

IN-DEPTH REVIEW

Occupational management of type I latex allergy

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Background	Although the incidence of type 1 latex allergy has decreased in recent years with the introduction of powder-free low-protein (PFLP) latex gloves, type 1 latex allergy is still commonly found among workers who use natural rubber latex (NRL) gloves at work.
Aims	To elucidate the optimal management of workers with type 1 latex allergy whose work necessitates the use of NRL gloves in the workplace.
Methods	A sensitive electronic search of relevant bibliographic databases was performed with related search terms for articles from 1 January 1990 to 1 September 2010. Relevant abstracts were reviewed, and studies that furnished data on the management of type 1 latex allergy in the workplace were extracted. Articles for inclusion in the review were appraised using the Scottish Intercollegiate Guideline Network methodology.
Results	A total of 7041 abstracts were retrieved; 12 articles met the inclusion criteria for the review. We found moderately strong and consistent evidence that avoidance of NRL in the workplace reduces both symptoms and markers of sensitization in latex-allergic individuals. There is limited evidence that latex-allergic workers can continue to use PFLP gloves with no worsening of symptoms, provided that their co-workers also use PFLP latex or non-latex gloves.
Conclusions	Individuals with type 1 latex allergy whose work necessitates them wearing latex gloves may continue in their job provided that adjustments are made to ensure that they are not exposed to powdered latex gloves.
Key words	Evidence-based practice; natural rubber latex allergy; occupational health.

Introduction

In the 1990s, an epidemic of immediate-type allergy was recognized among those who wore natural rubber latex (NRL) gloves at work. The risks appeared to be highest in health care workers, the most closely studied group, but cases were also reported in food handlers [1], hairdressers [2] and construction workers [3]. The consequent substitution of powdered latex gloves with powder-free low-protein (PFLP) latex gloves reduced the risk of incident disease [4].

In many countries the number of new cases of occupational latex allergy is now low. Nonetheless, small numbers continue to be identified, some of them as a result of historic exposures. While there is some evidence that individuals with latex allergy can remain in a workplace where glove wear is required [5], there is no clear guidance on how this is best achieved. The

available options range from the use of alternative glove materials, such as polyvinylchloride or nitrile, to the continued use of powder-free, low-protein latex gloves with or without barrier hand protection. Consideration needs also to be given to non-sensitized co-workers whose glove use may be hazardous for the index case; for them, the options are the continued use of powder-free, low-protein gloves or the use of non-latex alternatives.

The aim of this review was to identify the optimum workplace management of individuals with type I latex allergy whose work necessitates the use of NRL gloves in the workplace.

Methods

We undertook a systematic review of the management of latex allergy in the workplace as a basis for the 2008

National Health Service (NHS) Plus evidence-based guideline [6] and subsequently updated this to include original research articles published between 1 January 1990 and 1 September 2010. The search terms and databases used for the original and updated systematic reviews were similar. Studies were retrieved electronically by means of a sensitive search strategy using the following pairings: latex [MeSH] AND/OR rubber [MeSH], AND NOT condom; AND allergy [MeSH] OR gloves [MeSH] OR dermatitis [MeSH] OR asthma [MeSH] and health [MeSH]. The following bibliographic databases were searched: Medline, PubMed, Embase, HSE Line, OSH-ROM, the Health Development Agency Public Health Evidence Base, Health Periodicals Database, Evidence Based Periodicals Database, Cochrane Library, CINAHL and Faculty of Occupational Medicine UK Library.

Titles and abstracts of retrieved articles were sifted by the authors to identify studies on workplace-based intervention studies for individual employees with type 1 latex allergy. Studies of organizational interventions or on type IV latex glove allergy and those published in languages other than English were excluded. Full texts were retrieved for abstracts meeting the inclusion criteria and their reference lists checked for any relevant studies that had been missed earlier. Each selected study was critically appraised by the authors and assigned a Scottish Intercollegiate Guideline Network (SIGN) grade (Table 1);[7] disagreements at each stage were resolved by discussion. In addition, we searched Medline (over the same period) for randomized controlled trials (RCTs) of immunotherapy in patients with latex allergy.

