

Innovation in the secondary respiratory care setting in the lung function laboratory

Winner Occupational Lung Disease Team, Birmingham Heartlands Hospital

Confirmation of occupational asthma in the lung function laboratory

The Occupational Lung Disease team: Clinical Scientists and physiologists; Vicky Moore, Sarah Manney. Computer scientist; Cedd Burge. Consultant Physicians; Professor Sherwood Burge, Dr Alastair Robertson, Dr Maritta Jaakkola, Dr Charles Pantin; Research Registrar; Dr Arun Dev Vellore.

Our Location: Occupational Lung Disease laboratory, Birmingham Heartlands Hospital, Birmingham, B9 5SS.

Details of the innovation we have developed

We have developed a method for the objective confirmation of occupational asthma which is suitable for implementation in all lung function and occupational health departments. It has been provided free of charge to 351 users worldwide and is supported by our website www.occupationalasthma.com. The method is called Oasys (1) and analyses 2-hourly measurements of PEF at home and at work. It has an independently validated sensitivity of 78% and specificity of 92% (2), better than any other independently validated test for occupational asthma.

Why we developed the service – what was the problem we were seeking to solve?

Occupational asthma is the commonest lung disease caused by current occupational exposures and stops skilled people working mid-career. The Health and Safety Executive estimate the cost to the UK economy at £1.1 billion over the next 10 years. About 15% of adult onset asthma is caused by exposures at work. Affected workers often lose their jobs and livelihood without a confirmed diagnosis, which is likely to be incorrect in around 45% based on history alone. The diagnosis of occupational asthma is difficult and previously beyond the resources of most lung function and occupational health departments. A recent survey showed that only 15% of departments were able to offer diagnostic tests complying with the new BTS standards of care for occupational asthma (3) (based on the evidence-based BOHRF guidelines (4)).

How did we develop the innovation?

The process started when the Wright peak flow meter was the only portable method for measuring lung function. We started by measuring hourly PEF in workers who had specific inhalation tests in the laboratory to see if similar reactions were identifiable with real life exposures in the workplace. The results of individual days measurements were more variable in the field than in the laboratory, necessitating measurements over numbers of days to reduce noise due to environmental and measurement factors. Plotting the “daily” maximum, mean and minimum PEF (with a “day” starting with the first reading at work and stopping with the last reading before work on the next day) proved the best method for expert interpretation. To reduce the need for expert interpretation and to standardise reporting a discriminant analysis was developed to mimic expert interpretation. This was developed and tested in separate groups of workers with independently validated occupational asthma (Oasys-2 (5)). Since then we have developed additional methods of analysis based on differences in “daily” mean PEF using the 95% confidence limits for PEF variability seen in non-asthmatics exposed to high levels of irritant dust (grain at >30mg/m³) and asthmatics not at work(6). A daily difference >16l/min has a sensitivity of 67%. We have investigated the data quantity requirements for each method

to achieve optimal sensitivity and specificity(2;7). The system has been field tested in a number of workplaces including electroplating, electronics, surface coating, engineering, detergent manufacture and aluminium smelting and has been found acceptable and achievable by about 70% of workers studied. We now process around 500 records a year. Work has continued on Oasys since the initial breakthrough and since 2006 can: separate multiple exposures at work; produce graphical and statistical data for other measures of spirometry (such as FEV₁, FVC etc); and integrate with the electronic patient record. It can also analyse data from groups of workers as a method of monitoring exposure control.

How do we know that what we have done has improved the service?

Nationally less than 50% of workers diagnosed with occupational asthma have any type of validating test (SWORD (8)); our services validates around 80% of the 70 workers with occupational asthma seen annually (results reported in our web-based annual report <http://www.occupationalasthma.com/shield.aspx>) and helps many others seen elsewhere.

How could it be applied elsewhere?

The basic version of the Oasys program is currently available free of charge to anyone who requests it. It could easily be implemented into all lung function laboratories where occupational asthmatic clinics take place. It is a quick and easy tool to use and is constantly being updated and developed to keep up with new technology available.

Name and contact details

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