

CASE REPORT

Practising evidence-based occupational health in individual workers: how to deal with a latex allergy problem in a health care setting

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Background	Natural rubber latex, mainly contained in disposable medical gloves, is an important cause of occupational allergy in health care workers. Management of latex allergy includes education, reduction of cutaneous or mucosal contact with rubber products and minimization of exposure to latex allergens in the work environment.
Methods	This paper reports a case study dealing with the latex allergy health problem of an operating theatre nurse. The examination was required because of a recent onset rhino-conjunctivitis crisis and asthma during usual working activities. The case was investigated and a solution provided according to the evidence-based medicine (EBM) paradigm using the PICO model.
Results	The literature search was conducted using Medline and the Cochrane Library. Twenty-one papers were considered to offer appropriate solutions. Two main types of interventions were suggested: (i) changing the work setting, (ii) limiting the work activities. The evidence obtained was discussed with the nurse, who was considered unfit to continue her work in the operating theatre where her colleagues used latex gloves. The resident proposed that she could relocate to a work environment where only non-latex gloves were used and latex medical devices were not present.
Conclusion	The case study shows that, as for other clinicians, the occupational physician can use the EBM paradigm according to the PICO model as a tool for providing appropriate solutions for the individual worker.
Key words	Asthma; conjunctivitis; disability evaluation; evidence-based medicine; evidence-based occupational health; fitness for work; intervention; latex allergy; professional competence; quality of health care.

Introduction

Over the last decade, the prevalence of natural rubber latex allergy has reached epidemic proportions among workers who use or are exposed to powdered latex products [1]. Latex sensitization prevalence rate ranges from 2.9 to 22% in health care workers, and from 0.12% to about 20% in occupationally unexposed populations [2]. Latex sensitivity and allergy can present a variety of clinical reactions including contact dermatitis, rhino-conjunctivitis, asthma and anaphylaxis. Some health-care providers who have coexisting risk factors, such as atopy and food allergies, are at an even greater risk of severe allergic reactions following repeated latex exposure.

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Case report

A resident in an occupational health unit saw a 39-year-old nurse working in an operating theatre. The nurse was referred because of a recent onset of rhino-conjunctivitis crisis and asthma during usual work activities. The nurse was exposed to a variety of risk factors, including biological agents, chemical agents (latex) and ionizing radiation; she was also engaged in night-shift work and occasionally lifted patients. Her occupational history was that she had worked as a nurse in an ENT operating theatre for 15 years and in an ambulatory ward for 4 years. Her medical history included common children's diseases, an allergy to poaceae, birch and hazelnut and an intervertebral disc bulge at L4–L5. Her vaccination file showed a protective antibody titre following B hepatitis vaccination, a negative TB screening test, BCG vaccination in the past and an absence of anti-HCV antibodies.

Table 1. The four-component question using the PICO model

P = patient problem	In occupational health P indicates a single worker's or a group of workers' problem. Using the case indicated above, the question starts from the nurse working in the operating theatre. The first component of the question is as follows: 'For a nurse working in a hospital operating theatre...?'
I = intervention	I includes the intervention or the practice adopted (diagnostic tests or screening tests, information to workers). There are two alternative interventions for this case: (i) change the work setting or (ii) prescribe a limitation of working activities. According to these alternatives, the 1st and 2nd components of the question can be arranged as follows: 'For a nurse working in a hospital operating theatre will the change of work setting or a limitation of working activities...?'
C = condition	C means the exposure (e.g. exposure to chemicals, ergonomic factors or individual lifestyle). In this case it is latex exposure. After including this component, the question reads: 'For a nurse working in a hospital operating theatre will the change of work setting or a limitation of working activities, for exposure to latex...?'
O = outcome	O represents the outcome (e.g. blood lead reduction or accident reduction in workers' population following the preventive intervention). In this case the expected outcome is the improvement of asthma and rhino-conjunctivitis crisis. The final question is: 'For a nurse working in a hospital operating theatre will the change of work setting or a limitation of working activities, for exposure to latex, improve asthma and rhino-conjunctivitis crisis?'

Physical examination and laboratory tests were normal. Eight years previously, she underwent prick tests with the following results: mix poaceae++-; mix asteraceae +- -; alternaria++-; latex++-. The previous year, a patch test was performed with the following results: KBr +-; para-phenylenediamines+++; Ni++-; dispersed red (C₁₆H₁₈N₄O₃) +- -. A high immunoglobulin E serum level against latex radioallergosorbent test was found (4.34 kUA/l).

Formulating the question

On the basis of the present complaint and clinical information, the resident carried out an evidence-based investigation. The resident identified the following relevant information to create the question: *39-year-old nurse; working in an operating theatre; exposed to latex; with a recent onset of rhino-conjunctivitis crisis and asthma* and created a question including the four components of the PICO model [3] (Table 1).