The workplace interventions for managing individuals with type 1 latex allergy are shown schematically in Figure 1 and listed below. This scheme was used to categorize the selected papers.

Table 1. SIGN grading of levels of evidence

1++	High-quality meta-analyses, systematic reviews of RCTs or RCTs with a very low risk of bias
1+	Well-conducted meta-analyses, systematic reviews or RCTs with a low risk of bias
1–	Meta-analyses, systematic reviews or RCTs with a high risk of bias
2++	High-quality systematic reviews of case-control or cohort studies, high-quality case-control or cohort studies with a very low risk of confounding or bias and a high probability that the relationship is causal
2+	Well-conducted case-control or cohort studies with a low risk of confounding or bias and a moderate probability that the relationship is causal
2–	Case-control or cohort studies with a high risk of confounding or bias and a significant risk that the relationship is not causal
3	Non-analytic studies, e.g. case reports and case series
4	Expert opinion

1. Redeployment to a post where gloves are not used.
2. The use of non-latex gloves by both the individual and their colleagues.
3. The use of non-latex gloves by the individual while colleagues continue to use PFLP latex gloves.
4. The use of PFLP latex gloves by both the individual and their colleagues.
5. The use of PFLP latex gloves with personal protection by the individual.

Results

After discarding duplicates, the electronic searches and follow-on references identified 7041 abstracts; of these,

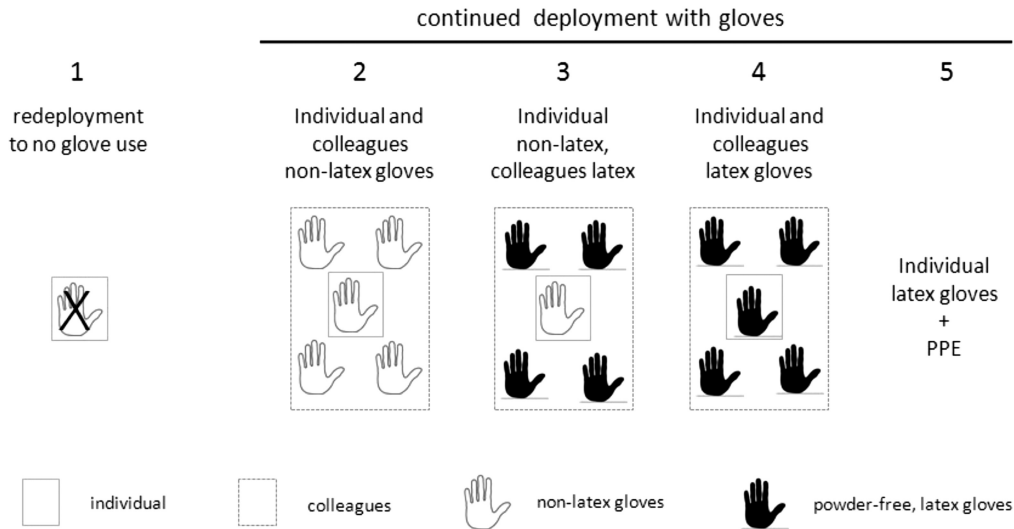


Figure 1. Workplace interventions for an employee with latex allergy. All ‘latex’ gloves are powder-free and of low protein content (PFLP).

169 full articles were retrieved, of which 12 fulfilled the inclusion criteria of the review. None of the latter was an RCT of one or more interventions.

We found an additional six immunotherapy publications suitable for inclusion in this review.

The 12 reviewed studies are summarized in Table 2. In eight of them [5, 8–14], the intervention included affected individuals using non-latex gloves and their colleagues using PFLP gloves (option 3). Five of these eight articles also studied interventions where both the affected individuals and their colleagues used non-latex gloves (option 2). In four studies [5, 8, 12, 13], the interventions included at least some affected individuals and their colleagues continuing to use PFLP latex gloves (option 4). Three articles examined the use of personal protective equipment—either high-efficiency particle arrest (HEPA) filtered-helmet or barrier skin protection cream (option 5).

