Routes of referral for occupational asthma

A national study

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Routes of referral for occupational asthma

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Occupational asthma remains a common occupational disease in the UK with up to 3000 new cases being diagnosed each year. HSE estimates that this disease may be costing our society over £1.1 billion pounds each year. In October 2001, the Health and Safety Commission agreed a package of measures aimed at reducing the incidence of asthma caused by exposure to substances in the workplace by thirty per cent by 2010. A new approach to tackling the problem is required, by both HSE and other stakeholders.

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EXECUTIVE SUMMARY

Background

Occupational asthma remains a common occupational disease in the UK with up to 3000 new cases being diagnosed each year. HSE estimates that this disease may be costing our society over £1.1 billion pounds each year. In October 2001, the Health and Safety Commission agreed a package of measures aimed at reducing the incidence of asthma caused by exposure to substances in the workplace by thirty per cent by 2010. A new approach to tackling the problem is required, by both HSE and other stakeholders.

Objectives

The aim of the study was to document the routes of referral for cases of occupational asthma recruited from five hospitals with a specialist interest in occupational lung disease and one district general hospital. The study comprised both a retrospective and prospective element; the objective of the retrospective study was to collate review information regarding cases of occupational asthma reported previously to Surveillance of Work Related and Occupational Respiratory Disease scheme (SWORD). The objective of the prospective study was to recruit individuals presenting as new and possible cases of occupational asthma from each of the collaborating centres, and to assess the diagnosis according to an agreed standard. In addition, the route of referral for these patients and detail of their cases was explored by administering a standard questionnaire to the patient.

Conduct of the Study

The retrospective study involved a systematic review of the case notes from all consenting patients who had been reported to the SWORD scheme over the previous 12 months by the six collaborating centres. Information was collected regarding the tests performed to reach a diagnosis and any other relevant information. Individuals consenting to participate in the prospective study were contacted by telephone, and an interviewer led structured interview was carried out. Study participants were contacted again twelve months after the initial survey to collect information regarding their final diagnosis and other outcome measures.

Main Findings

Seventeen sets of case notes from three of the collaborating centres were reviewed in the retrospective study. Cases of occupational asthma reported to SWORD vary widely both within and between centres in terms of diagnostic approach. The only consistent clinical measure from all cases reported to SWORD was the documentation of work related symptoms

Ninety-seven individuals were recruited to the prospective element of the study. Of these, seventy-seven were re-interviewed 12 months after the initial contact. The most common route of referral to secondary care for patients with suspected occupational asthma was through the general practitioner (71.8%), with 19.7% being referred through an occupational health physician. This latter route is not currently funded through the NHS charging systems. The mean referral time from onset of symptoms was 4.04 years (maximum of 28 years). The provision of hazard training in this group of workers with established symptoms of respiratory disease appeared to be poor.

50% of all cases referred to secondary care with a possible diagnosis of occupational asthma have a firm diagnosis of occupational asthma at the one-year follow-up. The majority of these patients remain symptomatic, and on treatment (87%). Diagnostic tests performed varied widely between expert centres. Some patients had been symptomatic for more than 10 years prior to referral, despite clear knowledge that early diagnosis and removal from offending agent within one year of the development of symptoms is associated with a better prognosis. 44% of this cohort is still working in the same job that caused their symptoms at the one-year follow-up. There is clear published evidence that this will lead to a poorer long-term prognosis. Secondary care facilities and ability to accept referrals from diverse sources vary in this study, and almost certainly vary much more widely nationally.

Conclusions

This study has drawn together clinicians with expertise nationally in occupational asthma and assessed, retrospectively, diagnostic criteria for occupational asthma reported to the national SWORD reporting scheme. This was seen to be clearly variable between centres and within centres. The prospective limb, recruited 97 patients with possible occupational asthma from the same clinical centres. Again, applied diagnostic criteria were variable. Approximately 50% of these were subsequently found to have occupational asthma. At one year follow up, 40% of these workers remained in the same job, many were still symptomatic and taking treatment, and most were under regular specialist follow up. These workers appeared to have variable provision of occupational safety and health, and provision of this did not appear to influence more rapid referral to secondary care. The patient's perception of their own workplace exposures was largely confined to dusts, fumes and chemicals, with the physical hazards of excessive heat and cold .The presence of any form of occupational health provision was associated with increased levels of health surveillance, hazard assessments. Fifty per cent of the study population were referred from general practice, twenty per cent from occupational health physicians, ten per cent by solicitors and ten per cent via another hospital (a tertiary referral), in addition to other minor routes; some were referred by multiple routes, for example following hospital admission and via an occupational health physician.

Recommendations

- This unique observational cohort should be maintained, and extended to include other expert centres. This will enable other outcome measures to be investigated. Particularly those relating to quality of life, psychosocial and medical outcomes. The cohort contains approximately equal numbers of individuals who either have or have not been diagnosed as suffering from occupational asthma. This will enable comparisons between the two groups to be made.

- The case notes of all cases included in the prospective element of the study should be reviewed to determine the nature and extent of investigations completed. Comparisons could be made between the patient's perception of their condition, and that recorded within the notes. The cohort should be maintained to enable further follow-up to monitor progress, natural history of disease, quality of life issues and economic outcomes.

- Consistent levels of occupational health provision are needed to ensure appropriate hazard assessment and health surveillance if required.

- Heightened awareness of occupational asthma in primary care could lead to improved referral rates and earlier diagnoses. This could be achieved with education at both pre- and postgraduate level.

- There is an urgent need to unify national services, so that consistent standards of care are given to all workers who have occupational asthma as a suspected diagnosis.

1 INTRODUCTION

Occupational asthma remains a common occupational disease in the UK and around the world. Reports of prevalence vary, but a best estimate would probably be that about 9% of all adult asthma could be attributed to work (Blanc and Toren, 1999). A simple definition of occupational asthma is asthma, wholly or predominantly due to an agent encountered at work. Clinically, this is associated with variable airflow restriction, and/or airway hyper-responsiveness; often agent-specific IgE may be detected in serum. This definition is distinct from work-aggravated asthma, where a pre-existing asthma sufferer has their symptoms brought on by workplace exposures. However, in both cases the result for the sufferer is symptoms of wheeze, shortness of breath and chest tightness.

The cost of occupational asthma is alarming, both to the individual and to society. Indeed, HSE estimates that this disease may be costing the UK over £1.1 billion pounds each year. Hence, the accurate diagnosis of occupational asthma is key to removing affected workers from harmful exposures early; such actions are known to be associated with a better prognosis for the affected individual (Malo *et al*, 2001).

Both workers and their employers have responsibilities under the Health and Safety at Work Act etc., (1974) to help prevent potentially harmful exposures to agents in the workplace. For example, employers are required to perform risk assessments for hazards in their workplace and identify appropriate and effective control measures to ensure that the risk is reduced to as low as reasonably practicable. This should include formal COSHH assessments, particularly for materials known to be a cause of occupational asthma. Furthermore, in workplaces that use known respiratory sensitisers, there is a requirement for employers to carry out periodic health surveillance. At present, little is known about how commonplace this activity is, particularly where patients have suspected health problems related to their work.

Once a diagnosis of occupational asthma is suspected, rapid access to an appropriate specialist unit is clearly important. Where the standards of care are well structured and documented, the outcome for the patient is likely to be better for the patient following appropriate treatment. This is certainly the case for non-occupational asthma (Partridge, 2003), and the same may be true for occupational asthma.

The accurate diagnosis of occupational asthma is also clearly important in this process. Although both the American Thoracic Society and British Thoracic Society have produced some guidelines, there is currently no agreed standard for the diagnosis of the condition amongst specialist physicians. Published data from experts shows that there is even a wide level of disagreement in the interpretation of some standard tests (Baldwin *et al*., 2002). The toolkit available to secondary care physicians to investigate the condition includes history, spirometry (including assessment of variability in peak expiratory flow), bronchial reactivity (to histamine or methacholine), specific antibody measurement (skin prick test or IgE by RAST), knowledge of workplaces and potential sensitisers (through visits and experience) and specific allergen challenge with workplace agents. At present there is no information to quantify the extent of utilisation of these techniques in secondary care at the national level, or the consistency with which these procedures are performed.

From the patient's perspective, their first step on their route to referral is to recognise the relationship between work and any symptoms that they may be experiencing, and to realise they need to seek further help. Existing data suggest that there are barriers to this process; first, that exposed workers anticipate economic consequences for them if they report any symptoms, even if there is an annual health surveillance programme in place (see section 3). Second, it appears

that there is a reluctance for patients to discuss with any healthcare professional both lifestyle and workplace restrictions resulting from asthma symptoms (Jones *et al*., 2002). In the primary care arena general practitioners and practice nurses do not always have access to the knowledge that would enable them to provide timely and appropriate interventions in cases of occupational asthma.

Specialist secondary care physicians agree that there should be more activity to establish a hierarchy in the diagnosis and management of occupational asthma cases, including the realistic expectation of patients through each of the potential routes of referral. This would include development of systems for peer review and audit of existing services and the development of standards for both non-specialist chest physicians and specialist regional centres. Such an approach would include a goal to reduce the time to referral from the onset of symptoms.

The SWORD element of the THOR scheme provides the best estimates of UK incidence of occupational asthma (Meyer *et al*, 2001). However, the limitations of the data from this scheme must also be recognised, in that it does not include data from the primary care sector, there is no standard for diagnosis within the scheme so diagnostic rigor varies between reporting clinicians, and the numbers notified to the scheme vary widely between expert centres. Where the scheme is very useful is in the identification of potential new sensitisers and in drawing attention to agents and occupations that should be targeted for primary prevention. Using the data from Blanc and Toren (1999), which showed that 10% of all adult asthma could be attributed to work, it is possible to calculate a theoretical prevalence in the UK population. Assuming that 13.6% of the UK population has been diagnosed with asthma, and that 33% of this population is of working age, there should be 272,000 individuals with occupational asthma in the UK. As there are 450 chest physicians in the UK, this means that each would be providing care to approximately 604 occupational asthmatics; a typical chest physician with a specialist interest in occupational asthma sees far fewer cases.

This report details the findings from a multi-centre UK study to assess the routes of referral to an appropriate secondary care based respiratory physician for individuals presenting as new and possible cases of occupational asthma from each of the collaborating centres. In addition, the rigor with which a diagnosis of occupational asthma has previous been made is reported from a retrospective study assessing previous cases reported to SWORD.

2 SPECIFIC OBJECTIVES

- To examine case notes to collect relevant information regarding cases of occupational asthma reported to SWORD from five hospitals with a specialist interest in occupational lung disease and one district general hospital.

- To identify prospectively new and possible cases of occupational asthma in the same specialist respiratory centres, and to confirm the diagnosis according to an agreed standard.

- To investigate the route for referral for these patients by administering a standard questionnaire and to investigate previous occupational health provision, including health surveillance at the workplace, associated with the causative exposures.

- To produce a final report, including recommendations resulting from the investigation.

3 RESEARCH METHODS

3.1 THE STUDY TEAM

The study team comprised six geographically disparate sites within the UK. Each of these sites was a large hospital facility, and at least one respiratory physician at each site declared a major interest in the assessment and diagnosis of occupational asthma. The centres comprised the Sheffield Occupational and Environmental Lung Injury centre (David Fishwick), Aintree Hospital (Chris Warburton), Birmingham Chest Clinic (Sherwood Burge), Doncaster General Hospital (Trevor Rogers), the Royal Victoria Infirmary, Newcastle-upon-Tyne (Chris Stenton) and the North West Lung Centre (Rob Niven).

