Follow-up survey of patients with occupational asthma

J. Feary1,2, J. Cannon1, B. Fitzgerald1, J. Szram1, S. Schofield1 and P. Cullinan1,2

1Department of Occupational Lung Disease, Royal Brompton and Harefield NHS Foundation Trust, London SW3 6NP, UK,
2National Heart and Lung Institute, Imperial College, London SW3 6LR, UK.

Correspondence to: J. Feary, National Heart and Lung Institute, Imperial College, London SW3 6LR, UK. Tel: +44 020 7594 7968; e-mail: j.feary@imperial.ac.uk

Background Occupational asthma (OA) is often associated with a poor prognosis and the impact of a diagnosis on an individual's career and income can be significant.

Aims We sought to understand the consequences of a diagnosis of OA to patients attending our clinic.

Methods Using a postal questionnaire, we surveyed all patients attending our specialist occupational lung disease clinic 1 year after having received a diagnosis of OA due to a sensitizer (n = 125). We enquired about their current health and employment status and impact of their diagnosis on various aspects of their life. Additional information was collected by review of clinical records.

Results We received responses from 71 (57%) patients; 77% were referred by an occupational health (OH) provider. The median duration of symptoms prior to referral was 18 months (interquartile range (IQR) 8–48). At 1 year, 79% respondents were no longer exposed to the causal agent. Whilst the unexposed patients reported an improvement in symptoms compared with those still exposed (82% versus 53%; P = 0.023), they had poorer outcomes in terms of career, income and how they felt treated by their employer; particularly those not currently employed. Almost all (>90%) of those still employed had been referred by an OH provider compared with 56% of those currently unemployed (P = 0.002).

Conclusions The negative impact of OA on people's careers, livelihood and quality of life should not be underestimated. However, with early detection and specialist care, the prognosis is often good and particularly so for those with access to occupational health.

Key words Allergy; asthma; occupation; outcomes.

Introduction

Occupational asthma (OA) caused by exposure to workplace respiratory sensitizers is not uncommon. In the UK an estimated 200–300 new cases of OA are reported annually to a national surveillance scheme (‘SWORD’) but this is undoubtedly an underestimate of the true figure [1]. Most affected individuals are of working age and financially dependent on their job. Patients with OA are usually advised to avoid further exposure to the causative antigen which in many cases leads to a change of job, often with a loss of earnings. We sought to understand the consequences of a diagnosis of OA on our patient population.

Methods

As part of routine care, we surveyed all patients attending our specialist occupational lung disease service between May 2006 and May 2016 with a final diagnosis of OA (n = 125). Patients with suspected OA had a diagnosis made (or excluded) using: a history of exposure to a known respiratory sensitizer; the presence of work-related respiratory symptoms following a period of latency; measurement of appropriate specific antibodies or skin prick tests (if available); and, if the patient was still exposed, analysis of serial peak flow recordings carried out over a minimum of 4 weeks with at least four recordings made each day and including both days at and away from work. Where it was not possible to make a definitive diagnosis on these tests alone, or in cases where a novel asthmagen was purported to be the causal agent, specific inhalation testing as an inpatient using a single-blind approach was carried out in line with European consensus guidelines [2]. The final diagnosis was made by consensus following discussion at a multidisciplinary meeting which includes physicians, specialist nurses and immunologists. For the purposes of this study we did not
Key learning points

What is already known about this subject:
• Occupational asthma is often associated with a poor prognosis particularly if diagnosis is delayed and with ongoing exposure to the causative agent.
• The impact of a diagnosis of occupational asthma on an individual, particularly with respect to their future employment and income, can be significant.

What this study adds:
• The prognosis of occupational asthma in our population is good overall, particularly in those removed from the causal agent with improvement in symptoms occurring within a few months.
• Individuals referred by their occupational health service were more likely to remain in employment after diagnosis and to have a better prognosis.
• Most participants reported that the diagnosis of occupational asthma had had a negative impact on their career, income and quality of life.

