OCCUPATIONAL ASTHMA

Hospital Attendances and Acute Admissions Preceding a Diagnosis of Occupational Asthma

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Abstract

Purpose Occupational exposures are a common cause of adult-onset asthma; rapid removal from exposure to the causative agent offers the best chance of a good outcome. Despite this, occupational asthma (OA) is widely underdiagnosed. We aimed to see whether chances of diagnosis were missed during acute hospital attendances in the period between symptom onset and the diagnosis of OA.

Methods Patients diagnosed with OA at the regional occupational lung disease service in Birmingham between 2007 and 2018 whose home address had a Birmingham postcode were included. Emergency department (ED) attendances and acute admission data were retrieved from acute hospitals in the Birmingham conurbation for the period between symptom onset and diagnosis.

Results OA was diagnosed in 406 patients, 147 having a Birmingham postcode. Thirty-four percent (50/147) had acute hospital attendances to a Birmingham conurbation hospital preceding their diagnosis of OA, including 35 (24%) with respiratory illnesses, which resulted in referral for investigation of possible OA in 2/35. The median delay between symptom onset and diagnosis of OA was 30 months (IQR = 13–60) and between first hospital attendance with respiratory illness and diagnosis 12 months (IQR = 12–48, range 3–96 months)

Conclusions The chance to reduce the delay in the diagnosis of OA was missed in 33/35 patients admitted or seen in ED with respiratory symptoms in the period between symptom onset and diagnosis of OA. The diagnosis of OA was delayed by a median of 12 months by failure to ask about employment and work relationship of symptoms.

Keywords Asthma · Occupational asthma · Acute bronchitis · Exacerbation · Diagnosis · Emergency care

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Introduction

Occupational asthma (OA) accounts for one in six new cases of adult-onset asthma [1], with UK healthcare and social costs of £1billion each decade [2]. OA can arise de novo, or in those with existing or reactivated childhood asthma, and its incidence is 74–300 cases per million workers per annum [3]. Early recognition of OA, and subsequent removal from causative exposure is the best predictor of good healthcare and employment outcomes for the affected worker [1, 4]. Indeed BTS/SIGN asthma guidelines recommend asking asthmatic patients of working age whether their symptoms are work related [5], and referring to a specialist those with a positive response to confirm or exclude OA. Despite this, diagnosis is often delayed [6], or missed in approximately 50% of cases [7]. Our previous audit has shown that physicians of any seniority rarely ask about occupation or work-relatedness of symptoms when confronted with an asthmatic

of working age in ED or acute medical unit [8]. We aimed to see whether the symptomatic period prior to a diagnosis of OA is punctuated with emergency department (ED) attendances and/or admissions with acute respiratory illness, and whether opportunities to identify OA in acute secondary care are taken.

Methods

University Hospitals Birmingham (UHB) NHS Foundation Trust (Birmingham Chest Clinic) hosts the West Midlands regional NHS occupational lung disease service. For each patient diagnosed with OA at the service, limited data are kept in a Microsoft Excel spreadsheet for subsequent monthly reporting to the UK Health and Safety Executive SWORD surveillance scheme; these comprise age, 3-letter postcode, gender, month/year of diagnosis, month/year of onset of symptoms, industry, occupation and causative agent [9]. A clinical diagnosis of OA is made on the balance of probabilities (i.e. when more likely than not), and all patients exhibit asthma with a history showing work-relatedness. For the majority of patients seen at the unit, diagnosis is also confirmed by objective tests, 70% by OASYS [Occupational Asthma SYStem] analysis of serial peak flow measurements [10] and 11% by specific inhalation challenge tests [11]; a summary of this has been described elsewhere [12].

All cases of OA diagnosed between 1 January 2007 and 31 December 2018 were retrieved, and those with a Birmingham (UK) 3-letter postcode (B1 to B98) retained. Emergency Department (ED) and admission data were available for hospitals in the Birmingham conurbation: Queen Elizabeth, Heartlands, Good Hope, Solihull, Sandwell and West Birmingham.[1] Patients were grouped into those whose nearest hospital to home was one in the Birmingham conurbation and those who lived nearer another hospital (Redditch, Dudley, Warwick, Walsall and Nuneaton) who may also have received some of their care in a Birmingham conurbation hospital. For each patient, the source of OA referral to the regional occupational lung disease service (e.g. general practitioner (GP), occupational health provider) and whether referral was prompted by an acute event requiring secondary care, was extracted from the clinic records by GW. For each patient attending Birmingham conurbation hospitals, dates and coded diagnoses of all ED attendances and admissions from 2002 to the time of OA diagnosis were retrieved (ED attendances that led to admissions were counted only as admissions). All data were non-normally distributed and are displayed with medians and interquartile ranges. The study was judged to be a service evaluation by UHB NHS Foundation Trust and so no formal ethical approval was sought.