Option 1

We found no studies that tested redeploying individuals with type I latex allergy away from all exposure to NRL as an intervention. However, a 5-year cohort study [15] followed up 34 of 62 health care workers, some of whom had changed jobs and were no longer exposed to latex at work. At follow-up, those who had successfully avoided further latex exposure were more likely to have lost their skin prick responsiveness to some latex allergens and more likely to report the loss of latex-related symptoms of all types.

Options 2 and 3

Five longitudinal cohort studies [9–12, 14] and one case series [8] considered the effect of substituting non-latex gloves for latex-allergic workers, with co-workers using either non-latex gloves (option 2) or PFLP latex gloves (option 3).

Hamilton *et al.* [9] followed up 20 anaesthetists with latex sensitivity or latex allergy over a 15-month period during which they were provided with non-latex gloves. During the first 8 months of the study, the hospital replaced all latex gloves with non-latex gloves (option 2), with the exception of the operating theatres, where powdered latex gloves continued to be used. At the end of 15 months, all symptomatic individuals became asymptomatic. Eighty-eight percent of those who had had a positive latex serological test at the beginning showed a reduction in their serum levels of specific IgE ($P < 0.01$). Of the 18 individuals who were skin prick tested, six showed a decrease and four (22%) had an increase in their skin prick test reactivity, but eight (45%) had no measurable change.

Bernstein *et al.* [8] reported resolution of work-related symptoms in 90% of 49 latex skin prick test positive health care workers who had reported skin, respiratory,

and/or systematic symptoms and who switched to non-latex gloves. It is not clear whether the co-workers continued with PFLP latex gloves or latex-free gloves; however, 19 out of 20 subjects with symptoms of work-aggravated asthma were switched to latex-free gloves, and 18 reported resolution of all symptoms despite 12 (66%) continuing to work with co-workers using powdered NRL gloves.

A study [10] followed 17 health care workers with latex-induced contact urticaria syndrome for a median of 5 years. All changed to using non-latex gloves, while co-workers continued to use the same or PFLP latex gloves (option 3). All had positive skin prick tests with latex glove extract at diagnosis, but on re-examination, only 11 (65%) continued to do so ($P < 0.05$).

A 1-year prospective study [11] collected self-reported data from 90 health care workers on symptoms of atopy or latex allergy symptoms combined with skin prick testing and latex-specific IgE serology. Powdered NRL gloves were substituted with PFLP latex gloves or latex-free gloves in different departments of their hospital. Latex-sensitized workers were provided with non-latex gloves (options 2 and 3). At follow-up, there was a significant decrease ($P < 0.03$) in latex-specific IgE antibodies in six of seven latex-allergic subjects. NRL aeroallergen levels fell to below detectable limits within 24 h of substitution of powdered latex gloves, and it was found that the use of asthma medication and anti-allergic drugs could be discontinued by the two health care workers with latex-related respiratory tract symptoms.

Another prospective study [14] followed 88 health care workers with either latex sensitivity ($n = 55$) or latex allergy ($n = 33$) over a mean of 38 months after powdered latex gloves had been replaced with PFLP latex gloves for all workers (option 2). Follow-up was by questionnaire, skin prick tests, latex-specific serum IgE and challenge tests. At follow-up, 24 (27%) of the health care workers no longer showed signs of latex sensitization by any method. Complete loss of NRL sensitization was less frequent in subjects with allergy than in those with sensitization (3% versus 42%, $P < 0.001$).

A study of co-workers using non-latex gloves versus PFLP latex gloves (option 2) was undertaken by Vandenplas and colleagues [12] who followed up 36 subjects with latex-induced asthma/rhinitis over a 5-year period. The study demonstrated that the use of PFLP latex gloves by colleagues reduced asthma/rhinitis symptoms and indices of severity in affected employees to a degree similar to the use of non-latex gloves by colleagues.

