



Professor Sherwood Burge, Heart of England NHS

Managing a Workforce Exposed to a Respiratory Sensitiser

Professor Burge, is a NHS Chest Physician at the Birmingham Chest Clinic and migrated to Birmingham in 1980. He was interested in people who have been made ill by work and so set up a unit to look at lung disease, specifically asthma and asbestosis which make up 80% of lung problems.

Professor Burge clarified that Occupational Health is not the responsibility of the NHS. However, Occupational Disease is part of the NHS and is available to help those people who have been failed by Occupational Health (ie those who fail surveillance). The service the Chest Clinic provides is at no cost to the employer. The focus of the presentation would be on the failures of Occupational Health and Professor Burge explained that he would be discussing in some detail, the key triggers of occupational asthma.

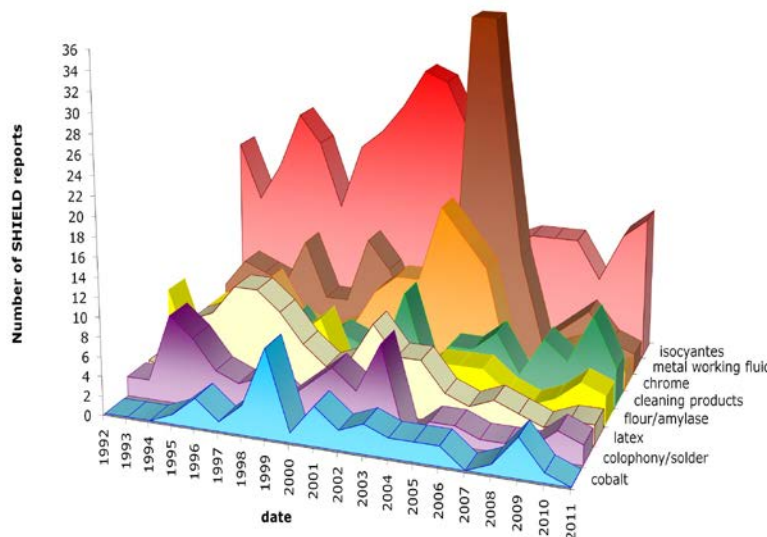
Guidelines

There is a plethora of regularly updated asthma guidelines, which are evidence based and all fairly consistent. One example quoted is the British Occupational Research Foundation (BOHRF), which has recently published guidance on occupational asthma in partnership with the HSE and the TUC (see HSE website www.hse.gov.uk).

Other guidance on asthma is SIGN/BTS Guidelines 2012. Occupational asthma may account for about 9-15% of adult onset asthma. It is now the commonest industrial lung disease in the developed world with over 400 reported causes. Non-work related asthma brought on by allergy is often as a result of exposure as a child. It can also be triggered by drugs such as aspirin and beta blockers, an inhalation accident or a major flu-type illness.

Typical Sensitisers

People seen by the Chest Clinic in Birmingham are included in a database, broken down by category. This slide shows evidence up to 2011 for each category.



Isocyanates (red on the chart) top the list in Europe and the UK and are present in many different forms. They are what polyurethanes consist of and are in spray paints, foams, surface coatings, adhesives etc. Isocyanates are the most likely cause of adult onset asthma in workers with isocyanate exposure.

Metalworking fluid (brown) as can be seen is a growing problem. It is now mostly

synthetic, water-based and causing more incidences of asthma than ever before. Sometimes it is due to the bugs that grow in the fluid, although biocides are there to control them. However, there is evidence that the biocides could be part of the problem. Sometimes the metals being worked, like cobalt and chrome, can be dissolved in it and this could be making things worse. There was a huge outbreak in Birmingham in 2004/2005 – 17 cases in one year. Nearly all cases were working to the exposure limits in place. At the moment there is no exposure limit.

Chrome (orange). There is a problem with stainless steel welding, paints and dyes and electroplating.

Cleaning Agents (green). Another growing area. More and more domestic and industrial cleaners in both the UK and Europe are developing asthma. The cause is not clear but is leading to more and more sensitisation. Cleaning agents are changing – they are now not only designed to clean but to sterilise and also to leave a residue, for instance on floors - which can then be scuffed up and particles released into the atmosphere. They also contain biocides which, again, could be part of the problem.

Flour and Amylase (yellow). Exposure is very difficult to control due to the nature of work within a bakery environment. Making enzymes into a liquid rather than a powder reduces the risk.

Latex (grey). Most of the problems from latex use are caused by the residue of powder left over from the manufacturing process which has not been washed off sufficiently. Often this has been as a result of making the gloves more cheaply.