3.2 RESEARCH ETHICS

The Trent Regional Multicentre Research Ethics Committee approved the study. Recruits to the study population (both prospective and retrospective) gave written informed consent to participate.

3.3 THE PROSPECTIVE STUDY

Study participants were recruited from the six referring centres between September 2001 and September 2002. Eligibility for inclusion in the study was based on the referral letter noting a possible connection with occupation, or the assessing physician noting this possibility.

After gaining informed consent, a single researcher (JD) carried out a semi-structured telephone interview with each subject. This enquired generally about previous occupational health provision, including health surveillance in the workplace and how the diagnosis, if known, was made. More specifically, each worker was asked about their current symptoms, previous medical history, onset of work related symptoms and access to medical or other professional support. Details about diagnostic tests and any conclusions reached (in the patients opinion) were also noted. A detailed occupational history was taken, including likely exposures in the workplace.

In order to assess the impact of a potential diagnosis of occupational asthma on workers, various responses to the questionnaire were analysed using qualitative techniques. All responses to questions that could not be objectively coded were transcribed and emerging themes were identified. Whilst qualitative aspects of this study were not the primary endpoint, themes and examples of specific comments are included in the results.

3.4 THE RETROSPECTIVE STUDY

All patients reported to SWORD in the preceding year (September 2000-September 2001) by the study respiratory physicians were invited to consent to take part in the study. After gaining informed consent from each subject, the researcher visited the specialist centre from where the case was reported, to collect information from the subject's medical records relating to how their diagnosis of occupational asthma was made and their route of referral before this diagnosis was reached.

Information was collected from the medical records about investigations and consultations that led to a diagnosis of occupational asthma, or otherwise, and were coded according to a checklist.

Each investigation carried out to reach the diagnosis of occupational asthma was documented, along with the number of consultations each subject required, and by whom, before a diagnosis was made. The designation of the healthcare professional making the diagnosis of occupational asthma was recorded. The length of time was calculated from the onset of work related respiratory symptoms to a firm diagnosis (if a diagnosis was made at this stage).

3.5 DATA ANALYSIS

All quantitative data collected was entered into a SPSS for Windows (version 10.0), although the analysis is largely confined to descriptive statistics, rather than tests of inference. Differences between means were assessed using a student's t test, and differences in proportions using a Chi squared test. Underlying normality of the data was tested using SPSS normality testing and statistical significance was accepted at the 5% level unless stated otherwise.

4 RESULTS

4.1 RESULTS OF THE PROSPECTIVE STUDY

4.1.1 General Descriptive Results

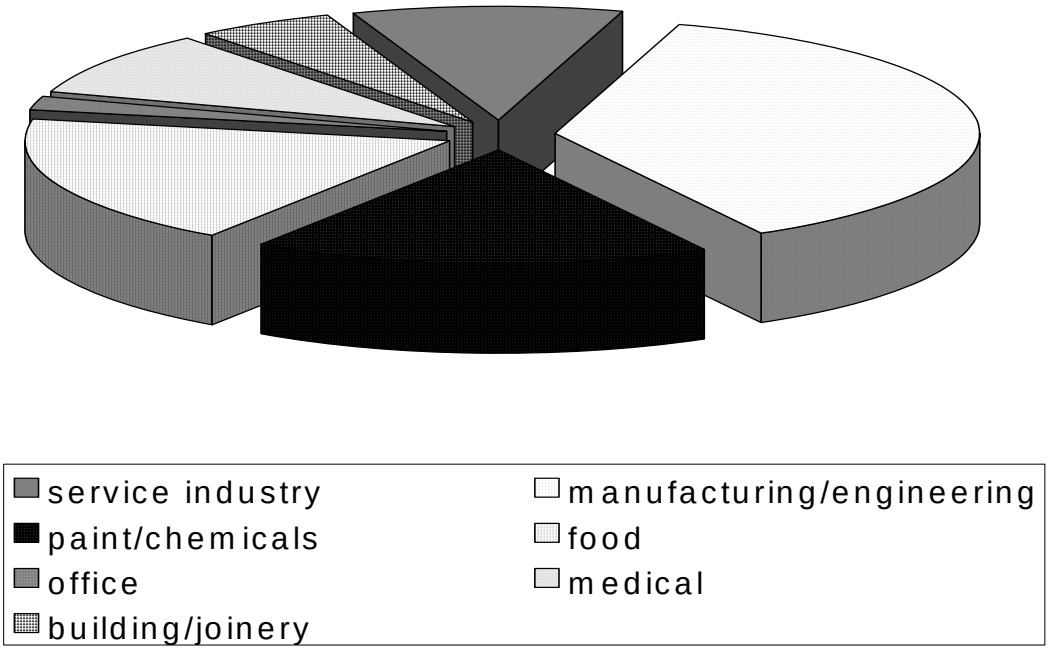
One hundred subjects were recruited into the prospective study. However, only 97 telephone interviews were completed. One subject withdrew before the interview was carried out and a further two subjects became untraceable. The study population consisted, therefore, of 97 individuals. The mean age of the patients was 44 years (range 24-64). Seventy five percent of these were male.

All the data presented represents the views of the study volunteers, and it therefore represents their interpretation of information given to them by their consultant physicians.

Job Category

Figure 1 notes breakdown of job category seen in all patients. This illustrates the array of occupations currently held by workers, when they presented to secondary care for assessment. There was a predominance of manufacturing, engineering, chemicals and paint workers. The array of jobs seen was similar to the general breakdown nationally, although no laboratory animal workers were included in this cohort.

Figure 1
Breakdown of job category



Potential Hazards in the Workplace

When asked about hazards and exposures in their workplace, many workers perceived multiple potential hazards and associated risks in their workplace. For example, 88% perceived dust to be a problem, 87% perceived fumes to be a problem, and 71% perceived chemical exposure to be a problem. A full breakdown is given in Table 1.

Table 1
Potential Hazards Perceived by Subject in their Workplace

Potential Hazard	Yes Number (%)
Dust	85 (88)
Fumes	84 (87)
Chemicals	69 (71)
Gases	53 (55)
Excessive Heat/Cold	48 (49.5)
Metals	39 (40)
Solvents	35 (36)
Plastics	14 (14)
Wood dust	9 (9)

Despite the high level of perception in the work place, there was only variable provision of training in hazard recognition and handling offered by employers. Table 2 illustrates the proportions of workers offered various aspects of hazard training in the workplace. Overall, approximately two thirds of workers were in receipt of some form of hazard training (65 workers, 67%).

Table 2
Hazard Training in the Workplace

Training	Yes Number (%)
Any Hazard Training	65 (67)
Spoken Training	60 (62)
Written Hazard Training	47 (48.5)
Other Hazard Training	42 (43)
Training Video	21 (22)

In addition to the quantitative data a large amount of qualitative data was collected about the hazards perceived in the workplace. The following were comments made by individual subjects regarding perceived hazards in the workplace:

"We recently had an incident in the plant room where a pipe burst releasing refrigeration vapour"

"It's a terrible place to work, there is chemical powder in the air continuously, there was no dust extraction prior to 2000"

"The atmosphere is full of impurities, fans blow air around and there is oil mist in the air continuously. It is known as the dirtiest shop in the plant. The air has improved since the diesel line was disbanded

"Fumes and dust are blown around by industrial fans & extractor fans above the work area"

"The air is thick with flour dust; there was no ventilation from '86 -'91 in the sieving area as the windows were screwed down. We still have no extraction system"

Personal Protective Equipment

With regard to the self-reported use of personal protective equipment, the vast majority of workers (91%) used some form of protection. However, only 65 workers (67%) had previously been provided with any form of respiratory protection in the workplace. Table 3 shows these data in more detail.

Table 3

Personal Protective Equipment Provision (PPE) in the Workplace

PPE	Provided Number (%)
Any PPE	88 (91)
Other PPE (e.g. gloves, overalls etc.)	88 (91)
Respiratory Protection	65 (67)
Eye Protection	56 (58)
Ear Protection	44 (45)

The following were comments made regarding personal protective equipment:

"I was told by HSE in February 2002 that I should be wearing an air fed mask for the work that I do, I am still waiting for the equipment (May 2002)"

"We wore dusty overalls in the canteen area and everywhere we went until the end of the shift"

"I have a respiratory mask but I don't wear it: it irritates me"

"Breathing apparatus is now available if required"

"I asked for protective equipment but didn't get it, the company refused, they said I didn't need it"

Occupational Health Provision

The level of occupational health provision by responsible trained personnel was variable for these affected workers. One quarter of all relevant worksites were without any form of occupational health provision, whilst 27% were without input from an occupational health physician and 37% were without any occupational health nurse. Health and safety officers were more common, with only 14% of workplaces not having access to such a responsible named individual. Despite the reasonable levels of cover noted above, only just under half the workers were covered in a full time capacity (48.5%).

There was no difference in the size of workplaces with an occupational health provider (mean number employed 159.4 workers) in comparison to those without (mean number employed 32.3 workers), p=0.108.

Tables 4 and 5 show what type of occupational health provision was available in each workplace and the frequency and location of that occupational health provision.

Table 4

Occupational Health and Safety Personnel in the Workplace

Job Title	Yes Number (%)
Health & Safety Officer	83 (86)
Occupational Health Doctor	71 (73)
Occupational Health Nurse	61 (63)
Any Occupational Health Provider	73 (75)

Table 5

Frequency and Location of Occupational Health Provision

Frequency/Location	Yes Number (%)
Full Time Service	47 (48.5)
Part Time Service	35 (36)
Occupational Health On Site	37 (38)
Occupational Health Off Site	43 (44)

"I told the company nurse that I was asthmatic at induction week but I was still placed in the paint shop despite the occupational health nurse advising I shouldn't be put in that area"

"I don't feel that the occupational health doctor or nurse at work have been very helpful"

"In 2001 all staff demanded health checks and were seen at the local hospital because the company didn't have an occupational health service"

"No occupational health facility at night and I work full time night shift"

Safety Inspections and Workplace Assessments

Only 43% of the study participants recalled their workplace performing COSHH assessments whilst 64% recalled some form of risk assessment being carried out. HSE produces very clear guidance relating to the need for surveillance in the workplace when workers are exposed to potential respiratory sensitisers.

Table 6 illustrates the nature of safety assessments carried out in the workplace, and if any inspections had been carried out by regulatory bodies.

Table 6

Inspections/ Safety Measures

Inspection/ Safety Measure	**Yes Number (%)**
Hazard Assessments*	68 (70)
HSE Inspection	49 (50.5)
Environmental Health Inspection	19 (20)
City Council Inspection	6 (6)

*Denotes risk assessment or COSHH assessment

Further comments were made regarding inspections:

"HSE only inspected the company following an accident

"No inspections are carried out during the night shift and I work full time nights"

"Since HSE inspected the factory changes are starting to be implemented"

"I think the place would be closed down if there was to be an inspection"

Tables 7 and 8 show the levels of health surveillance and hazard assessments and whether these were carried out in workplaces with and without occupational health provision.