Option 4

Three longitudinal studies, over periods of 3–4 years [5, 12, 13], considered the effect of substituting powdered

Table 2. A summary of the articles included in the review

Authors and title	Study design and population	Intervention + intervention category	Main results	Study limitations and SIGN grading
Smith <i>et al.</i> [15], Percutaneous reactivity to NRL proteins persists in health care workers (HCWs) following avoidance to NRL	Prospective cohort study: 34 of original 62 HCWs from a 2000 study identified with positive skin prick test to non-ammoniated latex	Intervention category 1: 5-year follow-up with skin prick testing, serology and spirometry and classified according to high or no exposure during the 5-year follow-up period	The subjects with work-related urticaria decreased from 34 to 7, those with work-related rhinitis decreased from 27 to 10 and those reporting work-related asthma decreased from 18 to 2. Highest reduction in skin prick test (SPT) sensitivity to NRL allergens was seen in those with no exposure during follow-up period, but those who continued to be exposed also demonstrated a reduction in SPT reactivity	Did not distinguish between use of powdered gloves by co-workers and use of powder-free gloves by individuals—SIGN Grade 2–
Bernstein <i>et al.</i> [8], Clinical and occupational outcomes in HCWs with NRL allergy	Case series: 67 HCWs with NRL allergy	Intervention category 2 and 3: all subjects were switched to non-latex gloves. Unclear whether co-workers continued to use latex gloves or were also switched to non-latex gloves	Interventions designed to reduce or eliminate latex exposure in latex allergic HCWs with urticaria were universally effective (11/11) who switched to non-latex gloves) and highly effective among those with rhinitis (15/18—83%) or asthma (20/20—100%). Four (of 24) employees with asthma changed jobs because of their allergy, but only two out of health care work; in each case, their symptoms resolved	Interpretation limited by sparse information on numbers recruited and excluded, lack of a referent population—SIGN Grade 3
Hamilton and Brown [9], Impact of personal avoidance practices on HCWs sensitized to NRL	Longitudinal cohort: 20 US anaesthetists with latex sensitization	Intervention category 2 and 3: avoidance practice education and provision with non-latex gloves	Symptoms disappeared after personal avoidance of latex gloves at work but skin prick test reactivity continued in some	Interpretation limited by small study size, lack of detail on how rigid latex avoidance had been and lack of clarity over length of follow up—SIGN Grade 2–

Table 2. (Continued)

Authors and title	Study design and population	Intervention + intervention category	Main results	Study limitations and SIGN grading
Nettis <i>et al.</i> [10], Type I latex allergy in HCWs with latex-induced contact urticaria syndrome: a follow-up study	Longitudinal cohort: 17 HCWs	Intervention category 2 and 3: evaluation of immunological markers and use test for latex allergy following avoidance measures 3–7 years postdiagnosis of latex allergy in 17 HCWs. All follow-up subjects stopped using latex gloves. Co-workers either switched to non-latex or used powder-free, low-protein gloves if necessary	Decreased SPT reactivity, and serum-specific IgE with increased time to positive use test in all but one subject, suggesting that NRL avoidance can reduce markers of sensitization and symptoms in the workplace	Small sample size and the extractable latex content of the gloves is not given for either the initial or follow-up test—SIGN Grade 2+
Allmers <i>et al.</i> [11], Reduction of latex aeroallergens and latex-specific IgE antibodies in sensitized workers after removal of powdered NRL gloves in a hospital	Longitudinal cohort: 90 HCWs. Sensitization of HCWs to NRL was determined by skin prick tests and measurements of specific IgE antibodies. NRL allergen concentrations in room air were measured before and after substitution of powdered NRL gloves with powder-free or synthetic gloves in different departments of a hospital and determined by a competitive inhibition immunoassay	Intervention category 2, 3 and 4: powdered NRL gloves were eliminated from the workplace and replaced with powder-free or non-latex gloves. Non-latex gloves were provided for sensitized workers	The number of HCWs with positive skin prick test responses and NRL-specific IgE-positive HCWs was 7 (8%) at the start of the study. All seven reported glove-related allergic symptoms. Six of seven sensitized subjects had a significant decrease of latex-specific IgE antibody concentrations during follow-up examinations. Within 24 h after substitution took place, NRL aeroallergen levels fell below the detection limit in areas with synthetic gloves or powder-free NRL gloves alike	The latex content of the powdered latex gloves fell during the study period due to changes in manufacturing techniques—SIGN Grade 2+

