

Implementation of statutory occupational respiratory health surveillance

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Health surveillance is required by UK regulations in certain circumstances, and is usually provided through an occupational health organization. Although there are studies assessing the provision of health surveillance across the country, there are no published studies addressing the practical application of legislation, guidelines and medical research to respiratory health surveillance programmes. An audit of a multidisciplinary health surveillance programme was carried out, using review of occupational health records, occupational hygiene reports and managers' risk assessments, to compare the implementation of health surveillance in different organizations and under different contractual relationships. Sixty-six per cent of National Health Service (NHS) and 56% of industrial workplaces were able to provide risk assessments but were unable to link these with appropriate health surveillance. Twenty-seven per cent of NHS employees potentially exposed to respiratory sensitizers had baseline surveillance, compared with 87% in industry. Fifty-five per cent of Medical Research Council questionnaires were inappropriately administered by the employee themselves, rather than an interviewer as recommended. Other follow-up questionnaires in use had not been formally validated. Non-regular lung function assessment using spirometry was the predominant tool used for follow-up surveillance. There was no overall strategic approach to respiratory health surveillance in the organization studied. Health surveillance programmes should focus on disease prevention without becoming a repetitious application of unvalidated tools. Clinical governance demands quality assurance standards that will effectively implement a coordinated approach to health surveillance.

Key words: Audit; health surveillance; occupational asthma; respiratory sensitizers.

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Introduction

Health surveillance is one cornerstone of the management of health and safety in the workplace. The requirement for competent health surveillance is part of the European 'Framework' Directive [1] and part of UK legislation [2]. Health surveillance of workers in environments containing respiratory sensitizers is a core activity

for many occupational health services. Currently, between 200 and 300 agents encountered in the workplace have been reported in relation to sensitization and occupational asthma [3], and the long list of causes means that a wide range of establishments, large and small, potentially expose workers to asthmagens. As the list of recognized sensitizers continues to grow, it is clear that a targeted risk reduction programme is required to prevent the development of occupational asthma.

A survey of occupational health provision by the UK Health & Safety Executive (HSE) [4] found that only 8% of private establishments had access to a clinician, and

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that only half of these clinicians had an appropriate occupational health qualification. Small establishments are less likely to have access to clinicians. One response to this has been the launch of NHS Plus [5], which is part of the UK National Health Service (NHS) plan [6]. The intention is to encourage NHS trusts to offer occupational health services to industry. The occupational health services must be accredited and must comply with clinical governance [7], which is a quality assurance system for the NHS. This paper describes an evaluation of respiratory health surveillance programmes for workers in environments containing respiratory sensitizers, as defined by the COSHH regulations [8]. All the programmes were provided by an NHS-based occupational health service to a mixture of health care and industrial workers. The aim of the evaluation was to compare the structures, processes and outcomes of the respective programmes. Proposed core elements of a health surveillance programme were developed following a review of relevant literature and legislation using the computer bibliographic databases Medline and Embase. Additional references were obtained via manual searches of journals and reference lists provided in reports and textbooks. Legislative data were obtained from HSE publications and approved codes of practices issued by the HSE.

Methods

The study is a descriptive retrospective analysis of a health surveillance programme performed for employees potentially exposed to respiratory sensitizers in the NHS and industry. It was an opportunistic study of services provided by an NHS-based occupational health service. The study comprised a questionnaire survey of managers and safety advisors, and a review of occupational health records of workers.

The study population was those employees identified by the managers as working in areas where potential exposure to respiratory sensitizers may occur. The identification of such employees is a statutory requirement. The study population remained stable throughout the period of review, and included those employed in areas using: glutaraldehyde, formaldehyde, isocyanates, isothiazolone

or small laboratory animals. There were 27 departments in which managers identified employees as working in areas where potential exposure to respiratory sensitizers may occur. Eighteen of these departments were within NHS trusts and nine were external companies whose employees were potentially exposed to respiratory sensitizers. Companies for which health surveillance was no longer provided were excluded from the audit.

The sensitizers identified are shown in Table 1, with the numbers of potential employees exposed and the proportion of employees included in the audit.