Colophony/Solder (mauve) – within electronic soldering flux, and old-fashioned sticking plaster which caused dermatitis.

Cobalt (blue) – relatively rare and involved in the manufacture of metal.

Sensitisation

- ✚ If you expose workers to a sensitising agent, such as isocyanates, some of them will go on to be sensitised and develop occupational asthma.
- ✚ With higher exposures more people will be sensitised, but some will be sensitised well below the current exposure standards.
- ✚ Your risk assessment should have identified the risk of sensitisation.
- ✚ You should have respiratory surveillance in place where this is a risk; this is a clear requirement within HSE guidelines.
- ✚ You should have an agreed plan for managing workers who develop occupational asthma, which will more than likely mean cessation of the activity and therefore a change of job.

There will be people already diagnosed with asthma but not sensitised to substances in the workplace, eg latex, and therefore not prevented from working.

Case History 1

Professor Burge gave an example of a 28 year old man who had developed coughing and chest tightness for the last 9 months which improved on days off work. His GP diagnosed asthma. (All patients with airflow obstruction should be asked whether their symptoms improve on days off work or on holiday (BTS/SIGN asthma guidelines). Those that do improve should be investigated for occupational asthma; the diagnosis can be confirmed in around 50% of cases who do.)

The man is a fibreglass constructor and makes dormer windows. He has never smoked. His employment history included 1 year in a patisserie warehouse bagging flour, 3 years as a welder of mild steel and aluminium, fabrication and paint spraying, 6 years bricklaying and, since 2009, has been a dormer window fabricator where he is involved in painting and sanding. This last job is the only one which caused his symptoms. His breathing tests were normal.

What can the employer do next?

The choices for the employer are:

- believe the worker and relocate him/her away from the source of the problem (but where?)
- not believe him/her and leave them in the same job
- measure workplace exposures (but what?) and reassure the worker if levels are within the standards.

Often the standard response is to say that the problem has been caused by some non-work related exposure rather than to investigate it.

How can it be proved that it is occupational asthma?

If a person is likely to lose their job as a consequence of a diagnosis, proof will be required that the illness has been caused by workplace exposure. It is important to note that there are some people who will fail surveillance but not have asthma.

There are various monitoring methods but one not recommended is a pre and post shift assessment, as it is unlikely that occupational health workers would be working to the same shift patterns. Another method is to sample urine. This can reveal levels of exposure but not whether that exposure has caused a problem.

There is another method which involves measurements taken by the patient throughout the day over a period of several weeks using a portable electronic meter to record the flow of air. Meters can cost up to £2000, but basic models could be around £20. The normal pattern is that the problem is worse in the morning, reduces over the middle part of the day and then gets worse during the evening. What you are looking for is a consistent deterioration related to work. However, the readings for some people with occupational asthma can show an improvement whilst at work. For others there is a delayed reaction.

How to find the cause

Once there is a positive diagnosis of asthma and a clear correlation with work activity, the next step is to contact the patient's employer, with the patient's permission, to establish the cause.

In Case History 1, during a workplace visit various substances were identified as contributors: such as styrene in the fibreglass, methyl methacrylate within an adhesive, and a foaming process which may have been an isocyanate and if so would be the most likely cause of his occupational asthma.

Three methods of identifying the cause are:

- Specific IgE* to a well characterised antigen
- Specific Inhalation Challenge
- Trial of relocation and serial PEF** measurements

**IgE stands for immunoglobulin E, and is one of five types of immunoglobulins involved in immune sensitivity and response in humans.*

***Peak expiratory flow*

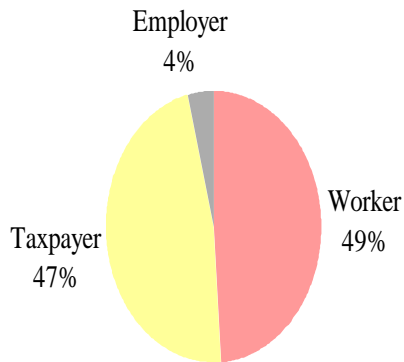
The man then underwent a series of tests whilst in hospital over a period of a week. The tests found very low levels of isocyanates. This raised a question from the audience: What about colleagues who are also being exposed to the risk? This is the point at which the employer will need to put surveillance in place to monitor exposure.

The testing process proved to be quite expensive as the income received to carry out the tests was £395 but the costs incurred were £3,258. Part of this cost was made up of £2,276 for a 4 night stay in hospital. However, Professor Burge believes it is indeed worth the expense as the knowledge gained from carrying out the tests and in finding the cause has saved the nation a considerable amount of money in the longer term - particularly as the lifetime costs of one person's exposure can be around £250,000.

