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Agents and trends in health care workers' occupational asthma

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Abstract

Background—There is a disproportionately high number of cases of work-related asthma occurring in health care occupations due to agents such as glutaraldehyde, latex and cleaning products.

Aims—To understand the causes and measure trends over time of occupational asthma (OA) in health care workers (HCWs).

Methods—We reviewed OA notifications from the Midland Thoracic Society's Surveillance Scheme of Occupational Asthma (SHIELD) database in the West Midlands, UK, from 1991 to 2011 and gathered data on occupation, causative agent and annual number of notifications.

Results—There were 182 cases of OA in HCWs (median annual notifications = 7; interquartile range [IQR] = 5–11), representing 5–19% of annual SHIELD notifications. The modal annual notification was 20 (in 1996); notifications have declined since then, in line with total SHIELD notifications. The majority of cases (136; 75%) occurred in nursing, operating theatre, endoscopy and radiology staff. The most frequently implicated agents were glutaraldehyde ($n = 69$), latex ($n = 47$) and cleaning products ($n = 27$), accounting for 79% of the 182 cases. Cleaning product-related OA was an emerging cause with 22 cases after 2001 and only 5 cases between 1991 and 2000.

Conclusions—Control measures within the UK National Health Service have seen a decline in OA in HCWs due to latex and glutaraldehyde, though OA remains a problem amongst HCWs exposed to cleaning products. Continuing efforts are required to limit the number of cases in this employment sector.

Keywords

Cleaning agent; glutaraldehyde; health care; latex; occupational asthma

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Conflicts of interest None declared.

Introduction

Work-related asthma (WRA) includes occupational asthma (OA) caused by sensitization to an agent at work, and work-exacerbated asthma (WEA) in which existing cases of asthma are worsened by workplace conditions [1]. Evidence from surveillance in the USA suggests that health care is the source of a disproportionate number of WRA cases [2]. Asthma symptoms have been associated with a variety of agents, including cleaning and disinfecting chemicals, aerosolized medications, latex and adhesives [2–4]. A 2008 article summarized data on OA cases reported during 1991–2005 to the Midland Thoracic Society's Surveillance Scheme of Occupational Asthma (SHIELD) in the West Midlands, UK [5]. In this article the 125 OA cases identified in nurses, health professionals and doctors were not described in detail. Information from surveillance systems could provide further insight into the problem, so the aim of this report was to highlight the causes of OA in health care workers (HCWs), with the hope that a better understanding of causation will contribute to preventing WRA in this employment sector.

Methods

SHIELD is a voluntary reporting scheme for occupational and chest physicians in the West Midlands, UK, where participating professionals notify details of newly identified OA cases. WEA cases are not included. All notifications require a convincing history of sensitizer or irritant exposure with work-related asthma symptoms, where OA is more likely than not. No specific tests are required for notification, although 70% of all SHIELD OA diagnoses are based on serial peak-flow measurements, 46% on allergen-specific immunoglobulin E, and 11% on specific inhalational challenge. Further details about this surveillance scheme have been published [5,6]. Notifications from HCW occupations for 21 years (1991–2011) were identified from the SHIELD electronic database, together with data on sensitizing agents.

Results

There were 182 SHIELD notifications of OA in HCWs (median annual notifications = 7; interquartile range [IQR] = 5–11). These represented 5–19% of annual notifications. Annual notifications peaked in 1996 at 20, but have declined since then, particularly after 2002, with 3–7 annual notifications. Total notifications also fell from 135 cases per year in 1995 to 34 cases per year in 2010 and 2011.

The most frequently encountered agents were glutaraldehyde, latex and cleaning products (see Table 1), which accounted collectively for over three quarters ($n = 144$, 79%) of cases (see Table 1). Glutaraldehyde was the most frequently encountered agent ($n = 69$) with 12 cases in 1996, but no notifications reported after 2005. Seven cases ($n = 47$) were attributed to latex in both 1997 and 1998, but numbers declined with only 15 cases between 2001 and 2011. Cleaning products ($n = 27$) emerged as a cause with 5 cases from 1991–2000, and 22 cases from 2001–2011. With respect to occupation the majority of cases (136; 75%) involved nursing, operating theatre, endoscopy and radiology staff.

Discussion

Annual notifications of OA in HCWs declined from 1996 onwards, in line with total annual SHIELD notifications, attributed principally to fewer cases of glutaraldehyde- and latex-related OA. Conversely, cleaning product-related OA was increasingly recognized and was the most frequently implicated agent since 2001.

This study is strengthened by using a complete 21-year dataset from a large geographical region with a working age population of approximately 2.5 million [7]. It should however be acknowledged that SHIELD is a voluntary reporting scheme, and hence subject to selection bias and reporter fatigue over time. Notifications to SHIELD are made when the diagnosis of OA is more likely than not, requiring a history suggesting either sensitization or irritant OA. Only 11% of SHIELD notifications had specific inhalation challenges, whereas this is a requirement for other reporting schemes.