Table 7

Health Surveillance by Occupational Health Provider

	Health Surveillance in Workplace (n=60)	No Health Surveillance in Workplace (n=37)
Occupational Health Provided (n=73)	60 (82%)	13 (18%)
No Occupational Health Provided n=(24)	0	24 (100%)

p=0.0001 (Fishers exact test)

Table 8

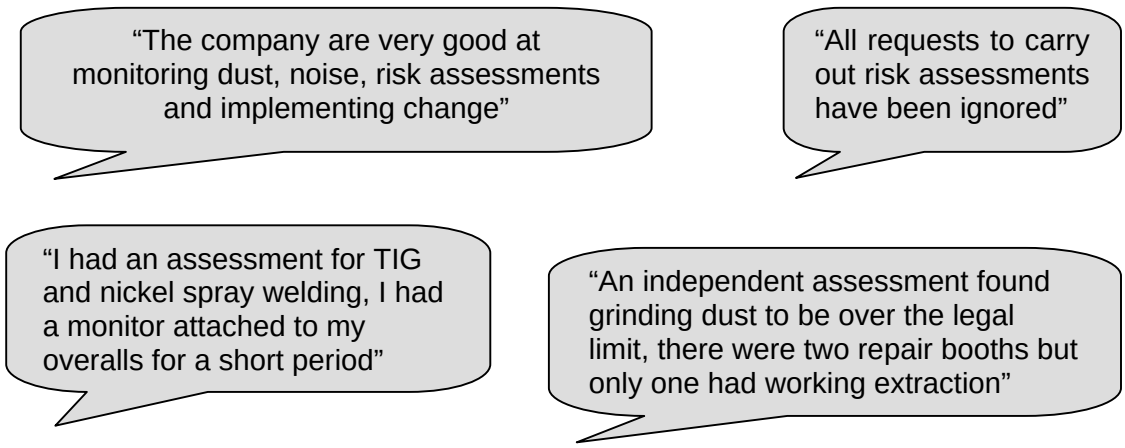
Hazard Assessments by Occupational Health Provider

	Aware of Hazard Assessments (n=68)	Not aware of Hazard Assessments (n=29)
Occupational Health Provided (n=73)	57 (78%)	16 (22%)
No Occupational Health Provided (n=24)	11 (46%)	13 (54%)

p=0.004 (Fishers exact test)

It can be seen that there was a significant difference between the level of health surveillance provided in those workplaces where there was an occupational health provider; indeed no health surveillance was carried out when occupational health provision was absent.

Further comments were made about workplace monitoring and risk assessments:



Overall, three quarters of workers recalled some form of occupational health input being available at their workplace. When comparing the completion of hazard assessments between workplaces with or without any occupational health input, there were marked differences.

Health Surveillance

Sixty eight percent of all patients had previously undergone some form of health surveillance, and there was a clear association between health surveillance and occupational health provision. All of those with current health surveillance had access to an occupational health provider, whereas only 35% of those with no health surveillance had such access ($p<0.001$).

Those with health surveillance were significantly more likely to have the following;

- Hazard Training
- Written training
- Spoken Training
- Health and Safety Officer in the workplace
- Full time, onsite occupational health service
- Doctor or nurse led occupational health service
- Risk assessments

Current Symptoms

The array of symptoms experienced as part of the initial presentation with possible occupational asthma were predictable, with the majority complaining of a combination of dyspnoea (76%), chest tightness (62%) and wheeze (57%). Approximately one third (31%) complained of significant nasal symptoms. The duration of these symptoms (from first complaint to incorporation in the study cohort at the time of secondary care referral) was highly variable, with a mean duration of 4.4 years (range 0 to 27). Tables 9 and 10 describe the current symptoms experienced by each subject firstly as a whole group and then split by gender.

Table 9

Current Symptoms

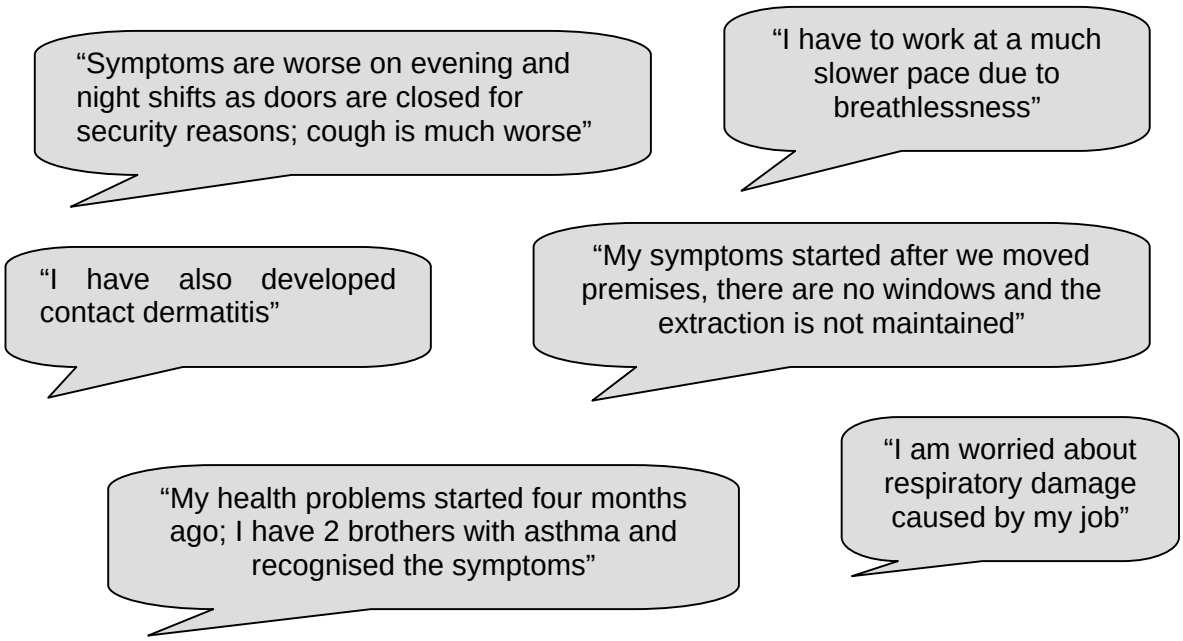
Symptom	Yes Number (%)
Shortness of Breath	74 (76)
Chest Tightness	60 (62)
Wheeze	55 (57)
Cough	54 (56)
Rhinitis	30 (31)
Phlegm	28 (29)
Eye Irritation	23 (24)

Table 10

Symptoms by gender

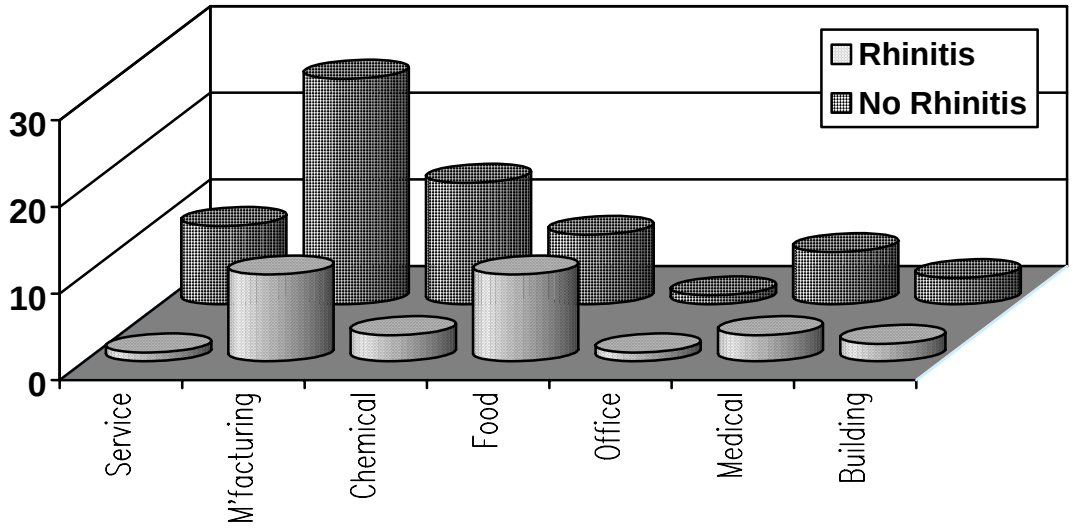
Symptom	Male [number (%)] n=73		Female [number (%)] n=24	
	YES	NO	YES	NO
Cough	35 (48)	38 (52)	19 (80)	3 (20)
Phlegm	21 (30)	52 (70)	7 (30)	17 (70)
Wheeze	39 (53)	34 (47)	16 (67)	8 (33)
Chest tightness	47 (64)	26 (36)	13 (54)	11 (46)
Shortness of breath	59 (81)	14 (19)	15 (62)	9 (38)
Rhinitis	21 (29)	52 (71)	9 (38)	15 (62)
Ocular symptoms	15 (20)	58 (80)	8 (33)	16 (67)

There was a large amount of qualitative data collected regarding current symptoms the following are a selection of comments made during the interview:



Rhinitis and job category

Figure 2 below notes differences in rhinitis prevalence between job categories, with a suggestion that there are certain differences in prevalence between categories. None of these differences were statistically different.



Primary Care Assessment

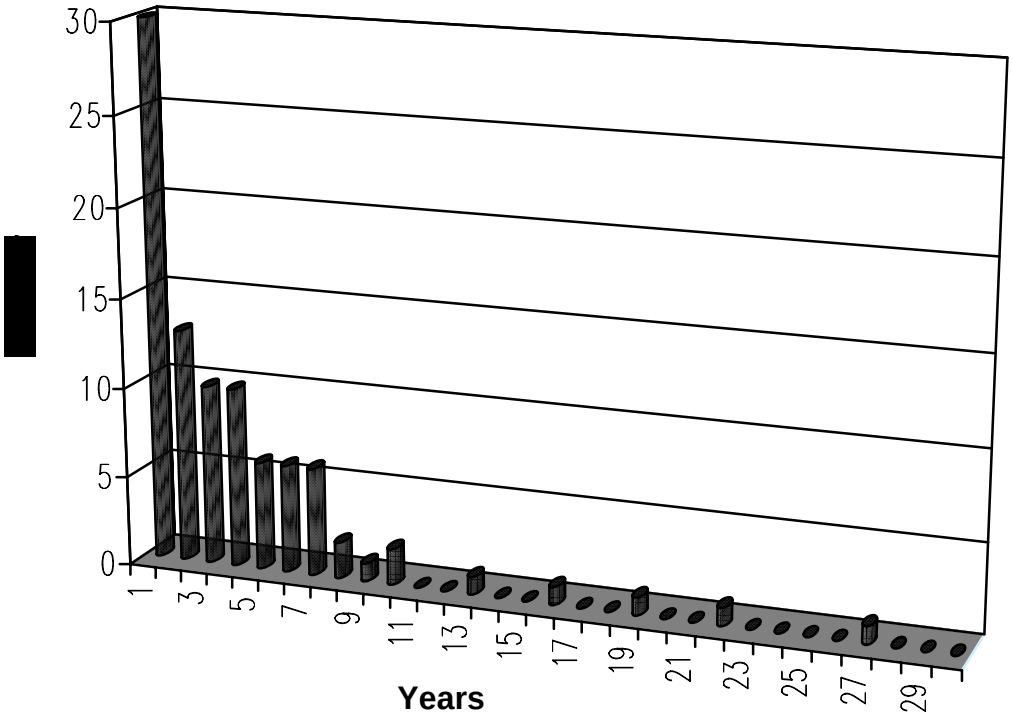
Table 11 illustrates the numbers of consultations patients received relating to their work related respiratory problems, prior to referral to the specialist centre.

Table 11
Number of GP consultations by gender

Number of times consulted GP	Male n=73	Female n=24
0	5 (7%)	0
1-5	36 (50%)	7 (30%)
>5	32 (43%)	17 (70%)

Figure 3 below notes the length of time in years between first reporting symptoms to a primary care physician, and an eventual referral to a secondary care physician. The mean duration prior to referral was 4.04 years.

Figure 3
Time between symptom onset and referral to secondary care



Referral to secondary care

Table 12 shows the source of referral to secondary care. It can be seen that the route to secondary care was varied, although the primary care physician referred the majority of patients. Notable exceptions were referrals by solicitors (presumably for a medico legal opinion) and from occupational health nurses.