A large NHS occupational health provider covering both NHS trusts and external industrial clients administered the programmes. The NHS and industrial services were separate arms of the same occupational health service.

All individual occupational health records were accessed for employees identified by these managers. The following information was collected where available: full name, date of birth, smoking status, atopic status, asthmatic status and details of any health surveillance measures performed within the preceding 4 year period. Atopy and asthma were based on information contained in the health surveillance questionnaires.

As there was little information in the occupational health record of risk assessments, personal exposure assessments or environmental sampling, a postal questionnaire was used to ascertain from managers and safety advisors whether risk assessments and occupational hygiene surveys had been performed. This information was used to assess the appropriateness of undertaking health surveillance for the employees included in the audit.

Outcomes assessed were:

- workplace risk assessment
- occupational hygiene data
- demographic data
- medical history
- symptom assessment
- lung function testing
- analysis of pulmonary function tests and organizational communication/intervention.

Table 1. Employees potentially exposed to respiratory sensitizers and the proportion included in audit

Hazard	Employees potentially exposed		Employees' records audited	
	NHS (n = 278)	Industry (n = 275)	NHS (n = 168; 60%)	Industry (n = 177; 64%)
Glutaraldehyde	166	–	105 (63%)	–
Formaldehyde	91	70	47 (52%)	9 (12%)
Laboratory animals	21	–	16 (76%)	–
Isocyanates	–	41	–	33 (80%)
Others	–	164	–	135 (82%)

Results

The audit selected 27 departments in which managers identified employees as working in areas where potential exposure to respiratory sensitizers might occur. Eighteen of these departments were within NHS trusts and nine were external companies.

From managers' lists, 553 employees were identified as being potentially exposed to respiratory sensitizers; of these, the individual occupational health records of 345 employees were audited (62%).

Details of the review of records are presented in Table 2, and a review of the health surveillance results are presented in Table 3.

Level of health surveillance

A health surveillance programme was in place for all areas or agents identified during the audit. Not all potentially exposed employees, as identified by managers, had documented evidence of having received surveillance, nor was the level of surveillance always appropriate.

Examination of individual occupational health records for either questionnaire administration or lung function assessments enabled the level of health surveillance performed to be assessed. Baseline surveillance (a specific questionnaire and/or lung function assessment, prior to working in the area associated with potential exposure) was present in 199/345 (58%) records: 46/168 (27%) in the NHS employees and 153/177 (87%) in industry ($P < 0.001$). It was noted that all NHS employees complete a general pre-employment medical questionnaire prior to commencement, though no specific assessment regarding respiratory risks was performed upon commencement. Evidence of follow-up surveillance was recorded in 134/168 (79%) NHS records and 138/177 (78%) industrial records ($P = 0.683$). It is clear that there is a low level of overall baseline surveillance in the NHS, and follow-up surveillance is represented equally in both groups.

Risk assessments and monitoring

Risk assessments had been performed by 12/18 (66%) NHS managers and 5/9 (56%) industrial employers. However, there was no linking of this information to the health surveillance programme, as those organizing the health surveillance programme did not systematically review the data from the risk assessments. There was no evidence of specialized risk assessment documentation presented from any department. For example, the risk assessment from the X-ray departments clearly identified that glutaraldehyde-containing film-developing products were no longer used; however, the employees continued

Table 2. Review of individual health records

	NHS (%)	Industry (%)
No. of departments	18	9
Written risk assessment provided	12 (66)	5 (56)
Environmental or personal sampling performed in department	8 (44)	5 (55)
No. of potentially exposed employees identified	278	275
No. of potentially exposed employees' notes audited	168 (60)	177 (64)
Baseline surveillance results in notes	46 (27)	153 (87)
Follow-up surveillance results in notes	134 (79)	138 (78)
No. of asthmatics identified	19 (11)	12 (6)

Table 3. Evidence of health surveillance in health records

	NHS (%)	Industry (%)
Total no. of health surveillance episodes	427	457
Results assessed by doctor	96 (23)	247 (54)
Results assessed by nurse	82 (19)	6 (1)
No evidence of assessment	249 (58)	204 (45)
Questionnaires used		
Total	284	186
MRC	30 (10)	118 (63)
Interval	124 (44)	1 (0.5)
Modified	130 (46)	67 (36.5)
No. of spirometric measurements	143	271
Evidence of information to employer	16 (4)	240 (53)

to receive annual health surveillance by respiratory questionnaire for presumed glutaraldehyde exposure.

