy – 1 third remain unemployed after 6 years

Disability Discrimination Act will apply

RIDDOR reportable



Extrinsic Allergic Alveolitis (EAA)

EAA is caused by exposure to a very large variety of substances including certain animal or vegetable dusts over varying lengths of time – anything from weeks to years.

EAA The Source

These dusts are a complicated mixture of substances often containing allergy-causing micro-organisms (tiny living particles). These dusts can be from:

Husks, bark, wood, mouldy hay, straw and sugar cane, straw, grain insects and insect fragments, birds, dried urine of rodents, animal dander (old skin scales that are constantly shed) mushroom compost, metal working fluids, certain drugs, bacteria fungi.

Micro-organisms also produce toxic chemicals that form part of the dust.

EEA Symptoms

Acute
Sub-acute
Chronic

EEA Symptoms

<u>Initial</u>	<u>Ongoing</u>
Cough	Breathlessness
Shortness of breath	Occasional Fever
Sweating	Loss of Weight
Nausea	Fatigue
Headache	permanent damage
Sore throat	DEATH

EEA Management

Monitor for occurrence
Investigate causes
Diagnose condition
Remove employee from exposure
Reassess control hierarchy

IF caught early can be successfully treated

Chronic Obstructive Pulmonary Disease - COPD

Also known as: CorPulmonale
COAD

A collection of conditions:

- Chronic Bronchitis
- Emphysema

Chronic Obstructive Pulmonary Disease - COPD

Chronic bronchitis: Long term inflammation of the airways increasing mucus production and leading to long term *chronic cough*.

Emphysema: Small alveoli lose their elasticity, coalesce and reduce the surface area for oxygen exchange. Airways become narrow and carry less $O^2 =$ *breathlessness*

COPD Symptoms

Gradual onset of increased coughing and mucus production – productive cough

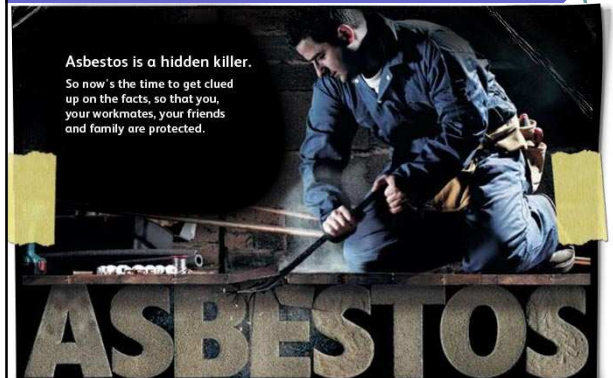
Gradual onset of increasing shortness of breath (Dyspnoea)

May see increase in short term sickness absence due to upper respiratory tract infections

Chronic Obstructive Pulmonary Disease - COPD

Main cause
SMOKING
&
Coal Dust
Pollution may be a factor

HSE Campaign - 20 deaths per week



Asbestos

Conditions:

- Asbestosis Fibrosis in the lungs
- Pleural Plaques Fibrosis on the membrane covering the lungs (Pleura)
- Mesothelioma Cancer in pleura and peritoneum
- Lung cancer

Smoking increases risk +++

What is the Cause

Individual Susceptibility (Unknown determinants)

Exposure to asbestos fibres

SMOKING increases risk +++

IGNORANCE

Guidance Note MS 13

Appointed Medical advisor and Health Surveillance

Chest X-rays increase risks of lung cancer and are of limited value in surveillance.

Every 2 years whilst employed looking at symptoms on questionnaire and FEV1 FVC.

Main Indicators are medical history and symptoms

Inorganic Dusts

The risk is dust triggering an immune response in the lungs leading to massive fibrosis (scarring) that obliterates the bronchioles and alveoli

It is an obstructive condition with symptoms similar to EAA but can take decades to present with symptoms

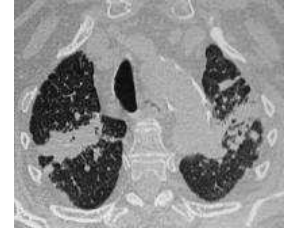
Coal Miners Lung (Pneumoconiosis)

Increasing loss of lung function with cardiac effects as blood flow meets increasing resistance and poor O₂ exchange with increasing dyspnoea



Silicosis

At risk Occupations:
Any one working with soils, cement, stone.
Hawks Nest Tunnel in Virginia in 1930's is estimated to have killed up to 1000 men



Silicosis - At Risk Occupations

- Road Workers, Sand blasting,
- Quarrying
- Working slate
- Masons
- Pottery
- Brick work
- Moulders & Fettlers

Inorganic Dusts – Health Surveillance

Exclusion of workers with previous chest complaints _ TB particular risk

5 yearly chest X-ray

Annual LFT's

Much less prevalent than OA

Bronchiolitis Obliterans

Severe restriction of airways caused by inflammatory response in Bronchioles to infection, fumes, similar to OA (and for many unknown reasons) that leads to scarring and irrevocable damage to airways.