Searching for evidence

In spite of the existence of many databases, Medline and the Cochrane Library were chosen to search for available evidence. Other databases could have been searched, but the paper's aim was to show how a health problem can be addressed by using databases. Medline is the premier bibliographic database covering the field of medicine. It contains over 12 million bibliographic citations dating back to the mid-1960s and author abstracts from more than 4800 biomedical journals. It is provided free of charge by the National Library of Medicine and can be accessed directly at <http://www.PubMed.gov>. The Cochrane Library, which consists of a regularly updated collection of evidence-based medicine databases, includes high quality information and systematic reviews of scientific studies. Access to the Cochrane Library

(<http://www.cochrane.org>) is free of charge only in some countries, whereas in others a fee is charged.

Medline uses Medical Subject Headings (MeSH) vocabulary as the indexing language and has a browser that allows identification of the appropriate terms for articles. By opening the browser, a text word can be entered and the browser will provide a list of MeSH terms matching the word. By choosing the matching MeSH term, the search improves in both specificity and sensitivity [4]. Boolean operators AND, OR and NOT limit results of a search by combining search terms or concepts.

The resident began the search on Medline using the text word *latex allergy* combined with the Boolean operator AND with the MeSH terms *health personnel*. This search yielded 392 results. To increase the precision of the search, the text term *latex allergy* was replaced with the MeSH term *latex hypersensitivity* and the combination of *health personnel* AND *latex hypersensitivity* resulted in 278 hits. To increase its specificity, the same search was carried out by using the MeSH major topic (i.e. MeSH term that is one of the main topics discussed in the article), leading to 157 hits. The combination of the MeSH terms *latex hypersensitivity* and *asthma* yielded 50 articles and the inclusion of the *health personnel* MeSH terms restricted the findings to nine papers. The search on Medline took about 20 min.

The Cochrane Library uses Thesaurus index, including the MeSH terms. These can be combined with the Boolean operator AND, OR and NOT. A relatively simpler search strategy can be employed for the Cochrane Library, as its size in the occupational health field is still small compared with Medline. The resident started the search using the MeSH terms *latex hypersensitivity* and *asthma* and found four hits from the Cochrane central register of controlled trials. To increase the sensitivity of the search, she used the text term *latex allergy*. This search resulted in one review and eight

randomized controlled trials (RCTs) of which three were about health care personnel. The search on Cochrane Library took about 5 min.

Appraising the evidence

Eighteen Medline articles and three Cochrane Library articles were considered relevant to the specific problem and were thus retrieved. Five papers were available as full text on-line at the library of the School of Medicine, whereas the others were abstracts. The reading of these hits took about 2 h. Three interventions were reported:

1. Limitation of working activities
This intervention includes different solutions, such as the reduction of aerosols of the latex proteins [5,6], use of powder-free, low-protein or non-latex gloves [5–8], education of the staff about latex safety [5]. All these interventions are of proven effectiveness.
2. Change of work setting
This intervention includes changing the workplace or the construction of a latex-free setting [9]. In addition, a complete management intervention was reported [10].
3. Specific immunotherapy
Some authors carried out a study to determine the efficacy and safety of specific immunotherapy with a standardized latex extract in sensitized workers and concluded that latex-specific immunotherapy might be a useful approach, but further trials need to be conducted [11,12].

Applying the evidence

The next step consisted of determining how these findings could be applied to the case under study. The evidence obtained was discussed with the nurse. The resident explained the two possible hypotheses of intervention: (i) changing the work setting or (ii) limiting her work activities. Since a latex-free operating theatre was not present in the hospital, the nurse was considered unfit to continue her work in the operating room, where colleagues used latex gloves. The resident advised her to change to a work environment where only non-latex gloves were used and latex medical devices were not present. She was advised that, regarding the possibility of specific immunotherapy, definite evidence supporting the effectiveness of this treatment still does not exist.

Evaluating the process

The resident who approached the problem was aware of the need for further information to be used in addition to the internal evidence (that is, the problem solved on the basis of the previous experience and knowledge). She was able to formulate correctly the problem using the PICO model and then carry out a search using Medline and the

Cochrane Library. Several relevant papers were retrieved and the resident was able to synthesize the results according to a framework, thereby suggesting two different solutions. The 2 h spent in the process might be considered too time consuming for a specialist, but it might be of value from an educational point of view. The proposed solution is based both on the available literature evidence and the nurse's preference, in addition to the specific setting in which the problem emerged. The interaction with the nurse provides an example of stakeholders' consultation according to the basic ethical principles (do no harm, beneficence, non-maleficence, respecting autonomy and justice).

Conclusion

As for other clinicians, the occupational physician can also use the evidence-based medicine paradigm according to the PICO model to provide appropriate solutions for individual workers by focusing on their relevant clinical issues. The continuous updating of databases allows searching and finding not definitive solutions. Appraising and applying the evidence, together with the worker's consultation and taking into account the specific setting, could provide a convenient tool for improving practice.

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