Environmental and personal monitoring had been performed in 8/18 (44%) NHS workplaces and 5/9 (56%) industrial settings; however, this information was not collated in the occupational health departments, nor was it linked to the risk assessments or health surveillance programme.

Health surveillance programme

The process of health surveillance was based on an internal mailing of questionnaires to employees identified by managers as working in an area where potential exposure may occur.

There were three questionnaires in use for baseline and follow-up surveillance: a Medical Research Council (MRC) questionnaire, an interval questionnaire and a modified questionnaire (these latter questionnaires were unvalidated questionnaires based on the MRC questionnaire but designed for self-administration). The MRC questionnaire was used on 118/186 occasions for industrial employees and in only 30/284 situations in the NHS. Of the MRC questionnaires used, there was

variability in the administration method: 8/30 in the NHS group were interviewer administered, compared with 59/118 in the industrial group.

Assessment of lung function as a method for detecting early changes associated with disease development is historically the mainstay of many health surveillance programmes. During the audit period, 414 pulmonary function tests were performed, using a variety of spirometers. Where tests had been performed, forced expiratory volume in 1 s and forced vital capacity measurements were entered in the occupational health records. Predicted values were based on standard charts or computerized calculations, though there was no available correction for race, which may be relevant if surveillance is to accurately assess lung function in multi-ethnic groups. It was not possible from the occupational health records to assess the reliability of individual spirometers or whether the same type of machine had been used at subsequent assessments. Serial peak flow assessments were instituted in eight cases. All involved assessment of apparent work-related symptoms and were reviewed by the occupational health physician. Bronchial challenge testing did not constitute part of the health surveillance programme provided by this organization, as local guidelines recommend referral to a chest physician for detailed investigation of possible symptoms.

Interpretation of results

Occupational health nurses reviewed all questionnaires and occupational physician review of lung function assessments was evident in 343/414. Interpretation of results of health surveillance was on an individual basis, with results filed in individual occupational health records. If there were no reported changes on the questionnaire, the results were filed in the occupational medical record without report to either the individual or manager in the NHS.

The industrial surveillance programme was based on proposals generated by occupational health nurses in conjunction with an occupational physician, and as part of this service specification, written acknowledgement that health surveillance had occurred was provided to both the individual and the manager. Review of occupational health records showed that managers had received acknowledgement in 16/427 of NHS contacts and in 111/457 of industrial contacts ($P < 0.001$). There was no evidence of non-confidential health surveillance records kept by managers or health and safety advisors in the NHS, nor were there any group data maintained for epidemiological assessment.

Discussion

The HSE discussion document 'Developing an

Occupational Health Strategy for Great Britain' [9] has highlighted the need for a strategic approach to occupational health provision across the UK. Despite advances in occupational health, people continue to become ill as a consequence of workplace exposures, and health surveillance programmes continue to play a significant role in the prevention of work-related disease.

'Health surveillance' is a term used collectively to describe a range of procedures that aim to protect employees' health, by detecting work-related diseases early and reducing subsequent ill-health [10]. A specific aim of a respiratory health surveillance programme is to ensure the early detection of symptoms so that disease progression is prevented [11]. Asthma is defined as 'variable dyspnoea due to widespread narrowing of peripheral airways in the lungs, varying in severity over short periods of time either spontaneously or as a result of treatment' [12]. Occupational asthma is asthma caused by sensitization to an agent in the workplace, though the definition varies depending on the criteria used in diagnosis [13,14].

Health surveillance and health screening for respiratory disease, mainly asthma, are major activities for many occupational health departments, and so it is essential to ascertain whether these are carried out appropriately and produce meaningful results.