Following national guidelines a letter was then written to the patient to explain the findings and provide advice.

Another letter was sent to the employer pointing out his responsibilities regarding

Lifetime costs of occupational asthma in the UK £72-100,000,000



Ayres JG, Thorax 2011; 66:128

restricting the employee's exposure to isocyanates and the requirement to report the matter under RIDDOR.

From Ayres Thorax 2011;66:128.

- Direct costs include medical care and industrial injuries benefit.
- Indirect costs assume 25% stay in same job with 30% losing 20% income
- 25% change jobs with same employer; 20% losing 20% income
- 15% change employer; 85% losing 50% income (including periods of unemployment)
- 15% retire
- 20% remain unemployed
- 2012 prices assuming retirement age 67

Audit standard; BTS standards of care for occupational asthma Thorax, 2008; 63: 240

All patients with suspected occupational asthma should have the following clearly documented in the medical case notes by the second consultation:

- A full list of occupations held and likely associated occupational exposures.
- FEV₁ and FVC.
- If at work, serial PEF measures taken for at least four continuous weeks including rest days with at least four good quality readings per day analysed by a validated method.
- If exposed to allergen with appropriate specific IgE measure or skin prick test, the result of this test.
- **Letter to patient** concerning advice about continuing employment once a diagnosis has been made.
- Compensation advice appropriate to the case.

A good outcome requires a specific diagnosis and a co-operative employer. This man was transferred to another building where porches and canopies were made using identical methods but without insulation. His work-related symptoms stopped, although he continued to wheeze and have respiratory infections.

Case History 2

This person did not have such a successful outcome. He was a foreman in a company manufacturing printed circuit boards. He developed asthma requiring several periods off work and stays in hospital. Analysis showed clear correlation with work activity as there was improvement away from work. He was sensitised to isocyanates and his symptoms occurred when either he was soldering or was in the presence of others doing soldering work.

The employer would not permit the Professor in to the premises and an HSE Improvement Notice was then issued but, whilst pointing out various failures, no mention was made that the company should be doing surveillance. Nor had the patient's asthma been RIDDOR reported. Following testing it was clear that isocyanates were causing the symptoms, although colophony was also a trigger. Following a visit from the Factory Inspector the isocyanate process was closed

down and a half face mask was provided to the employee, although with a dust filter rather than a carbon filter. His condition continued to deteriorate. He has since been sacked and is now depressed and unhappy about how he has been managed by his employers. He now has very bad asthma which he has had over the last two years, all because matters were not dealt with effectively whilst he was at work.

Employers and their health and safety personnel should:

- **provide regular health surveillance** where a risk of occupational asthma is identified, to include a respiratory questionnaire with functional and immunological tests where appropriate.
- **assess exposure** in the workplace and enquire of relevant symptoms among the workforce when a worker develops symptoms suggestive of rhinitis or asthma, to identify opportunities to institute remedial measures to protect other workers.
- ensure that measures are taken to ensure that workers diagnosed as having occupational asthma **avoid further exposure** to its cause in the workplace.

What this NHS service offers you

- Support for you and your patients for the diagnosis of occupational asthma via the website www.occupationalasthma.com .
- A specialist NHS service for workers with possible occupational lung diseases at the Birmingham Chest Clinic.

Conclusions

- Workers with possible occupational asthma are the responsibility of the NHS and warrant specialist referral.
- Isocyanate exposure will continue to cause occupational asthma at levels well below exposure standards.
- Reducing the numbers incidentally exposed will reduce the incidence of isocyanate asthma and allow relocation of sensitised workers.
- Occupational asthma can stop you working, even as a hygienist, doctor or nurse.
- Occupational asthma can close workplaces.

See BHSEA website on www.bhsea.org.uk for full details of this presentation.

Members' Questions

- **George Allcock** commented on whether it would be reasonable to include a question as part of health surveillance, about hobbies and interests which might cause respiratory sensitisation. Professor Burge said this was a good point. The peak flow record will show whether the sensitisation is occurring at home because the results there will be worse than at work. He went on to list some of the animals (often pets) which are known to have caused sensitisation such as rats, mice and horses.
- **Mark Hoare**, University of Birmingham, was puzzled as to why one person becomes sensitised but not another? Professor Burge mentioned in his reply atopic and non-atopic people. Atopic people are those with a genetic predisposition (or hereditary) to become sensitised.

- **Ed Friend** (ex HSE Inspector), commented that in his experience health surveillance can only go so far and it is vitally important to also ensure that work equipment is properly and regularly maintained, air filters are changed at the correct intervals etc, to further protect workers. Professor Burge agreed.

George thanked Professor Burge for his excellent, most entertaining and stimulating talk.