Lung transplant can be only treatment

Symptoms

Intermittent shortness of breath

Wheezing

Non-productive cough

Restricted FEV₁

Improves away from work

Similar to OA - differential diagnosis based on irreversibility and lung testing by specialist centres

Occupational Hazards R42

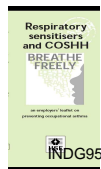
Diacetyl, Sulphur dioxide, Nitrogen Dioxide, Ammonia, Chlorine, Thionyl chloride, methyl Isocyanates, Hydrogen Fluoride, Hydrogen bromide, Hydrogen sulphide, Phosgene, Polyamide-amine dyes, mustard gas, Ozone

Long Term Impact of uncontrolled Occupational Respiratory Disease

Permanent disability
Loss of employment
Economic impact on employer
Cost to Society
Early Death and Disability

Information for employers

G402 Guidance note on Health Surveillance
G401 Guidance Note on COPD
G404 Guidance note on Inorganic Dusts
INDG95 Advice for employers



Health Surveillance

Dependent on exposures
PPE maybe inadequate
Behavioural issues
Is what we are monitoring for an identifiable disease
Can it be improved.
Who does it

Pre employment

Applicants with existing respiratory disorders **MAY** be more susceptible to work exposures
CANNOT discriminate as Disability Discrimination Act 1995 amended 2005 may apply
Careful objective evidence needed!!

Pre employment

ANY evidence of previous respiratory disease **MUST** be evaluated

- Medical history - possible GP report
- Questionnaire – detailed
- Lung Function testing (LFT)
- Refer to Brompton for advice and assessment
- Previous attendance ?? URTI

Pre employment

- This is the first risk assessment
- An opportunity for a tool box talk
- Make the Applicant aware of the potential hazards of the job – some will self select themselves out of the job

Pre employment

If the Brompton advises to/not to employ it remains the employers decision as whether they will employ the applicant

Initial health Surveillance

- Ideally before exposure, at 6 weeks, 3 months later, 6 months then annually subject to exposure
- Questionnaire - initial then use repeat
- LFT's
- At the very least FEV₁
- Preferably FVC and PEF

Who should do this

HSE recommends OH are involved
You can use only a questionnaire where controls are good with a suitably trained person to check them (same timescales)
Brompton advises initial minimum is LFT's to gain a baseline

Questionnaire only??

This is an option and is better than doing nothing.
A well educated work force that is willing to report symptoms with annual questionnaire to remind them of these
Problem – failure to self report to keep job
Reasonable fear given consequences!!

What are the LFT's

FEV₁ - Forced Expiratory Volume - the amount of air that is expired in the first second of a FORCED exhalation
FVC - The amount of air expired in total during a forced expiration until all air is expired
FEV₁/FVC – the ratio between the FEV₁ and the total Forced Vital Capacity (FVC)
PEF – the speed in litres that the person reaches on forced expiration

LFT's and Asthma

Clinical History
Questionnaire
Spirometry - $FEV_1 <$, $FVC <$, FEV_1/FVC normal
Serial Peak Flows if concerned – detects bronchial hyper responsiveness and can identify cause. Need at least 4 readings per day over 1 month
If OA suspected -
Refer to Brompton or OHP or Chest Physician

LFT's and COPD

Difficult to separate work related from smoking
Spirometry changes over time crucial information

$FEV_1 <$
 $FVC <$ if air trapping
 $FEV_1/FVC <$

Referral to GP for initial management/diagnosis

LFT's and Asbestos

Medical examination every 2 years by Appointed Physician:

- History & Examination
- Questionnaire
- LFT's
- Chest X-Ray if clinical concerns only
- Required only whilst employed

Case Studies

Popcorn Workers Lung – Bronchiolitis Obliterans

The use of butter flavours containing Diacetyl led to employees with lung function reduced to 16% to 21% - **normal begins at 75%**
One employee was 25 another 40
Neither smoked
Symptoms did vary with work exposures
Gradual onset over years

Prevention?

No health surveillance in place
All other producers in California and across US did not monitor employees and further cases were found once programme began
Inadequate controls
No face fit assessments of respirators
Some using paper masks

Symptoms

These had been present for years with increasingly restricted exercise tolerance and the death of one man due to respiratory failure after retirement.

Consumers may also be at risk due to reheating of pop corn.

Diacetyl use ceased 2002

1 employee dies 3 severely impaired

Colophony

Young woman in electrical company

Soldering over several years

Sudden onset of respiratory symptoms at night after day at work A&E oral steroids

Diagnosed with asthma

Another night attack

Collapsed at work adrenaline needed, A&E oral steroids

Colophony

No LEV

Total room extraction filters had not been changed and ineffective

No education re risks

No health surveillance

Colophony

Referred to Royal Brompton in 2007

No allergy tests available for Colophony

OA diagnosed based on history - employee choose not to work in industry again but remains disabled – advised re industrial injuries benefits

Needs Analysis & the role of OH Pharmaceutical Company

Provider had not worked with company to advise on exposures, no H&S on site

Employees reported to be leaving due to skin and breathing problems

High staff turnover

Multiple drugs being manufactured for hospitals

Pharma

No LEV and using hand mixers to mix product –powders/liquids

Carcinogens where prepared in fume cabinets

Paper masks used to avoid contamination of product not to protect employees

NO health surveillance not even aware required in spite of OH going in for 3 years one day a week!!

Outcome

Eventually persuaded factory manager to stop drug testing and start health surveillance for respiratory irritants and allergens.

H&S officer employed on contract basis – excellent advice and began risk management training

CRITICAL INTERVENTION!!!!

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- Reduce
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Links

<http://www.ers-education.org/pages/default.aspx?id=1386>

Paper: Clinical Usefulness of Spirometric Information

<http://www.bohrf.org.uk/>

BOHRF British Occupational Health Research Foundation

<http://www.cdc.gov/niosh/topics/flavorings/>

Centre for Disease Control (US) Popcorn Lung

<http://www.brit-thoracic.org.uk/>

British Thoracic Society

<http://www.ers-education.org/pages/default.aspx?id=725>

European Respiratory Society

Links

<http://www.lungsatwork.org.uk/>

Brompton contacts

Questions

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