Whilst there are comprehensive recommendations for health surveillance [15] and extensive legislation [2,8] to support its implementation, there is little evidence that these have been introduced practically into the workplace. A review of the literature and legislation concerning health surveillance for employees exposed to respiratory sensitizers suggests elements for a surveillance programme, presented in Table 4.

The selection of notes to be reviewed was dependent

Table 4. Suggested elements of health surveillance programme for employees exposed to respiratory sensitizers

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1. Health surveillance should be linked to competent risk assessments & results interpreted by competent individual [20]
 2. Evidence of assessment of exposure risk using environmental and personal monitoring should be recorded
 3. Where risk can not be eliminated there should be a clear written strategy for a health surveillance programme [8]
 4. There should be valid methods for disease detection and appropriate application of public health screening principles to the condition under surveillance [21–24]
 5. Employees at increased risk of developing disease should be identified [6]
 6. Implementation of surveillance programme should include:
 - use of appropriate application validated tools [25]
 - results should be evaluated by a person capable of meaningful interpretation [26]
 7. Results should be collected in an accessible form for epidemiological analysis and individual health records
 8. Reassessment of risk & surveillance programme on an annual basis
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on managers identifying those employees as working in areas where potential exposure to respiratory sensitizers may occur. Consequently, the sample bias is to those who have at some time been identified as being potentially exposed, possibly leading to an overoptimistic view of the use of health surveillance.

The audit is limited by the competence of managers to identify risks, and so those employees working with hazards that are not recognized as respiratory sensitizers are not included. This audit has not considered risk assessment in depth; however, it has been shown that, in some areas, risk assessments were not reviewed and were therefore inappropriate, e.g. the non-use of glutaraldehyde in X-rays. Those employees who had left employment for any reason or who had been excluded from work because of ill-health were not included in the audit—which could lead to failure to identify affected or susceptible employees.

It was not possible to evaluate accurately workplace exposure from the occupational health records, and the absence of a record of surveillance may have no clinical significance if, for example, an employee had no direct exposure to hazards.

Assessment of the appropriateness of health surveillance was limited by the absence of detailed job descriptions within the notes, and the lack of a temporal link between health surveillance results and current working conditions. The ability of health surveillance programmes to prevent disease is inherently dependent upon accurate risk assessments that are a reflection of current working conditions and take full account of available hygiene data.

National surveys have shown a varied provision of health surveillance throughout the UK, and others have shown the limitations of surveillance programmes [4,16]. Within this organization, links between managers performing risk assessments, occupational hygienists performing monitoring and occupational health staff coordinating surveillance were poorly established.

The surveillance of individuals requires sensitive and specific tools to detect changes indicative of disease, and it is important to optimize the validity of tools by combining several sources of information. Individuals with particular susceptibilities should be identified and surveillance targeted to their needs. For example, smoking is known to be associated with increased risk of occupational asthma in some instances [17], as well as poorer outcome in the long term. In the same way, a case can be made that asthmatics should be identified, as they are more susceptible to sensitization with some agents [18].

Guidelines from the USA [19] emphasize the limitations of spirometry as a surveillance tool, with issues about reproducibility and reliability of equipment being raised, as well as training requirements and factors influencing interpretation of results.

Quality control and assurance is an essential element of

any health surveillance programme, but particularly for respiratory health surveillance. Current guidance in the UK does not specify requirements for quality control, but for the future, with increasing clinical governance commitments, individual providers will require such measures in order to demonstrate competency.

Following the audit, a review of the questionnaire in use was undertaken and a wide assessment of risk assessments implemented.

Conclusion

This audit demonstrates the importance of integrated competent risk assessments, hygiene surveys and health surveillance programmes. This is not a new concept, but the audit does highlight the need for quality assurance systems that provide a continuous review of practice to prevent health surveillance programmes becoming invalid. Further development is necessary of models for health surveillance programmes in occupational health departments that are flexible and able to change with alterations in risks at work. It may be appropriate to consider these issues as a specific standard in the NHS Plus programme.

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