Table 2. (Continued)

Authors and title	Study design and population	Intervention + intervention category	Main results	Study limitations and SIGN grading
Vandenplas <i>et al.</i> [12], Occupational asthma caused by NRL: outcome according to cessation or reduction of exposure	Longitudinal cohort: 36 subjects with latex-induced asthma as ascertained by specific inhalation challenges were investigated after a median follow-up of 56 months (range: 12–92 months). Initial and follow-up visits included use of a detailed questionnaire and measurement of the concentration of histamine causing a 20% fall in forced expiratory volume in 1 s	Intervention category 2, 3 and 4: co-workers using PFLP latex gloves or non-latex gloves. Subjects used latex or PFLP latex gloves	At follow-up, 16 subjects were no longer exposed to latex, whereas 20 subjects had reduced exposure. In the subjects who avoided exposure, asthma severity decreased from a median score of 8.5–3.5 ($P < 0.001$) and the median histamine value increased from 0.4 mg/ml to 2.3 mg/ml ($P < 0.002$). In the subjects with reduced exposure, asthma-severity score improved from 6.5 to 2.5 ($P < 0.001$) and median histamine values rose from 0.5 mg/ml to 2.4 mg/ml ($P < 0.001$)	Participants were not randomly assigned to reduction in, or removal from, exposure to latex—SIGN Grade 2+
Rueff <i>et al.</i> [14], Effect of reduced exposure on NRL sensitization in HCWs	Longitudinal cohort: Immunological follow-up of 88 HCWs with NRL allergy or sensitivity	Intervention category 2: introduction of latex-free gloves for those with NRL allergy (NRLA) or sensitivity (NRLS), and powder-free latex gloves for co-workers. Study period: 3 years	At the last follow-up, a loss of skin prick test reactivity to NRL was observed in 1 of 29 subjects with NRLA (3.4%) and 16 of 35 with NRLS (45.7%) with previous skin test reactions ($P < 0.001$)	Small numbers; no control group—SIGN Grade 2++
Turjanmaa <i>et al.</i> [5], Long-term outcome of 160 adult patients with NRL allergy	Longitudinal cohort: 160 (of 174) NRL allergic patients (health care and non-HCWs) looking at occupational outcomes. Outcomes assessed by both questionnaire and examination for hand eczema	Intervention category 4: all gloves in the working environment were changed to low allergen latex gloves.	None of the HCWs had changed work because of NRL allergy; only 38% had continuing hand eczema (significant decrease from 54% in HCWs, $P < 0.019$). Ninety-eight percent of the non-HCWs continued with their previous jobs. There was no evidence of any fall in specific IgE	Interpretation limited by lack of comparison groups and variable length of follow-up—SIGN Grade 2+

Table 2. (Continued)