Table 12

Referral to Secondary Care*

Who Made Referral to Secondary Care	Centre 1 n=15	Centre 2 n=20	Centre 3 n=3	Centre 4 n=6	Centre 5 n=51	Centre 6 n=2	Total
			Number (%)				
General Practitioner	9 (60)	14 (70)	3 (100)	3 (50)	26 (51)	2 (100)	**57**
Occupational Health Nurse	0	0	0	0	1 (2)	0	**1**
Occupational Health Doctor	3 (20)	6 (30)	0	3 (50)	9 (18)	0	**21**
Solicitor	1 (7)	0	0	0	8 (16)	0	**9**
Union	0	0	0	0	8 (16)	0	**8**
Following Hospital Admission	2 (13)	2 (10)	0	0	4 (8)	0	**8**
Another Hospital	2 (13)	2 (10)	0	0	6 (12)	0	**10**

**certain individuals were referred by two routes*

Of the five individuals never consulting their GP, One was referred to secondary care following an acute hospital admission, and four referred directly from an occupational health physician.

Investigations

Tables 13 and 14 document the tests each subject underwent from their first consultation up to the time of the telephone interview. Approximately half the study group had received a firm diagnosis of occupational asthma by the time of the initial study interview, and this diagnosis (or otherwise) had clearly not influenced the patient's decision to stay in or leave the workplace. Table 15 notes diagnoses given to patients. Due to the variable time between first assessment and first interview, the study methodology clearly will add further variability to these results.

Table 13

Investigations completed at the time of first interview

Investigation	Yes Number (%)
Blood Screen	93 (96)
Peak Flow Monitoring	86 (89)
Respiratory Function Tests	84 (87)
Chest X-Ray	81 (83.5)
Skin Prick Test	75 (77)
Bronchial Challenge	54 (56)
Workplace Visit	3 (3)

Table 14
Investigations by gender

Investigation	Male [number (%)] n=73		Female [number (%)] n=24	
	Yes	no	yes	no
Blood test	70 (96)	3 (4)	23 (96)	1 (4)
Chest X Ray	61 (84)	12 (16)	20 (83)	4 (17)
Skin Prick Test	56 (77)	17 (23)	20 (83)	4 (17)
Peak Flow Monitoring	64 (88)	9 (12)	22 (92)	2 (8)
Lung Function Tests	65 (89)	8 (11)	19 (79)	5 (21)
Bronchial Challenge	42 (57)	31 (43)	12 (50)	12 (50)
Workplace Visit	0	73 (100)	3 (12)	21 (88)

Table 15

Diagnostic Information

Diagnosis	Yes Number (%)	No Number (%)
Has a diagnosis been given to the patient?	53 (55)	44 (45)
Is it Occupational Asthma?	51 (53)	46 (47)
Informed by Hospital Doctor	51 (53)	46 (47)
Informed by GP	1 (10)	96 (99)
Informed by Occupational Doctor	3 (3)	94 (97)

Sixty-eight (70%) subjects were still in the same job that caused the onset of symptoms at the time of the first interview. The remaining 30% had either left the employment that caused the symptoms or were on long-term sick leave. They made the following comments regarding sick leave, change in work and retraining:

Differences Between Centres

The following results in Tables 16 and 17 are presented to show diagnostic and follow up differences between referral centres. Whilst the numbers in certain categories are small, it is clear to see that there are differences in practice between centres both in terms of investigations requested and diagnoses made.

Table 16

Tests Leading to Diagnosis by individual centre

Test	Centre 1 N=15	Centre 2 n=20	Centre 3 n=3	Centre 4 n=6	Centre 5 n=51	Centre 6 n=2
			Number (%)			
Chest X Ray	11 (73)	12 (60)	3 (100)	4 (67)	49 (96)	2 (100)
Skin Prick Tests	5 (33)	18 (90)	0	3 (50)	49 (96)	0
Peak Flow Monitoring	14 (93)	17 (85)	2 (67)	4 (67)	47 (92)	2 (100)
Lung Function Tests	9 (60)	18 (90)	3 (100)	6 (100)	47 (92)	1 (50)
Bronchial Challenge	2 (13)	9 (45)	2 (67)	4 (67)	37 (72.5)	0
Workplace Visit	0	1 (5)	1 (33)	0	1 (2)	0
Diagnosis Given	5 (33)	10 (50)	3 (100)	4 (67)	30 (59)	1 (50)

The most frequent investigations recalled by the patients during the interview are clearly peak flow monitoring, chest X-ray and lung function tests. Workplace visits by specialist physicians are very uncommon.

Table 17

How many consultations with secondary care physician by centre

How Many Consultations	Centre 1 N=15	Centre 2 n=20	Centre 3 n=3	Centre 4 n=6	Centre 5 n=51	Centre 6 n=2
Number (%)						
1	7 (47)	8 (40)	0	3 (50)	42 (82)	1 (50)
2-5	6 (40)	9 (45)	3 (100)	3 (50)	7 (14)	0
>5	2 (13)	3 (15)	0	0	2 (4)	1 (50)

These data do represent assessment at secondary care at the time of the first interview. Inevitably, patients will be at differing stages through the diagnostic pathway according to each individual respiratory physician's pathway.

Change in employment

Table 18 further categorises patients into those who remain in the same job that was thought to have caused their respiratory symptoms, according to whether a firm diagnosis of occupational asthma had been made.

Table 18

Job change by diagnostic category

Are you in the same job?	**Yes (n=68)**	**No (n=29)**
Told has occupational asthma n=51	35 (69%)	16 (31%)
Not told has occupational asthma n=46	33 (72%)	13 (28%)

Occupational Health provision

Three quarters of all patients had previously had access to some form of occupational health provision in the workplace, although this did not significantly alter the prevalence of perceived hazards and risks associated with fumes, dusts, gases and other harmful agents.

Those with any form of occupational health provision were more likely to be aware of hazard assessments.

Occupational Asthma

Fifty three percent of all patients had been given a firm diagnosis of occupational asthma at the time of the first interview. There were no differences in awareness of COSHH assessments (51%, 49%) and occupational health department consultations (65%, 35%) between those respectively with or without occupational asthma.

Those with occupational asthma were much less likely to have previously been aware of an inspection from the environmental health department (9.8%, 30.4%, p=0.011).

There were no significant differences in provision of health surveillance or occupational health between those with and without occupational asthma.

Furthermore, there were no differences in frequency of health surveillance and an eventual diagnosis of occupational asthma.

In terms of specific exposures (although these are not know accurately), self reported exposures to chemicals were much more commonly seen in those with occupational asthma than those without.

Of all the methods of hazard training mentioned, only video training appeared to be less common in those with a diagnosis of occupational asthma.

Figure 4

Duration of symptoms prior to referral (occupational asthma versus no occupational asthma)

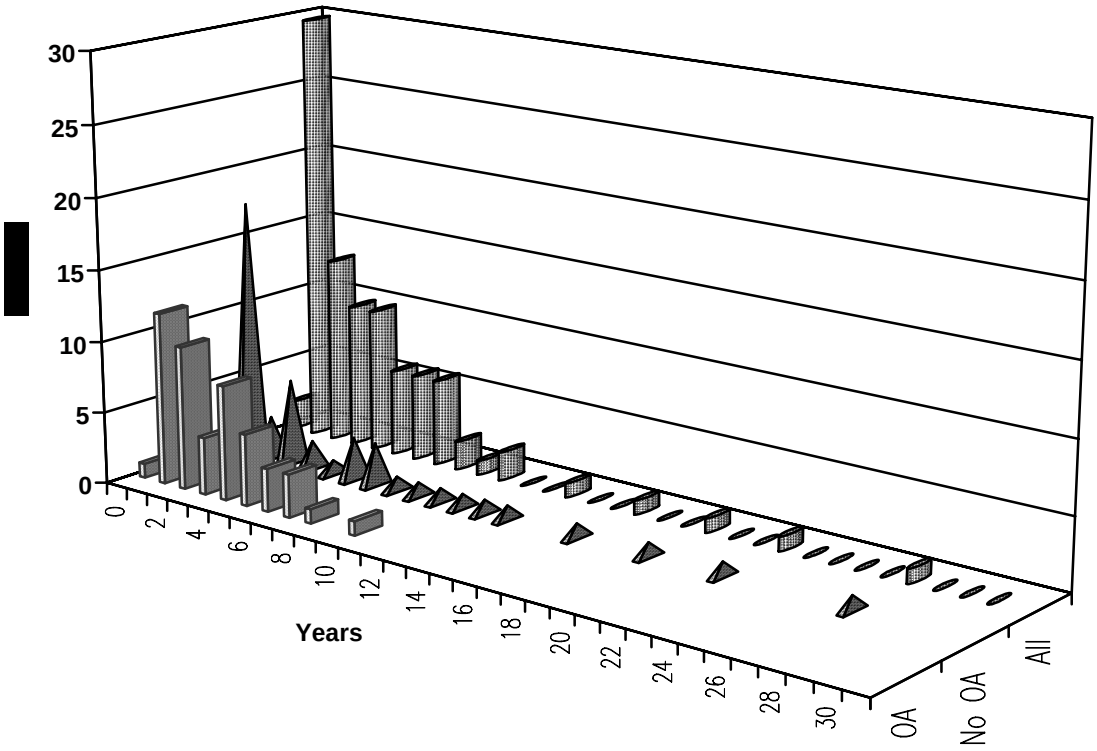
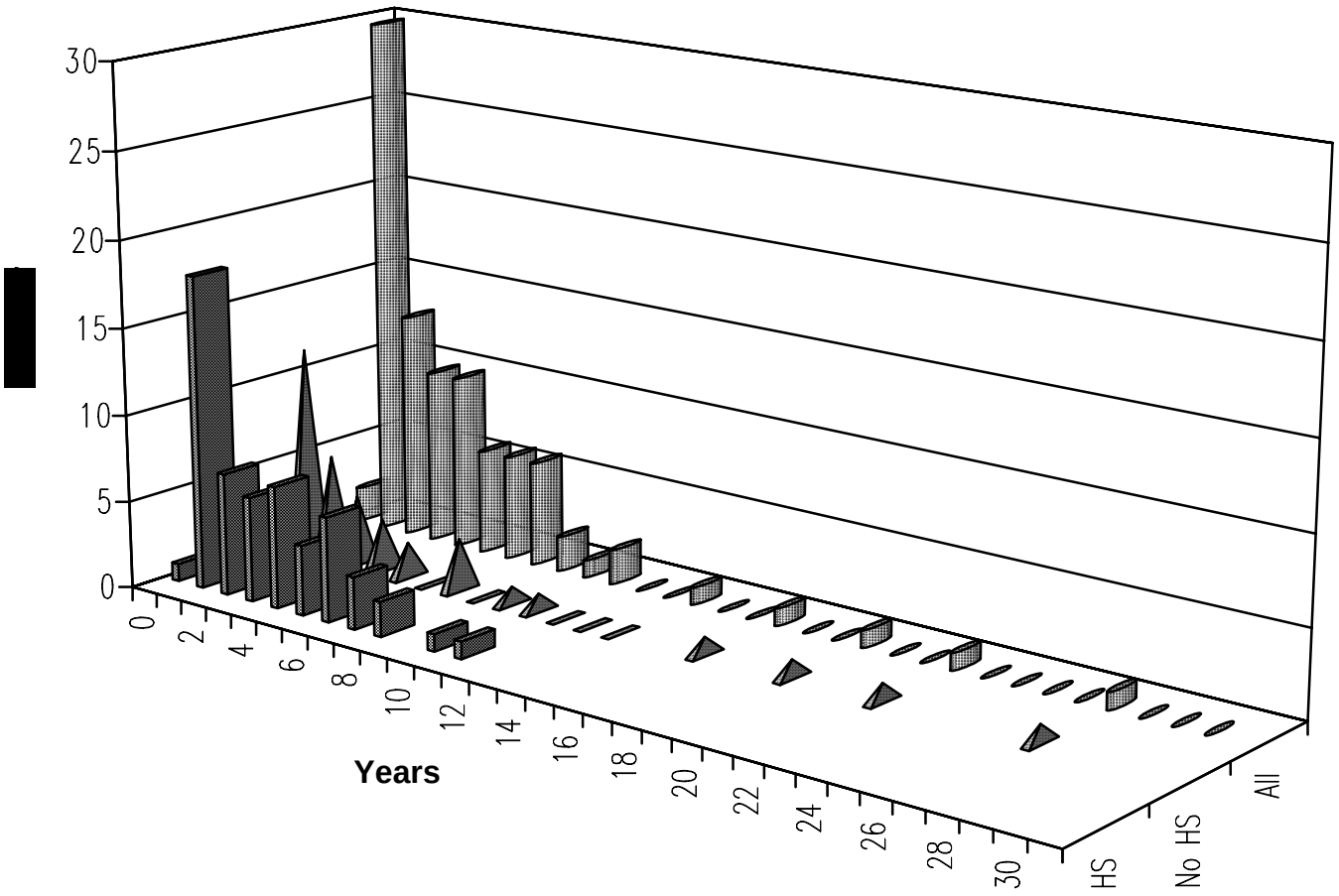