What impact this may have on practice or policy:
• Health care professionals should have a low threshold for suspecting occupational asthma in people with work-related symptoms to reduce the time to diagnosis and removal of exposure thereby improving prognosis.
• Many patients feel unsupported by their employer following a diagnosis of occupational asthma and consideration should be given on how to improve this.
• People diagnosed with occupational asthma should have access to occupational health to improve outcomes.

include patients with a diagnosis of work-exacerbated asthma or those with irritant-induced asthma.

We reviewed the clinical records of patients with OA to determine the duration of symptoms prior to referral, exposure history and source of referral. One year after diagnosis we sent each patient a postal questionnaire. The questionnaire enquired into their current employment and symptoms including if they were working with the same employer or a different employer and if they were still working with the agent that caused their asthma and if so whether their exposure was unchanged or reduced. Using a five-point Likert scale, the questionnaire also asked their opinion about how they were treated by their employer after diagnosis, and the impact on their quality of life, career progression and income. Finally, we asked about whether they had made a claim for Industrial Injuries Disablement Benefit (IIDB).

Responses to questions measured on the five-point Likert scale were ‘collapsed’ to binary variables for analysis. Using STATA version 14 (Stata Corp, College Station, TX, USA), we assessed associations between categorical variables using Pearson’s chi-squared test or Fisher’s exact test; and analysed differences in means using t-tests, and medians using the Mann–Whitney U-test. A P-value of <0.05 was considered statistically significant.

Results

We received responses from 71 (57%) patients. There were no significant differences in age, sex or occupation between those who did and did not reply. The majority of respondents were sensitized to high-molecular-weight agents (bakery and laboratory animal allergens) and most were male (69%); 77% were referred by an occupational health (OH) provider (Table 1).

The median duration of symptoms prior to referral was 18 months (interquartile range (IQR) 8–48) and significantly shorter for those who reported an improvement in symptoms at 1 year compared with those whose symptoms were unchanged or worse (17 months (IQR 6–36) versus 24 months (IQR 12–192); P = 0.016). Over 80% of participants reported an improvement in symptoms with a median time for this to occur of 3 months (IQR 1–6); 16% reported complete resolution of symptoms.

Most patients (79%) were no longer exposed to the cause of their OA; they were more likely to report an improvement in symptoms than those still exposed (82% versus 53%; P = 0.023). However, they reported poorer outcomes in terms of career, income and treatment by their employer (Figure 1); this was particularly so for those who were not currently employed (24%).

Figure 1. Outcomes by removal from exposure (P-values correspond to the differences between the groups using a chi-squared test).
Almost all the patients who were still employed (80% of those with, and 90% of those without ongoing exposure) had been referred by an OH provider, a proportion far higher than among those currently unemployed (53%; \( P = 0.008 \)). A greater proportion of those referred from OH stated that their quality of life had improved or been unaffected following diagnosis compared to those referred from other sources (51% versus 20%; \( P = 0.043 \)).

Overall, fewer than half made a claim for IIDB; this was particularly the case for animal workers and scientists where only 13% made a claim compared with 53% of other workers (\( P = 0.004 \)). Overall, most patients (86%) reported being ‘glad’ that their diagnosis had been made and 99% (missing data for one respondent) were satisfied with the service they had received from us.

**Discussion**

At 1 year after diagnosis, most of our patients with OA were no longer exposed to the aetiological agent. The majority reported an improvement in symptoms with 16% being asymptomatic but that their diagnosis had had a negative impact on their career, income and quality of life. Nonetheless, a strong majority were glad that the diagnosis had been made. In the UK, OH services are provided by nurses and doctors either ‘in-house’ or via an external contract. In our study patients referred directly from OH services were more likely to remain employed and report favourable outcomes. Possible explanations for this observation include a reflection of better care from such specialists, or that employers who access OH services are more likely to be accommodating of changes needed in those who develop OA.

The main strength of our study lies in its consistency of diagnosis and management advice, and our enquiry into a range of different patient-focused outcomes. The generalizability of our findings may be limited by the modest response rate. We report the outcomes of patients referred to a specialist clinical centre; our findings may not be representative of all workers with OA and particularly not those in whom the diagnosis is not made at all. We limited our study population to those with OA due to a respiratory sensitizer with latency. Irritant-induced asthma (or ‘reactive airways dysfunction syndrome’) and work-exacerbated asthma both have different underlying mechanisms and correspondingly require different management strategies.