Results

147/406 patients diagnosed with OA at the regional occupational lung disease centre had Birmingham postcodes and were included. There were 95 men (65%) with median age = 48 (IQR = 37–56). Causative agents are shown in supplementary data 1; the commonest causes were isocyanates = 28 (19%) and metalworking fluid = 17 (12%). The sources of referrals for OA were as follows: GP = 67 (46%), secondary care = 51 (35%), occupational health = 23 (16%), directly from attendance/admission = 2 (1%; 1 from AMU, 1 via GP), from solicitors = 2 (1%), from investigation of an outbreak = 2 (1%). The nearest hospitals were either in the Birmingham conurbation = 126 (86%), or outside Birmingham = 21 (14%). The median delay between symptom onset and diagnosis of OA was 30 months (IQR = 13–60) (Fig. 1).

Thirty-four percent (50/147) of patients had acute hospital events at a Birmingham conurbation hospital preceding their diagnosis of OA, including 35 (24%) with respiratory illnesses and 27 (18%) with non-respiratory illnesses (not mutually exclusive); these proportions were similar when considering only those living nearest to a Birmingham conurbation hospital: 44/126 (35%), 30 (24%) and 24 (19%), respectively. There were 45 acute hospital events with respiratory diagnoses in 35 patients (1–4 per patient, admissions = 26, ED attendances = 19). Diagnoses were acute airway episode (i.e. wheezy bronchitis, "infective exacerbation airways disease", asthma exacerbation) = 35 (78%), community acquired pneumonia = 5 (11%), dyspnoea unspecified = 3 (7%), pleuritic chest pain unspecified = 1 (2%) and cough unspecified = 1 (2%). No significant correlation between the number of hospital events and time from symptom onset to diagnosis was seen (Kendall tau-B co-efficient = 0.04; $p = 0.78$). The median time between first respiratory illness to diagnosis = 12 months (IQR = 12–48, range 3–96 months) (Fig. 2). There were 55 non-respiratory events in 27 patients (1–10 per patient, admissions = 27, ED attendances = 28). The commonest medical non-respiratory diagnoses seen were musculoskeletal = 23 (42%), chest pain (including cardiac) = 9 (16%), urological = 5 (9%), gastrointestinal = 4 (7%), neurological = 2 (4%), ENT = 2 (4%), skin = 2 (4%).

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[1] Only respiratory-related ED and admission data were available from Sandwell and West Birmingham hospitals.
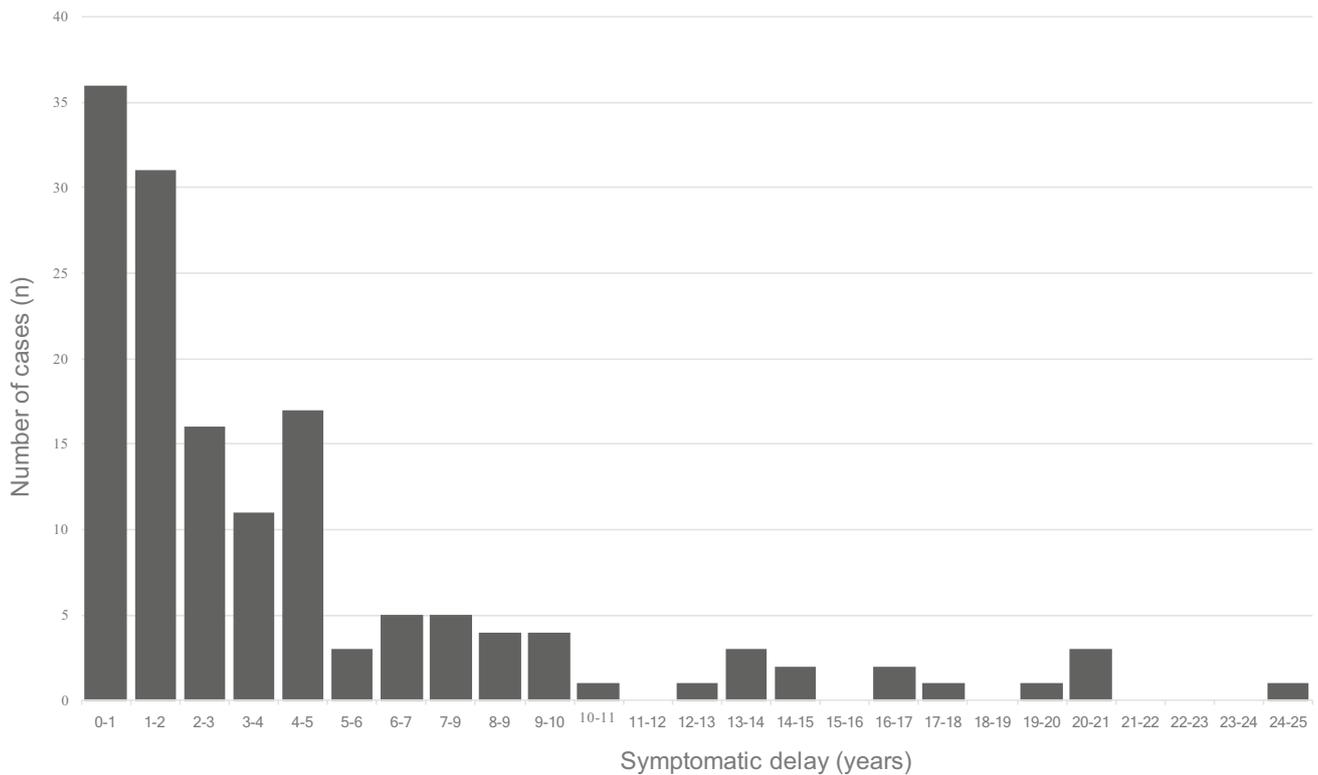
Fig. 1 Histogram showing frequency distribution of delay between symptom onset and diagnosis of OA; bins represent each year of delay
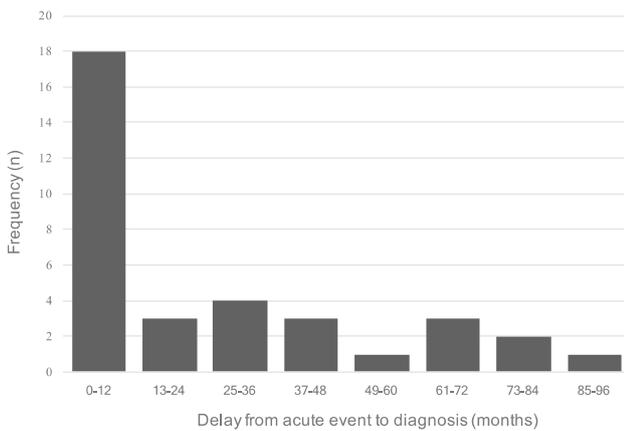