Figure 4 above illustrates that the duration of symptoms prior to referral to secondary care was highly variable, and did not differ significantly between those with (mean 3.29 years) and without (mean 4.84 years) a diagnosis of occupational asthma. Indeed, the maximum duration between onset of symptoms and referral was 10 years for an individual with occupational asthma in comparison to 27 years in an individual without a diagnosis.

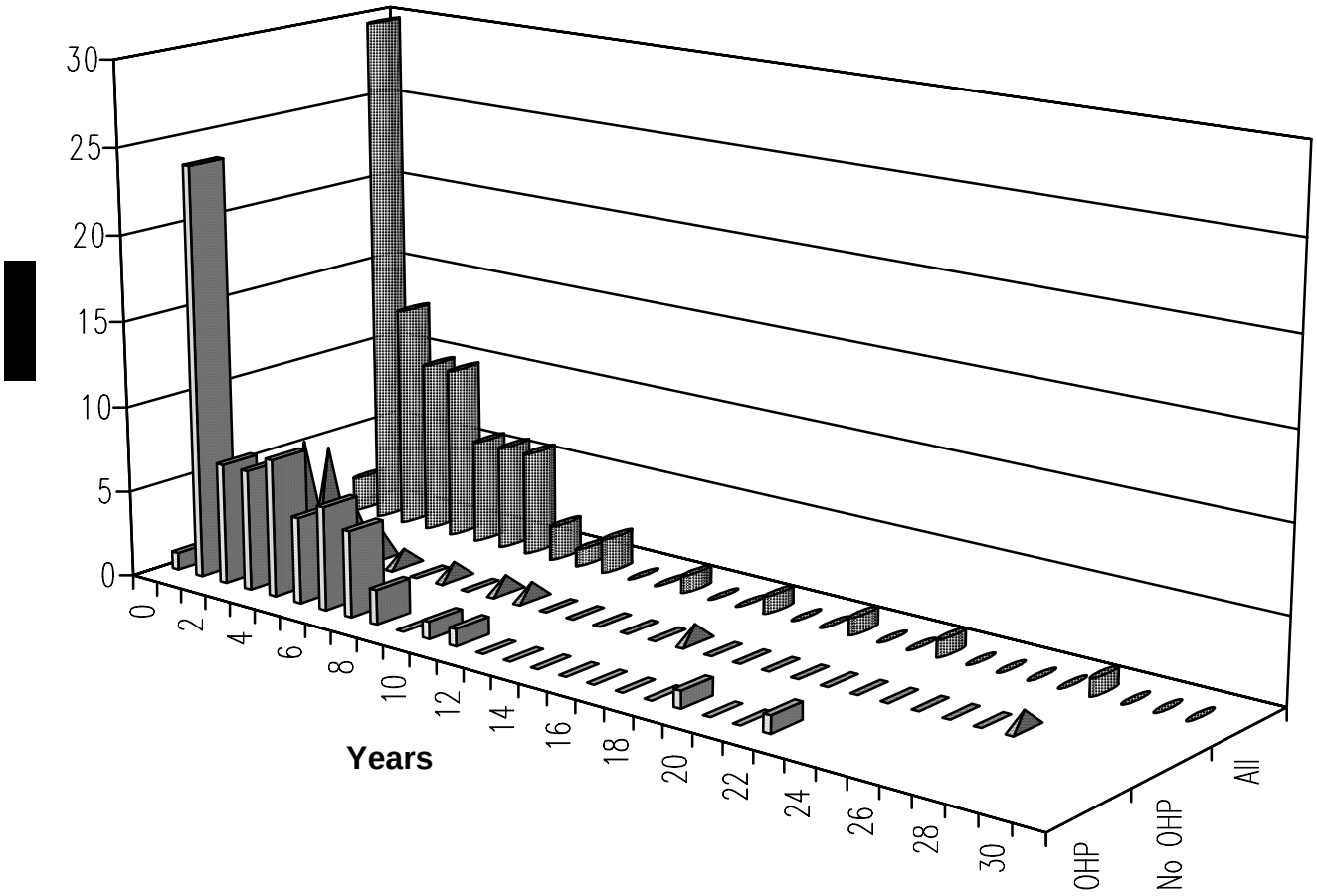
Figure 5

Duration of symptoms prior to referral (health surveillance versus no health surveillance)



Similarly, the data for health surveillance did not show major differences in duration of symptoms prior to referral in those either with (3.46 years) or without (4.92 years) any form of health surveillance. Figure 5 above shows the corresponding data.

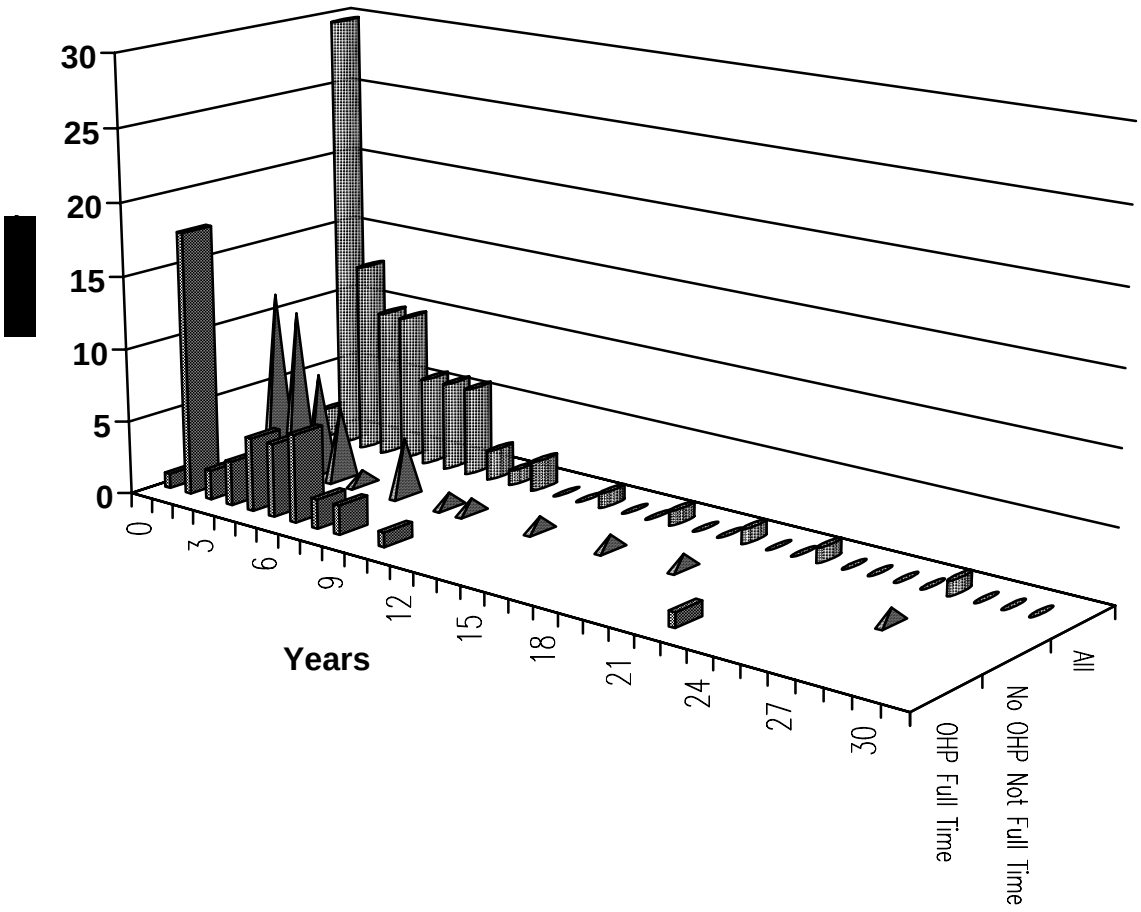
Figure 6
Duration of symptoms prior to referral (occupational health provision versus no occupational health provision)



Again, the provision (mean 3.87 years) or otherwise (mean 4.54 years) of any form of occupational health did not appear to influence the duration of symptoms between their onset and referral to secondary care. These data are shown in Figure 6 above.

Figure 7

Duration of symptoms prior to referral (full time versus part time occupational health provision)



When occupational health provision was broken down into full time and part time service, there was a significant relationship between shorter duration of symptoms prior to referral and a full time occupational service as judged by proportions in each time category (chi square p=0.034). However, the mean values for each group (3.78 years with full time occupational health, 4.30 years without full time occupational health) did not differ significantly. These data are shown above in Figure 7.

4.1.2 Follow up at one year

Seventy-seven workers have been contacted a second time, as per the original protocol. The results from the second telephone interview are shown in Table 19.

Table 19

One year re-interview results

	Yes (n)	%
Have you been given a diagnosis	83	92.0
If so, is it occupational asthma	45	48.9
Are you still in the job where your symptoms began	38	41.3
Are you aware of any hazard assessments in the workplace	80	87.0
Have any adaptations been made in the workplace	40	43.5
Do you have continuing symptoms	74	80.4
Are you still being followed up	90	97.8
Are you taking any treatment	80	87.0

After 12 months, the majority of indivuduals have been given a diagnosis, with about half the participants being told they have occupational asthma. Of these, 44% are still working in the job where their symptoms began, although 43% have had some adaptations made to their workplace. A significant number of people in the cohort still have symptoms 12 months after referral (83%), with most taking treatment.

80% of patients are aware at 12 months of some form of hazard assessment (COSHH or risk assessment). This compares favourably with the 68 patients aware of this activity after the first interview. It is possible that this reflects a true increase in assessments following the index case being investigated in hospital.

4.2 RESULTS OF THE RETROSPECTIVE STUDY

A limited number of patients from two study centres consented to this phase of the study. The results taken from the case notes are shown in Table 20 for individual cases.