Declining notifications of OA in HCWs are consistent with increased awareness and reduction in use of latex and complete withdrawal of glutaraldehyde within the National Health Service (NHS) in the UK. Powdered latex gloves have been replaced with powder-free latex or nitrile gloves in the NHS. Exposure to glutaraldehyde as a sterilizing agent for endoscopes has declined over the last 10 years; firstly by automation and enclosure of reprocessing, and subsequently by substitution with other cleaners [8]. While 43% of OA cases in radiology staff were due specifically to glutaraldehyde the advent of digital imaging has resulted in reduction in exposure linked to its use as a radiographic film developer.

There were fewer annual SHIELD notifications from 2000 [9], due in part to legislation on transfer of patient data (1998 Data Protection Act) and in part to reporter fatigue [5,9]. Annual notifications of OA in HCWs as a proportion of overall annual SHIELD notifications remained stable (range 5–19%). The results of this study are comparable with previous work. Pechter *et al.* [2] found that HCWs accounted for 16% of OA reports, which was an over-representation in their US population, and concluded that an increased risk existed in this employment sector. Hospital nurses were the occupation most affected, and cases of WRA were most frequently linked to cleaning products and latex. Two US studies attributed an increased risk of WRA in HCWs to cleaning products [3,4]. An analysis of time-trends in the incidence of WRA in France showed that the incidence of WRA in HCWs fell from 2001 to 2009, due in part to a reduction of WRA due to latex and aldehydes [10]. Conversely, an increase in cases due to quaternary ammonium compounds was observed.

Our study provides further evidence for the persistence of cleaning product-related OA in the UK linked to a variety of chemicals. However, there is potential for reporting bias, as publications about asthma among cleaners have increased. There is continuing concern about health care-associated infections, which could motivate more aggressive use of traditional cleaning products and quaternary ammonium compounds in health care settings.

Control measures have seen a decline in OA due to glutaraldehyde and latex in HCWs over the period 1991–2011 in the West Midlands, UK. OA is still a problem among HCWs exposed to cleaning products, so further effort is required to limit the number of cases in this employment sector.

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Key points

- Asthma in health care workers has been associated with agents such as glutaraldehyde, latex, antimicrobials and cleaning products.
- This study found that in the West Midlands, UK notifications of occupational asthma in health care workers declined, due principally to a reduction in the number of cases of latex- and glutaraldehyde-related occupational asthma.
- However, there was an increase in occupational asthma notifications due to cleaning products, so control strategies should be sought that limit exposure to such products.

Table 1

Cases of occupational asthma from health care occupations reported to the SHIELD surveillance system (1991–2011), by agents and occupation

Cause	Number of cases by cause <i>n</i> (%)	Health care occupations							
		Nurses and health care assistants (generic)	Theatre staff (including scrub nurses, anaesthetists, surgeons)	Endoscopy staff (including endoscopy nurses)	Radiology staff (including radiographers, radiologists, darkroom technicians)	Ward domestics (cleaners and ward hostesses)	Pathology staff (including doctors, laboratory technicians, mortuary staff)	Dental staff (including dentists, dental nurses)	Other staff ^a
Glutaraldehyde	69 (38)	15	18	20	9	0	3	2	2
Latex	47 (26)	26	4	1	1	2	1	4	8
Cleaning products ^b	28 (15)	14	2	0	0	7	2	0	3
Radiographic chemicals	11 (6)	0	0	0	11	0	0	0	0
Anaesthetic agents	7 (4)	2	5	0	0	0	0	0	0
Acrylates	5 (3)	2	1	0	0	0	0	1	1
Formaldehyde	4 (2)	0	0	0	0	0	4	0	0
Unknown	3 (2)	2	0	0	0	0	0	0	1
Antimicrobial drugs	2 (1)	2	0	0	0	0	0	0	0
Other ^c	6 (3)	0	1	0	0	1	0	1	3
Total	182 (100)	63	31	21	21	10	10	8	18

^aOther occupations were midwives (*n* = 5), administration staff (*n* = 4), physiotherapists (*n* = 3), other doctors (*n* = 2), unspecified (*n* = 1), carpenter (*n* = 1), plaster room staff (*n* = 1) and pharmacy staff (*n* = 1).

^bChlorine-releasing, chloramines, chlorhexidine, alcohol gels, denatonium from alcohol gel, benzylalkonium chloride, nitrogen trichloride, peroxyacetic acid.

^cOther causes were Scotch cast (*n* = 1), pigeon feathers (*n* = 1), Supalux (*n* = 1), humidifier (*n* = 1), bone cement (*n* = 1), air freshener (*n* = 1).