Fig. 2 Delay between first hospital attendance with acute respiratory event and the diagnosis of OA

Discussion

Twenty-four percent of patients subsequently found to have OA, either attended ED or were admitted with acute respiratory illness while symptomatic before diagnosis. In the majority, the hospital diagnosis was acute bronchitis, with or without infection, though there were some diagnoses of community-acquired pneumonia or uncategorised respiratory symptom. There was an average of one event per hospitalised patient, thus providing only a single opportunity to identify OA during the symptomatic but undiagnosed period. However, there was evidence from referral and clinical letters that only 1% resulted in subsequent referrals to the specialist service, and 50% would wait > 1 year for a diagnosis of OA, with a maximum of 8 years.

This study has been undertaken using a retrospective cohort from tertiary clinic population in Birmingham, UK. Provided that a home address with a Birmingham postcode was identified, no patients diagnosed between 2007 and 2018 were excluded. There are some limitations that should be acknowledged: (1) patients do not necessarily work in the same postcode or city where they live, so there may have been occult acute events at other hospital sites. Indeed, no data were available from other West Midlands hospitals outside the Birmingham conurbation, these omissions would have reduced the proportion seen in hospital before their diagnosis of OA; (2) selection bias through using only a tertiary clinic population means that patients diagnosed with OA elsewhere, by other services (e.g. occupational health providers), or with unrecognised OA would not have been included; (3) no hospital episode data from pre-2002 were available which may also have underestimated the frequency of hospital attendance for some; (4) GW reviewed clinic and

referral letters to establish whether acute events provided a prompt for referral, therefore this was subjective and not first hand from referral sources.

We have shown previously that physicians do not readily ask adult patients with acute asthma about the nature of their work and work-related symptoms [8]. Therefore, it is perhaps not surprising that opportunities to recognise OA and refer to specialist are not being taken. However, the process of referral to an occupational lung disease specialist following an acute event would usually rely on the co-operation of patient and GP, groups for whom significant barriers to referral for OA diagnosis have been demonstrated [6, 13, 14]. These are significant missed opportunities because, for each patient with OA, the likelihood of a 'cure' or prevention of deterioration is greater in those with a short duration of symptoms prior to diagnosis and removal from exposure to the causative agent [1, 4]. UK guidelines for the management of asthma [5] recommend that healthcare professionals ask all patients with new or reactivated childhood asthma whether symptoms are better on days away from work or on longer holidays, questions which have a high sensitivity for identifying OA; an occupational cause can also be identified through awareness of jobs and processes that carry particular risk for OA. Ensuring that adults of working age with acute respiratory illness are screened for OA should be embedded in physicians' practice and would be suitable for a Quality Improvement initiative.

In conclusion for some patients with OA, a (usually) single opportunity to identify OA and refer to a specialist exists, during hospital attendance or admission with acute respiratory disease. In a large UK urban population, this opportunity is not being taken, and contributes to long delays between onset of disease and diagnosis. All patients of working age should be asked about their employment and any relationship between their job and their symptoms.

Compliance with ethical standards

Conflict of interest None of the authors declare any conflict of interests.

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