Authors and title	Study design and population	Intervention + intervention category	Main results	Study limitations and SIGN grading
Filon and Radman [13], Latex allergy: a follow-up study of 1040 HCWs	Longitudinal: 1040 Italian HCWs (90% of those exposed to latex)	Intervention category 4: pre and postchange from powdered to powder-free latex gloves. 3-year follow-up period	92% response rate: (i) Most glove-related symptoms (prevalence 22%) were mild; (ii) prevalence of positive skin prick test to latex 6%; poor agreement with measurement of specific IgE; (iii) no evidence of job change or loss from latex allergy over 3 years of follow-up; and (iv) hand eczema was significantly reduced ($P < 0.0001$) at follow-up and disappeared in seven cases (29% of those with eczema at baseline). Urticaria disappeared in 44% of those with this symptom at baseline but was still present on contact with latex gloves in 24%	Possible underestimation of latex sensitivity prevalence and symptoms; possible selection bias with participants—SIGN Grade 2+
Laoprasert <i>et al.</i> [16], Inhalation challenge testing of latex-sensitive HCWs and the effectiveness of laminar flow HEPA-filtered helmets in reducing rhinoconjunctival and asthmatic reactions	Experimental: 11 latex-sensitive volunteers with occupational asthma attributed to latex allergy	Intervention category 5: volunteers wore a laminar flow helmet with and without HEPA filters during challenges with subjects wearing powdered latex and PFLP latex gloves. Flow-volume loops, symptom scores, and latex aeroallergen concentrations were measured before and during each test	PFLP latex gloves significantly reduced latex aeroallergenic concentrations and therefore exposure. Laminar flow HEPA-filtered helmets were effective in significantly reducing latex-induced rhinoconjunctivitis and asthmatic symptoms	Small numbers—SIGN Grade 2+
Allmers [17], Wearing test with 2 different types of latex gloves with and without the use of a skin protection cream	Longitudinal/cohort: 72 subjects reported symptoms indicative of type I allergy to NRL gloves. 44 of them had a positive prick test to NRL	Intervention category 5: use of two different types of latex gloves (high and low allergen content) with and without use of a skin protection cream	18 hypersensitive reactions were induced in 63 subjects wearing NRL gloves with high allergen content, which was reduced to 11 with skin protection cream. No change was observed in the reaction in NRL gloves of low allergen content, when cream was used/not used; however, the low-allergen content gloves only triggered a response in 2/70 individuals	Skin prick test outcomes depend on reagent used, therefore results may not be representative for all gloves—SIGN Grade 2–

Table 2. (Continued)

Authors and title	Study design and population	Intervention + intervention category	Main results	Study limitations and SIGN grading
Baur <i>et al.</i> [18], Results of wearing test with 2 different latex gloves with and without the use of skin protection cream	Controlled trial (not randomized): 109 latex allergic subjects with and without the prior skin application of a skin protection cream	Intervention category 5: use of two different types of latex gloves (high and low allergen)	The application of a skin protective cream increased the number of positive use tests in subjects demonstrated to have sensitization and reporting glove allergy. A positive-use test when wearing high-soluble allergen NRL gloves was significantly associated with both positive SPT and coated allergen particle (CAP) tests to latex	Skin prick test outcomes depend on reagent used, therefore, results may not be representative for all gloves—SIGN Grade 2+

latex gloves with only PFLP latex gloves throughout the working environment. The findings suggest that it may be acceptable for those health care workers allergic to latex to continue to use low-allergenic latex products if they have not observed any adverse reactions from using them.

Filon *et al.* conducted a prospective 3-year follow-up study [13] of 1040 Italian health care workers before and after a change from powdered latex glove environment to a PFLP latex glove environment; 960 (92%) subjects were followed up. In the 169 (18%), who had had glove-related symptoms, there was a significant reduction ($P < 0.01$) in mild symptoms (such as itching/erythema) after the introduction of PFLP latex gloves. A similar intervention was studied by Turjanmaa and colleagues who followed 160 latex-allergic patients (health care workers ($n = 71$) and non-health care workers ($n = 89$)). During the follow-up period (median: 3 years), all of the health care workers with latex allergy continued in their old jobs and managed well using PFLP latex gloves without a worsening of symptoms; only a few of them needed to use latex-free gloves [5].

Option 5

The final group of articles explored the use of personal protective equipment. Laoprasert *et al.* investigated the effect of HEPA-filtered laminar flow helmets in preventing latex-induced symptoms and showed they were effective [16]. Of 11 subjects with histories of latex-induced occupational asthma with demonstrable markers of sensitization, the use of laminar flow helmets effectively reduced latex-induced symptoms with no subjects exhibiting a fall in forced expiratory volume in 1 s after exposure to PFLP latex gloves. Two studies investigated whether the use of a skin protection cream with latex gloves increased or decreased latex-allergic symptoms (17,18). One study suggested that skin protection creams

may hamper the uptake of allergens from gloves [17]. In contrast, the other study reported that use of skin protection cream may favour the uptake of allergens from gloves thus increasing allergic reactions [18].

