DIFFICULTY OF ASSESSING BIOLOGICAL RISKS IN THE WORKPLACE

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The health burden of exposure to biological agents – UK data

• HSE estimates that each year between 1,500 and 3,000 people in Great Britain develop occupational asthma.
• This rises to 7,000 cases a year if you include asthma made worse by work (work related asthma).
• The cost to society is estimated to be up to £1.1 billion over 10 years.
• Exposure to biological agents forms a component (examples later).
• Around 2000 recognised and reported new cases of occupationally related infections per year.
The level of public understanding of exposure to biological agents?

• Many people will know that we are constantly exposed to micro-organisms, but that mostly they do us no harm.

• Most people understand the need to use measures to protect themselves from harmful exposure, e.g., food hygiene.
The level of understanding of workplace exposure to biological agents?

- When biological agents form part of the work process, for example:
  - in laboratory & biotechnology 😊
  - in composting 😞

- When handling contaminants, for example:
  - healthcare waste 😊
  - mouldy material 😞
  - bacteria in process waters 😞

- Incidental contamination, for example:
  - air conditioning 😞
Routes of exposure to biological agents

Person to person
Via aerosols
Via food or water
Contaminated objects or soil
Via insect or animal vectors

Inhalation
Ingestion
Through cuts or damaged skin
Sexual transmission
Directive 2000/54/EC as translated into UK legislation

- Control of Substances Hazardous to Health (COSHH) – biological agents are considered to be ‘substances’.
- Under COSHH, employers are obliged to:
  - Assess workers’ risk to health;
  - Implement proportionate and adequate controls;
  - Make sure the controls are working and are used;
  - Inform and train workers.

- Generic guidance to specific infectious agent guidance
Laboratory work with biological agents

- High levels of awareness, also specific and detailed guidance.
Biological agent exposure in healthcare

• High levels of awareness, but also high risk procedures; issues include:
  – Needlestick injury and blood borne virus risk;
  – Clinical waste handling;
  – TB;
  – Potentially, pandemic influenza.
Lower levels of awareness of risks of exposure to biological agents?

- Exposure to allergens, toxins and pathogens including zoonoses in agriculture, waste processing.
Lower levels of awareness of risks of exposure to biological agents?

- Exposure to allergens, toxins and pathogens as contaminants in industrial process waters.
- Recent example in UK – allergic alveolitis and asthma at Powertrain engineering plant.
Potential consequence of poor awareness – workplace effect on public health

- Despite comprehensive guidance on the risks of Legionnaires Disease.

- August 2002 – 7 members of public died, 180 made ill.

- Hot weather in UK 2006 – large increase in cases of LD. Future trend?
Bioterrorism risk in the workplace

- Anthrax contaminated mail.
- Postal workers exposed and infected.
- Awareness raised and contingencies in place:
  - Postal services,
  - Emergency services.
Measurement of biological agents in the workplace - methods

• Sampling bulk work materials (solids, liquids) – representative ‘grab’ samples.

• Collection and measurement of surface contamination – swabs or wipes of representative areas.

• Sampling and measurement of airborne contamination (bioaerosols) – probably the most important route of exposure in the general workplace.
Measurement of biological agents in the workplace – the challenge

What to measure and when to measure. For example:

- Ensuring measurements are representative of workplace conditions.

- Covering infrequent work activities – e.g., seasonal.

- Covering worst case high exposure activities, e.g., maintenance work.
Measurement of biological agents in the workplace

• Estimating inhalation exposure:
  – Several methods used;
  – No single ‘standard’ method;
  – Different sampling principles;
  – Fixed point vs. personal;
  – Short samples vs. longer work shift samples.
Standardisation of bioaerosol measurement

• Work by CEN Technical Committee 137 Working Group 5 – Biological Agents.
• Produced EN standards to specify the principles and requirements of sampling – not one single method.
• Should future initiatives take this further?
Detection of biological agents in workplace samples

- **Culture based:**
  - Conventional, cheap;
  - Colony counts;
  - Identification;
  - Under-represents total burden of exposure to immuno/toxic challenge.

- **Direct counting:**
  - All cells irrespective of culture;
  - Labour intensive;
  - Expensive equipment.

- **Detection of other biological markers:**
  - e.g., endotoxins, glucans, proteins;
  - Health based relevance;
  - Greater possibility of dose-response → OEL?

- **Molecular:**
  - Specific agent detection;
  - Rapid;
  - Quantifiable?
  - Expensive?
  - Able to detect full range?
  - Potential for development.
Attitudes in the general workplace

• Lack of awareness does not always equate to complacency or lack of care.

• Raising of awareness usually leads to genuine concern and a desire to do the right thing to protect workers, but also leads to questions such as:
  – Am I doing enough?
  – How much is enough?
  – How do I assess the risk?
  – What controls are adequate and proportionate to risk?
  – How can I validate controls?
  – If I’m not sure, how do I raise awareness or train staff?
Conclusions – the way forward?

• There is a clear need to protect workers from potentially harmful exposure to biological agents.

• This is hindered by lack of awareness in some sectors and for some biological hazards. The way forward – more awareness raising……..proportionate to risk.

• The lack of occupational exposure limits hinders employers’ ability to assess risk and apply controls in context..........but how feasible is it to set OELs?

• The way forward - developing simplified exposure assessment tools and linking these with health assessments.