The favourable prognosis that we observed probably reflects the relatively short period of symptomatic exposure before referral and diagnosis; the median duration of symptoms at time of first consultation here was

<table>
<thead>
<tr>
<th>Table 1. Agents causing occupational asthma in respondents and outcomes 12 months after diagnosis; by source of referral</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Exposure</strong></td>
</tr>
<tr>
<td>Allergen</td>
</tr>
<tr>
<td>Bakery allergens</td>
</tr>
<tr>
<td>Laboratory animal allergens</td>
</tr>
<tr>
<td>Isocyanates</td>
</tr>
<tr>
<td>Detergent enzymes</td>
</tr>
<tr>
<td>Platinum salts</td>
</tr>
<tr>
<td>Solder fumes (colophony)</td>
</tr>
<tr>
<td>Metal working fluids</td>
</tr>
<tr>
<td>Other allergens( ^b )</td>
</tr>
<tr>
<td><strong>Outcomes</strong></td>
</tr>
<tr>
<td>Change in symptoms</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Career</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Income</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Quality of life</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Treated well by employer</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>‘Glad’ diagnosis made</td>
</tr>
<tr>
<td>Current employment status</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

\( ^a \)10 referred from hospital doctors (eight of whom were respiratory specialists) and five from general practitioners (GPs).

\( ^b \)\( n = 1 \) case each of OA due to methacrylates, stainless steel fumes, obeche wood, sodium persulphate, jellyfish, herbicide, nematodes, pharmaceuticals.
just 18 months, much lower than the mean of 4 years reported elsewhere [3]. A meta-analysis of 39 studies found a pooled estimate of complete symptomatic recovery of 32% after avoidance of exposure to the causative agent [4] but with a longer follow-up time than our population (median 31 months (range 6–240)) suggesting our patients may continue to improve over time. National asthma guidelines state that the possibility of OA should be considered at an early stage and patients referred for specialist investigation to allow prompt identification of potential cases [5]. A recent study from Canada reported the psychosocial, occupational and economic outcomes of a diagnosis of work-related asthma in patients attending a tertiary clinic between 1991 and 2014. The authors contacted patients and invited them to complete a questionnaire; the overall response rate was 46%. Their findings were very similar to ours; of the 50 patients with OA due to a sensitizer, 60% had a decrease in their income following onset of OA symptoms and 64% were in receipt of worker compensation [6]. Previous studies have shown the negative impact of a diagnosis of OA on individuals’ careers and economic positions; findings from other case series suggest that around one-third of patients are unemployed following diagnosis [7–10]. Here we found that this was particularly the case for those removed from exposure and strikingly for those not currently employed [7–10]. It is plausible that workers who are redeployed, despite remaining in employment, are moved into lower-paid or less-skilled positions. There is inconsistent evidence that the risk of unemployment may be greater in those with OA than those with non-work-related asthma [6–8,11]. A previous study of workers with OA to Western Red Cedar found that remaining employed was the biggest predictor of reporting a good quality of life and with the highest scores reported by those who stayed with the same employer but were relocated away from exposure [12]. In keeping with an earlier study [7], a high proportion of our patients did not apply for IIDB despite, in all cases, being advised that they were eligible to do so. This was particularly so for animal workers who may be more easily able to find alternative, unexposed jobs; it may also reflect the perceived ‘sensitive’ nature of their work. Importantly, we found that patients referred from OH were more likely to remain in employment and that a diagnosis of OA had a significantly lower impact on their quality of life and a trend towards a more favourable outcome than those referred from other sources.

Our findings suggest that outcomes are better for those with access to OH services, yet in the UK this is patchy [13]; worldwide only around 20% of working people will have access to OH and thus are at greater risk of poorer outcomes if they develop OA [14]. The experience we report here confirms that the adverse impact of OA on people’s careers, livelihood and quality of life should not be underestimated but that, with early detection and care in a specialist centre, the prognosis is often good.

Competing interests
None declared.

References