Table 20

Diagnostic criteria for patients in two centres referred to SWORD as cases of occupational asthma

Case Number	Work related symptoms	Abnormal lung function (FEV_1 predicted less than 80%)	Bronchial hyper - responsiveness	Specific allergen responsiveness		Positive skin prick test or IgE to occupational allergen	Serial PEF with work effect
				Lab	Work		
R1	✓(+)	✓(+)	✓(+)	✗	✓(+)	✓(-)	✗
R2	✓(+)	✓(-)	✓(+)	✗	✗	✓(+)	✗
R3	✓(+)	✓(-)	✓(+)	✗	✓(+)	✓(-)	✗
R4	✓(+)	✓(-)	✓(+)	✗	✗	✓(-)	✗
R5	✓(+)	✓(+)	✓(+)	✗	✗	✓(-)	✗
R6	✓(+)	✓(+)	✗	✗	✗	✗	✗
R7	✓(+)	✓(-)	✓(+)	✗	✗	✗	✗
R8	✓(+)	✓(-)	✓(-)	✗	✗	✗	✗
R9	✓(+)	✓(+)	✓(+)	✗	✗	✓(+)	✓(?)
R10	✓(+)	✓(+)	✗	✗	✗	✗	✗
R11	✓(+)	✓(+)	✗	✗	✗	✗	✓(?)
R12	✓(+)	✓(+)	✗	✗	✓(+)	✓(+)	✓(+)
R13	✓(+)	✓(+)	✗	✗	✗	✓(-)	✓(+)
R14	✓(+)	✓(+)	✓(-)	✗	✗	✓(+)	✓(+)
R15	✓(+)	✓(-)	✓(+)	✗	✗	✓(-)	✗
R16	✓(+)	✓(-)	✓(+)	✗	✗	✓(-)	✗
R17	✓(+)	✓(-)	✓(+)	✗	✗	✓(-)	✓(+)

✓ **Test performed**
- ✓(+): with positive result;
- ✓(-): with negative result
- ✓(?): result unclear from notes

✗ **Test not performed**

It can be seen from table 20 that there was significant variation in the tests performed and the criteria used to refer cases to SWORD. The only consistently applied measure was the presence of work related symptoms.

5 DISCUSSION

The rationale behind this study was twofold. Firstly, a retrospective assessment was made of previously confirmed cases of occupational asthma (reported to SWORD) in order to assess the criteria with which a diagnosis was considered reportable, and to assess differences between expert centers. Secondly, a prospective study was carried out to assess new cases of probable occupational asthma referred to secondary care, with particular reference to their route of referral to the secondary care centre. Although inherently different in their approaches, both aspects were designed to heighten awareness of current practice, in order to make recommendations as to how best to work towards reducing the burden of ill health associated with occupational asthma, in line with the occupational Health Strategy.

The retrospective study was limited by numbers of individuals consenting to allow case notes to be reviewed. Nevertheless, from the cases analysed there appeared to be widely disparate criteria used to establish a diagnosis of occupational asthma that was subsequently reported to SWORD both within centres, and between centres. This has clear implications for the interpretation of national data generated from many geographic areas, where local specialist centres may adopt different diagnostic approaches to the same problem. The accuracy of cases reported to schemes such as SWORD could clearly be influenced by many approaches, for example collecting additional data on the report form regarding the tests carried out, although the requirement for such accuracy may trade against response rates by physicians.

The prospective study recruited over the year September 2001 to September 2002. A good response was seen and those who agreed to participate continued to be generally cooperative. This demonstrates the enthusiasm seen in these individual patients, who are keen to arrive at a clear diagnosis, and in particular whether there is a work related component to their illness. Although not directly enquired about, it was not the impression that many of these patients were pursuing a medico legal case via the civil justice system.

Patients were predominantly male, reflecting the job array usually associated with occupational asthma, although it is clear that both males and females were affected. Females tended to be working in healthcare related roles. When interpreting these data further, it is important to stress that they represent a relatively skewed, clinically severe population of patients, deemed ill enough to be referred to secondary care. There are no data (except perhaps from the Labour Force Survey data) to offer denominators over this period to calculate incidence. Indeed, attempts to do so would be injudicious.

The patient's perception of their own workplace exposures was largely confined to dusts, fumes and chemicals, with the physical hazards of excessive heat and cold. Specific exposures, such as solvents, plastics and wood dusts were reported much less frequently.

With regard to hazard training to enable these workers to understand how they can reduce their exposure to these substances, and thus to reduce the associated risk, provision was generally poor; particularly as these individuals had established symptoms of respiratory disease. Only two-thirds had received any form of hazard training, with most being delivered as spoken training.

Similarly, respiratory protective equipment had been supplied in two-thirds of cases, although clearly the absolute necessity for this and the appropriate use of such equipment is not known. Again, figures for occupational health provision are similar, with three-quarters of workers having some form of occupational health provision. The majority of this provision was part time (52%) and off site (62%). Only 29% of workers had access to full time on site occupational

health. As one might expect, the presence of any form of occupational health provision was associated with increased levels of health surveillance and hazard assessments. It is of note that health surveillance was absent in workplaces that did not provide occupational health support, despite this being a legislative requirement (COSHH and the Health and Safety at Work act 1974).

Interpretation of these data in light of the unique nature of this population are difficult, as on the one hand it might be expected that cases reaching secondary care would have good occupational health provision, as referral may depend on the recognition of possible respiratory disease. On the other hand, one might argue that provision is poor, as cases of disease have occurred. In addition, these data do not allow assessment of the quality of occupational health provision, just its presence (or absence).

Other data do exist to make comparisons. An HSE funded project based in Sheffield noted generally lower levels of occupational health provision (Bradshaw *et al*, 2001). This study approached small and medium sized enterprises, not patients, and encountered major problems with agreement to participate. This could suggest that only companies with few potential occupational health problems agreed to participate.

More recently, an HSE funded assessment of UK workplace occupational health provision noted likely occupational health support in only between 3-15% of companies nationally (Pilkington *et al*., 2002). In this study, hazard identification was the most common form of occupational health input, followed by risk management. The authors noted that there was a generalised lack of knowledge about dealing with health issues in the workplace.

The array of symptoms seen is this study population is comparable to a population suffering from respiratory disease, with about a quarter to a third also complaining of nasal symptoms (in some, suggestive of upper airway sensitization). Whilst there were few major gender differences in symptoms reported, females clearly had excess levels of cough, as previously noted (Dicpinigaitis *et al.*, 2001). This suggests that the interviewer led semi-structured questionnaire was able to collect clinical data relating to of these cases with some clinical consistency.

With regard to referral to an appropriate physician in secondary care, the majority were referred from general practice (primary care givers). Some were referred by multiple routes, for example following hospital admission and via an occupational health physician. Broadly, therefore, over half (59%) of all referrals were received from general practice, one-fifth from occupational health physicians, one tenth by solicitors and one tenth via another hospital (a tertiary referral), in addition to other minor routes. Currently, only primary care routes (and certain secondary care routes from other hospitals) are funded under NHS provision of care. Patients had been significantly symptomatic prior to secondary care referral for widely varying lengths of time (mostly less than 10 years), although certain patients had been symptomatic for over 20 years.

The timing of the first research interview in relation to the diagnostic procedures was inherently variable, although the vast majority had been seen five times or less in secondary care when the first interview was administered. The majority had undergone simple blood investigations, radiology and pulmonary function assessment (both laboratory based and serial PEF measures). Only half had undergone any form of bronchial challenge test (it is clearly not possible to distinguish at this stage between specific and non specific bronchial challenge), and only 3 had been seen in their workplace. Just over half of this group had already received a diagnosis of occupational asthma, made overwhelmingly by the hospital physician. Whilst relatively small numbers limits comparison between centres, the approach appeared to be disparate between centres. For example, the use of skin prick testing and bronchial challenge testing varied widely.

Once the diagnosis had been established, action taken by the patient and physician can at best only be inferred from the current study. The follow up data at on year will allow more inference, although early signs suggest that the majority stay in the job thought to have caused their respiratory symptoms. The decision to stay in the current job did not appear to relate to being informed of a diagnosis of occupational asthma.

In summary, this study has drawn together clinicians with expertise nationally in occupational asthma and assessed, retrospectively in three of these centres, diagnostic criteria for occupational asthma reported to the national SWORD reporting scheme. This was seen to be clearly variable between centres and within centres. If data from reporting schemes are to be compared geographically, then these issues must be addressed. One can assume that all other respiratory physicians in the UK will use varying criteria to diagnose this condition. A more detailed assessment of this nationally would appear sensible. The second component of the study, the prospective limb, recruited 97 patients with possible occupational asthma from the six clinical centres. Approximately 50% of these were subsequently found to have occupational asthma. At one year follow up, 40% of these workers remained in the same job, many were still symptomatic and taking treatment, and most were under regular specialist follow up. These workers appeared to have variable provision of occupational safety and health, and provision of this did not appear to influence more rapid referral to secondary care. Consistent lines of referral, investigation and communication are needed nationally to cope with this condition. Standards of care are required urgently to aide this process, so that both primary care physicians and respiratory physicians with no specialist knowledge are able to investigate these issues properly.

Recommendations

- This unique observational cohort should be maintained, and extended to include other expert centres. This will enable other outcome measures to be investigated over time. Particularly those relating to quality of life, psychosocial and medical outcomes over time. The cohort contains approximately equal numbers of individuals who either have or have not been diagnoses as suffering from occupational asthma. This will enable comparisons between the two groups to be made.

- The case notes of all cases included in the prospective element of the study should be reviewed to determine the nature and extent of investigations completed. Comparisons could be made between the patient's perception of their condition, and that recorded within the notes. The cohort should be maintained to enable further follow-up to monitor progress, natural history of disease, quality of life issues and economic outcomes.

- Consistent levels of occupational health provision are needed to ensure appropriate health surveillance and risk assessment.

- Heightened awareness of occupational asthma in primary care will lead to improved referral rates and earlier diagnoses. This could be achieved with education at both pre- and postgraduate level.

- Preventative strategies for occupational asthma are likely to be most effective when developed by all relevant health care professionals, including secondary care physicians.

- There is an urgent need to unify national services, so that consistent standards of care are given to all workers who have occupational asthma as a suspected diagnosis.

6 APPENDICES

APPENDIX 1: Retrospective Proforma

Occupational Asthma – The Route to Diagnosis – Retrospective Proforma

---

Gender _____ Age_____ DOB___/___/___ Postcode_____

A. Diagnostic summary

Date of diagnosis of occupational asthma ___/___/___
Date of diagnosis of RADS ___/___/___
If RADS, date of highest exposure ___/___/___
Date of first symptoms of asthma ___/___/___
Date of first employment ___/___/___
Date of first employment at "responsible" site ___/___/___
Work with presumed or known sensitiser yes no
Work with presumed or known irritant yes no
First presentation with symptoms
to;_____
Presumed agent or process;
_____
Work site type;
_____
Industry type;
_____

B. Diagnostic criteria;

B1. Work related symptoms documented

Chest tightness	yes	no	date started;	___/___/___
Wheeze	yes	no	date started;	___/___/___
Shortness of breath	yes	no	date started;	___/___/___
Nasal	yes	no	date started;	___/___/___
Ocular	yes	no	date started;	___/___/___

B2. Baseline pulmonary function documented

Please record all measured lung function on separate sheets and add staple to back of document); Please document most recent here;

Date of test___/___/___ Machine type used_____

FEV_1 yes no
_____litres_____Predicted_____
FVC yes no
_____litres_____Predicted_____
FEF yes no
_____l/sec_____Predicted_____
PEF yes no
_____l/min_____Predicted_____

B3. Bronchial responsiveness
Please record all measured levels of bronchial responsiveness, entering the most recent below. In addition, other assessments should be appended by adding extra sheets to the back of this document.

Date of test ___/___/___ Machine type used_____
Challenged with; Histamine yes no
Methacholine yes no
Other Please state_____

Result; PD_{20}_____
PC_{20}_____
Other_____
20% fall in FEV_1 (or other measure of airway function) achieved yes no

B4. Specific bronchial challenge
Please record all specific challenges to occupational agents, entering the most recent below, appending other data to the back of this document.

Date of test ___/___/___ Type of challenge_____
Duration of challenge_____ Location of challenge_____
Dose used_____
Placebo controlled yes no
Result; Early reaction seen yes no
Magnitude_____

Late reaction seen yes no
Magnitude_____

Significant reaction to placebo? yes no
If yes, please state_____
Bronchial responsiveness measured during challenge yes no

If yes, summarise changes below;

C1. Immunological Assessment

Skin Prick Test yes no Date of test ___/___/___

+ve to:_____

Specific IgE yes no Date of test ___/___/___

to:_____

Total IgE yes no Date of test ___/___/___

ECP yes no Date of test ___/___/___

Atopic yes no

Any other measures:_____

D1. Peak Flow Monitoring

Peak Flow Monitoring yes no Date of test ___/___/___

OASYS Analysis yes no Date of test ___/___/___

Work Effect Index _____

E1. Comments

APPENDIX 2: Study proforma

First Semi-structured Telephone Interview Schedule Sheet

Demographics
1.Gender_____ 2.Age _____ 3.Date of Birth_____

Workplace Description

4. Job title _____

5. How many other employees (if known)? _____

6. Your Main tasks

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

7. Potential or known exposures

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

8. Do you wear any Protective Equipment (PPE)? yes no if yes what?

_____
_____
_____
_____
_____

9. Potential Hazards / Hazards _____
_____
_____
_____
_____
_____
_____

10. Have you received any hazard training? yes no if yes what?

Health and Safety

11. Does the company have a health & safety officer? yes no

12. Does the company have an occupational health service yes no
if yes who provides the service and what does it consist of?

13. What health surveillance is carried out (if any) *use checklist*

14. If health surveillance is carried how often is this carried out?

15. What are your current symptoms?

16. How long have you had these symptoms? _____

_____
_____
_____
_____

17. Are they work related

_____
_____
_____
_____
_____

18. Have you consulted your GP about these symptoms yes no
if yes how many times?

_____
_____

19. When did you first consult your GP? _____
_____

20. Have you consulted your Occupational Health department (if applicable) yes no
if yes how many times?

_____
_____

21. Have you been referred to a hospital physician regarding these symptoms yes no
if yes how many times have you seen them? _____
_____

22. Have you been given a diagnosis? yes no if yes what have you been told?

_____
_____
_____
_____
_____

23. Who diagnosed this ? _____
_____
_____
_____

24. Have you required any tests to confirm this diagnosis yes no
if yes what were the tests

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

25. Are you still in the job where your symptoms first began yes no _____

_____
_____
_____

26. Are you aware of any risk assessments being carried out in your workplace? yes no
_____
_____
_____
_____

27. Are you aware of any COSHH assessments being carried out in your workplace?
yes no
. _____
_____
_____
_____
_____
_____

28. Are you aware of any inspection of your company by HSE or the City Council Environmental Health Dept. yes no
_____
_____
_____
_____

Other Comments
_____
_____
_____
_____
_____
_____
_____
_____

Second Semi-structured Telephone Interview Schedule Sheet

1. Have you been given a diagnosis yes no if yes what have you been told?

2. Who diagnosed this ?

3. Have you required any tests to confirm this diagnosis yes no if yes what were the tests

4. Are you still in the job where your symptoms first began yes no comments

5. Are you aware of any risk assessments being carried out in your workplace? yes no

6. Are you aware of any COSHH assessments being carried out in your workplace?
yes no

7. Are you aware of any inspection of your company by HSE or the City Council Environmental Health Dept. yes no

8. If you have occupational asthma, is your employer aware of your diagnosis? yes no comments

9. If yes, have any adaptations been made to your workplace? yes no

10. If you have had to move employment what is your job now?

11. Do you have continuing symptoms? yes no If yes what are they?

12. Are you still being following up by a doctor regarding your original symptoms? yes no
if yes who? (eg GP, Occ. Health,
Consultant)_____
_____
_____
___

13. Are you taking any treatment? yes no if yes what?
_____
_____
_____

14. Do you smoke as of one month ago? yes no
if yes go to question 17, if no go to question 15

15. Have you ever smoked as much as 1 cigarette per day,or 1
cigar per week, or 1oz tobacco a month for as long as a year? yes no
if no go to other comments, if yes continue

16. How old were you when you gave up smoking altogether? _____
17. How old were you when you started smoking regularly? _____
18. Do (did) you smoke manufactured cigarettes? yes no
if yes How many per day? _____
For how many years? _____
19. Do (did) you smoke hand-rolled cigarettes ? yes no
if yes How many per day? _____
For how many years? _____
20. Do (did) you smoke small cigars ? yes no
if yes How many per day? _____
For how many years? _____
21. Do (did) you smoke large cigars ? yes no
if yes How many per day?. _____
For how many years? _____
22. Do (did) you smoke a pipe? yes no
if yes How many oz per week? _____
For how many years? _____

23. Any other comments:
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

APPENDIX 3: Consent Forms

Version 2
February 2001

Centre Number: 1
Patient Identification Number for this trial:

CONSENT FORM

Title of Project: Occupational Asthma Routes of Referral and Diagnosis – Retrospective Study

Name of Researcher: David Fishwick

Please initial box

1. I confirm that I have read and understand the information sheet dated February 2001 (version 2) for the above study and have had the opportunity to ask questions. ☐

2. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason, without my medical care or legal rights being affected. ☐

3. I understand that sections of my medical notes will be looked at by responsible individuals from the Sheffield Occupational & Environmental Lung Injury Centre. I give permission for these individuals to have access to my records. ☐

4. I agree to take part in the above study. ☐

_____	_____	_____
Name of Patient	Date	Signature
_____	_____	_____
Name of Person taking consent (if different from researcher)	Date	Signature
_____	_____	_____
Researcher	Date	Signature

1 for patient; 1 for researcher; 1 to be kept with hospital notes

Version 2
February 2001

Centre Number: 1
Patient Identification Number for this trial:

CONSENT FORM

Title of Project: **Occupational Asthma Routes of Referral and Diagnosis – Prospective Study**

Name of Researcher: David Fishwick

Please initial box

1. I confirm that I have read and understand the information sheet dated February 2001 (version 2) for the above study and have had the opportunity to ask questions. ☐

4. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason, without my medical care or legal rights being affected. ☐

5. I understand that sections of any of my medical notes may be looked at by responsible individuals from the Sheffield Occupational & Environmental Lung Injury. I give permission for these individuals to have access to my records. ☐

4. I agree to take part in the above study. ☐

_____	_____	_____
Name of Patient	Date	Signature
_____	_____	_____
Name of Person taking consent (if different from researcher)	Date	Signature
_____	_____	_____
Researcher	Date	Signature

1 for patient; 1 for researcher; 1 to be kept with hospital notes

APPENDIX 4: Information Sheets

Diagnosis of Occupational Asthma – Prospective Study
Patient Information Sheet

What is the purpose of the study?

This research project will investigate patients with suspected occupational asthma in six centres in the UK.
The purpose of the study is to find out what previous health care or investigations you have had relating to your lung condition. It will also look at what diagnosis, if any, your doctor has made 12 months after you have entered the study. Finally, it will document any workplace health surveillance you may have had and enquire about substances you are exposed to in your workplace.

What will be involved if I agree to take part in this study?

You will be asked to take part in two telephone interviews, at a convenient time for you, with one of the researchers. This will take place one month after you have agreed to take part in the study and again 12 months later.
During the first interview you will be asked about your workplace, the tasks you carry out at work, whether you wear protective equipment and other general health and safety related questions. You will also be asked about consultations with your work doctor, family doctor and hospital doctor regarding your lung problem.
During the second interview you will be asked if you have a diagnosis yet, how it was made and whether you have changed your job or work practice.

Is the study voluntary?

Yes, you are free to refuse to join the study and this will not effect your current or future treatment in any way.

Can I withdraw from the study at any time?

Yes, you may withdraw at any time without giving any explanation. Again this will not effect your current or future treatment in any way.

Will the information obtained in the study be confidential?

Yes, the information gathered will be treated with strict medical confidentiality. No one else will be given the results of the interview in any form that can identify a particular person. Anything you say will remain completely confidential. Any written reports of this study will ensure that each person who takes part remains anonymous.

Will there be any risks or side effects associated with this study?

The study will consist of telephone interviews only. Your medical investigations or treatment will not be changed in any way as part of this study.

How long will the study last?

You will be interviewed by telephone for about 15 minutes approximately one month after you have given written consent to participate in the study. You will then be contacted 12 months later for a second shorter telephone interview.

Will anyone else be told about my participation in this study?

No one will be told that you have participated in this study. Only your hospital consultant and the researcher who interviews you will know you have taken part in the study.

Who should I contact if I require further information about the study?

You may contact your own consultant ***Dr David Fishwick*** on telephone number 0114 271 3631
Or
Lisa Bradshaw
Sheffield Occupational & Environmental Lung Injury Centre
Royal Hallamshire Hospital
Glossop Road
Sheffield S10 2JF
Tel 0114 271 3631 or 0114 289 2564
Fax 0114 271 1836
Email*:* lisa.bradshaw@csuh.nhs.uk

Will anyone have access to my medical records?

If you consent to take part in the study then the researchers ***may*** require access to you medical records. Any information taken from these records will again remain strictly confidential.

Diagnosis of Occupational Asthma - Retrospective Study
Patient Information Sheet

What is the purpose of the study?

This research project will investigate patients with a diagnosis of occupational asthma.

The purpose of the study is to find out what previous health care or investigations you have had that have led to you being given the diagnosis of occupational asthma. It will also investigate how long it took before you were given a diagnosis of occupational asthma following the onset of your lung symptoms.

What will be involved if I agree to take part in this study?

You will be asked to give written consent for the investigators from the Sheffield Occupational and Environmental Lung Injury Centre to have access to your medical records. They will then review the section of your medical notes that relates to your diagnosis of occupational asthma. They will document what investigations were carried out before you were diagnosed with occupational asthma. They will also document how long it took to make this diagnosis.

Is the study voluntary?

Yes, you are free to refuse to join the study and this will not effect your current or future treatment in any way.

Can I withdraw from the study at any time?

Yes, you may withdraw at any time without giving any explanation. Again this will not effect your current or future treatment in any way.

Will the information obtained in the study be confidential?

Yes, the information gathered will be treated with strict medical confidentiality. No one else will be given the information collected from your notes in any form that can identify you. Any written reports of this study will ensure that each person who takes part remains anonymous.

Will there be any risks or side effects associated with this study?

The study will consist of the researchers having access to your medical notes only. Your medical investigations or treatment will not be changed in any way as part of this study.

How long will the study last?

The researchers will only require access to your medical notes on one occasion. They will review the notes in your local hospital, the notes will not be removed from your hospital at any time.

Will anyone else be told about my participation in this study?

No one will be told that you have participated in this study. Only your hospital consultant and the researcher who reviews your notes will know you have taken part in the study.

Who should I contact if I require further information about the study?

You may contact your own consultant ***Dr David Fishwick*** on telephone number 0114 271 3631
Or
Lisa Bradshaw
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Will anyone else have access to my medical records?

If you consent to take part in the study then only the researcher will require access to you medical records. Any information taken from these records will again remain strictly confidential.

APPENDIX 5: CASE STUDIES USED AT WORKSHOP EVENT WITH OUTCOMES AT ONE YEAR

The following case histories represent thumbnail sketches of the first 23 cases to be included in the 12 month follow up questionnaire. These brief summaries note the original presenting story, and outcome *as judged by the patients themselves*.

Case 1

Male, store utility operator, aged 42 years
Exposed to PVC, demoulding agents, carbon monoxide, hydrochloric gas
Following symptoms for 1 year
Dyspnoea on exertion and chest tightness worse at night, both work related
Ex smoker

Remains in same job although fumes are less.
Wheeze, nocturnal dyspnoea, chest tightness, cough.
Lung Function, bronchial challenge, blood tests, skin prick tests, 2 hourly PEFs
Beclomethasone and salbutamol inhalers
"Occupational asthma"

Case 2

Female, hospital support worker, aged 61 years
Exposed to gluteraldehyde, formaldehyde
Following symptoms for 5 years
Persistent cough (worse at night), chest tightness, hoarse voice all work related
Never smoked

Retired due to ill health in 2002
Occasional chest tightness
Lung function, blood tests, CXR, bronchial challenge, skin prick tests, work place visit
Salmeterol and salbutamol inhalers
Told she has asthma.

Case 3

Female, glass linisher, aged 58 years
Smoothes glass edges, cleans glass and puts in polythene bags. PVC bags cut to size by machine
Following symptoms for 4 years
Cough, dyspnoea both work related
Ex smoker

No longer working due to ill health
No symptoms
Lung function, blood tests, CXR
No respiratory medication
Told she does not have asthma

Case 5

Male, flour tanker driver, aged 43 years
Exposed to flour dust, cleans out inside of tanker weekly
Following symptoms for 12 years
Dyspnoea, rash on neck, throat irritation, severe eye irritation, cough and sputum production, all work related
Current smoker

Different job within same company
Wheezes after exercise
Lung function, blood tests, IgE to wheat flour, 2 hourly PEFs
Beclomethasone and combivent inhalers.
Occupational asthma

Case 6

Male, technical officer, aged 44 years
Maintains and installs crime prevention equipment, exposed to soldering fumes, paints, adhesives
Following symptoms for 13 months
Rhinitis, nasal catarrh, facial rash, hives, asthma controlled with medication. Only rhinitis seems to be work related
Never smoked

Remains in same job but different building
Wheezes on exertion, has nasal polyps
Lung function, blood tests, IgE, 2 hourly PEF's
Salmeterol, fluticasone, salbutamol and nasonex nasal spray
Occupational asthma.

Case 7

Male, security officer, aged 46 years
factory produces holograms for credit cards & currency, works in small poorly ventilated office above factory
Following symptoms for 10 months
Chest tightness, dyspnoea, cough with white sputum, nocturnal wakening, all work related
Ex smoker

Not working, on sickness benefit.
Cough, dyspnoea on exertion, orthopnoea.
Lung function, blood tests, bronchial challenge, skin prick tests
Salbutamol, Atrovent & Symbicort inhalers.
Occupational asthma & COPD

Case 8

Female, tea factory machine operator, aged 32 years
Threads all components onto machine; thread, tags, envelopes. Also QC including weighing and wrapping flavoured teas
Following symptoms for 7 months
Rhinitis, chest tightness, sore throat, cough all work related
Current smoker

No longer working
Dyspnoea, chest tightness
Bronchial challenge, lung function, skin prick tests, 2 hourly PEF's
Beclomethasone & salbutamol inhalers
Occupational asthma.

Case 10

Male, QC manager, aged 57 years
Mainly office based, sometimes on factory floor & exposed to isocyanates, thinners and welding fumes
Following symptom for 9 months
Dyspnoea now controlled on inhalers, thinks it is work related
Ex smoker

Made redundant February 2002
No symptoms
Lung function, CXR, blood tests, skin prick tests, bronchial challenge, work place challenge, 2 hourly PEF's
Fluticasone and salbutamol inhalers
Occupational asthma

Case 11

Male, bakery process operator, aged 54 years
Mixed batter for pancakes, exposed to flour, operated computerised batter mixer
Following symptoms for 7 years
Dyspnoea, cough and rhinitis all work related also suffers from insomnia.
Current smoker

Taken voluntary redundancy
Dyspnoea, wheeze, chest tightness, rhinitis, nocturnal cough
Lung function, CXR, blood tests, skin prick tests, bronchial challenge, PEFs
Nasonex nasal spray, salbutamol inhaler
COPD

Case 12

Female, recovery nurse, aged 57 years
Exposed to anaesthetic agents, gluteraldehyde, formaldehyde, 'Dexit', 'Tristel', 'Prosys' & latex
Following symptoms for 6 years
Cough & wheeze both work related
Never smoked

Currently on long term sick leave
Cough, wheeze, white frothy sputum
Lung function, blood tests, CXR, bronchial challenge, PEFs, skin prick tests
Symbicort & salbutamol inhalers
Occupational asthma

Case 13

Male, tool setter, aged 42 years
Dry grinds carbon tipped tools, cleans out sumps of machines
Following symptoms for 18 months
Dyspnoea and general fatigue both work related
Ex smoker

Same job
Dyspnoea on occasion
Lung function, bronchial challenge, attempted 2 hourly PEFs but couldn't manage it!
Salbutamol inhaler
Asthma

Case 14

Female, oncology staff nurse, aged 45 years
Administers IV chemotherapy, exposed to latex, radiation and cytotoxic drugs
Following symptoms for 2.5 years
Chronic cough with sputum production, occasional chest tightness & wheeze, all work related
Never smoked

Changed job
Persistent dry cough
Lung function, CXR, blood tests, skin prick tests, bronchial challenge, 2 hourly PEFs
Budesonide and salbutamol inhalers
Occupational asthma

Case 15

Male, team leader, aged 43 years
Makes air conditioning coils, exposed to oil mist, copper aluminium and steel
Following symptoms for 18 months
Dyspnoea, wheeze, chest pain, sore dry eyes all work related
Never smoked

Changed job. Company closed down Feb 2002
No symptoms
Lung function, CXR, blood tests, bronchial challenge, 2 hourly PEF's
Salmeterol & salbutamol inhalers
'Mild' occupational asthma

Case 16

Male, tool maker, aged 59 years
Wet and dry surface and universal grinding exposed to grinding dust and fumes
Following symptoms for 8 years
Cough, wheeze, recurrent chest infections all work related
Never smoked

In same job
Dyspnoea on exertion, wheeze & cough.
Lung function, CXR, blood tests, skin prick tests, bronchial challenge, PEFs
Beclomethasone & salbutamol inhalers.
"Every possibility of occupational asthma"

Case 17

Male, electroplater, aged 38 years
Exposed to sulphuric, boric & hydrochloric acid & to cyanide and to numerous metals
Following symptoms for 8 years
Dyspnoea, rhinitis, cough & contact dermatitis all work related
Current smoker

In same job
Chest tightness, cough, rhinitis, sore throat, 'flu-like symptoms since returning to work
Blood tests, lung function, CXR, PEFs, bronchial challenge, skin prick tests
Fluticasone & Salbutamol inhalers
Asthma

Case 18

Male, HGV steam cleaner, aged 41yrs.
Exposed to caustic soda, other unknown chemicals & diesel fumes
Following symptoms for 6 months
Cough, chest tightness, wheeze, sore watery eyes all work related
Current smoker

Currently unemployed, on statuary sick pay
Chest tightness in air-conditioned buildings
Lung function, CXR, blood tests, bronchial challenge, PEFs
Salbutamol inhaler
Occupational asthma

Case 19

Female, theatre nurse, aged 57yrs.
Exposed to gluteraldehyde, formaldehyde, 'Dexit', 'Tristel' & latex
Following symptoms for 3 years
Dyspnoea, dry irritant cough & wheeze, all work related
Never smoked

Currently on long term sick leave
Dyspnoea and cough
Lung function, blood tests, bronchial challenge, 2 hourly PEFs, skin prick tests
Beclomethasone & salbutamol inhalers
Asthma caused by chloride solutions

Case 20

Male core maker in steel foundry, aged 62 years
Exposed to sand, chemicals, heavy metals
Following symptoms for 4 years
Dyspnoea, cough, lethargy, runny eyes & rhinitis
Ex smoker

In same job, currently on long term sick leave
Chest tightness, wheeze, dyspnoea, cough, sputum, rhinitis
Lung function, blood tests, CXR, bronchial challenge, PEFs
Seretide & salbutamol inhalers
Occupational asthma

Case 21

Male, refrigeration engineer, aged 30 years
Constructs refrigeration carcasses and injection moulds, exposed to isocyanates, liquid foam chemicals and fibreglass
Following symptoms for 1 year
Dyspnoea, cough and wheeze all worse at night. Not sure if work related as works 7 days
Never smoked

Remains in same job
Night time cough
Lung function, 2 hourly PEFs, skin prick tests, blood tests, IgE
No medication
Told he has “slight asthma”

Case 22

Male, fitter & welder aged 39 years
Exposed to welding fumes – MIG, seam and spot welding also to grinding dust
Following symptoms for 4 years
Chest tightness, sore throat, runny nose, fatigue particularly at end of working week all work related
Never smoked

In same job but different area with less welding
No symptoms
Lung function, blood tests, CXR, bronchial challenge, PEFs, skin prick tests
Salmeterol & salbutamol inhalers
Occupational asthma

Case 23

Male, plasterer, aged 39 years
Exposed to cement & plaster dust, mould, antifungal agent (biocheck) and asbestos
Following symptoms for 5 years
Chest tightness, cough and sputum, sneezing – he’s not sure if they are work related
Current smoker

In same job
Occasional dyspnoea, chest tightness & cough
Lung function, blood tests, CXR, bronchial challenge, PEFs, skin prick tests
Salmeterol & salbutamol inhalers
‘Moderate’ asthma

Case 24

Male, spot welder, aged 37 years
Exposed to aluminium, zinc, interweld adhesives, diesel fumes
Following symptoms for 5 years
Chest tightness, dyspnoea on exertion, sore throat, itchy eyes and nose – all work related
Current smoker

In same job but conditions have improved
Occasional chest tightness – not work related
Lung function, blood tests, CXR, bronchial challenge, PEFs, skin prick tests
No medication
Does not have asthma

Case 25

Male, airport baggage handler, aged 43 years
Exposed to diesel, petrol and aviation fumes, de-icer (kilfrost fluid)
Following symptoms for 6 years
Chest tightness, dyspnoea and wheeze, all work related
Ex smoker

In same job
Chest tightness, dyspnoea, wheeze, and cough
Lung function, blood tests, CXR, PEFs, skin prick tests
Fluticasone and salmeterol inhalers
Asthma

7 REFERENCES

1. Blanc PD, Toren K. How much adult asthma can be attributed to occupational factors. Am J Ind Med 1999;107(6):580-7.
2. Malo JL, Chan-Yeung M. Occupational asthma. J Allergy Clin Immunol 2001;108(3):317-328.
3. Partridge MR. Translating research into practice:how are guidelines implemented? Eur Respir J Suppl 2003;39:23s-29s.
4. Meyer JD, Holt DL, Chen Y, Cherry NM, McDonald JC. SWORD '99:surveillance of work-related and occupational respiratory disease in the UK. Occupational Medicine 2001;51(3):204-8.
5. Bradshaw LM, Curran AD, Eskin F, Fishwick D. Provision and perception of occupational health in small amd medium-sized enterprises in Sheffield, UK. Occupational Medicine 2001;51(1):39-44.
6. Survey of Use of Occupational Health Support. Institute of Occupational Medicine 445/2002.
7. Dicpinigaitis PV, Allusson VR, Baldanti A, Nalamati JR. Ethnic and gender differences in cough reflex sensitivity. Respiration 2001;68(5):480-2.

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