Immunotherapy

We identified six reports of controlled studies of specific immunotherapy in which clinical outcome data were provided (Table 3). All were small and most of poor methodological quality; not all participants in all studies had acquired their latex allergy through exposures at work.

The early promise of subcutaneous immunotherapy [19] was not confirmed in two subsequent studies [20,21] in which no improvement in symptoms was recorded by patients in the active treatment arms. Adverse events were not uncommon. Three studies of a commercially available sublingual immunotherapy agent [22–24] each reported significantly greater improvements in non-standardized symptom measures and latex provocation tests in those receiving active therapy. Some adverse events in actively treated patients were recorded.

Discussion

Our review found moderately strong and consistent evidence that individual avoidance of powdered NRL gloves in the workplace reduces both symptoms and markers of sensitization in latex-allergic individuals. This effect occurs irrespective of whether co-workers use non-latex gloves or PFLP latex gloves. There is limited evidence that latex-allergic health care workers can continue to use PFLP gloves with no worsening in their symptoms, provided that their co-workers use PFLP latex, or non-latex gloves. Current evidence is too weak to support the use of personal protective equipment or immunotherapy to prevent or treat latex allergy in the workplace.

Table 3. Controlled studies of latex immunotherapy

	Number	Blinding	Number of HCWs	Quality	Latex avoidance advised	Main findings
Subcutaneous immunotherapy						
Leynadier <i>et al.</i> [19]	17	Double	All (but not entirely clear from the article)	Low	Advised	Improvement in rhinitis/conjunctivitis/asthma scores
Sastre <i>et al.</i> [20]	24	Double		High	NS	No improvement in symptoms. Improved latex glove tests and immunology
Tabar <i>et al.</i> [21]	23	Double	7	Medium	NS	No improvement in symptoms
Sublingual immunotherapy						
Patriarca <i>et al.</i> [22]	24	No	10	Low	NS	Improvements in symptoms scores and challenge tests
Nettis <i>et al.</i> [23]	35	Double	11	Medium	Advised	Improvement in symptoms and provocation tests. No change in immunology
Buyukozturk <i>et al.</i> [24]	12	Double	12	Low	Advised	Improvement in symptoms and provocation test results

NS, not stated.

A strength of our review was the sensitivity of the search; despite this, no studies exploring redeployment of latex-allergic employees away from the use of latex gloves were found. The internal validity of the studies was variable, reflected in their SIGN gradings (Table 2). Furthermore, the studies spanned the period 1997–2010, making it probable that latex gloves with varying allergenic potential were being used. This, combined with variations in the definitions of latex allergy, makes it difficult to compare study findings directly. Nonetheless, there seems to be a consistent message. Our review indicates that it is reasonable for employers to allow staff with type 1 allergies to use PFLP gloves, so long as co-workers also use PFLP or non-latex gloves. These findings remain unchanged from the NHS Plus guideline [6] and are supported by a recent non-systematic evidence review [25].

In the UK powdered latex gloves have, in the main, been replaced by non-powdered latex gloves in the workplace, but the use of (usually non-powdered) latex gloves remains widespread in health care, hairdressing and food handling. The extensive use of latex gloves in health care stems largely from concerns about occupational exposure to blood-borne viruses and the need to maintain universal precautions in order to prevent transmission of infectious diseases. Apart from effective biological impermeability, latex gloves afford good tactile sensitivity and manual dexterity and tend to close around the site of perforations. These properties are useful in certain activities, for example, surgery.

However, it is important that workers only wear natural rubber gloves when necessary and are mindful that non-latex gloves can safely be worn for most infection control purposes [26]. The use in the workplace of gloves containing natural rubber proteins fall under the Control of Substances Hazardous to Health Regulations [27], and before latex gloves are used, a full risk assessment should

determine whether an alternative, non-latex glove can be used instead. Small-to-medium size employers such as hairdressers and caterers may need advice on how to carry out a risk assessment and on selecting appropriate latex and non-latex gloves for work; this information is available from the Health and Safety Executive [28].

The increased use of non-powdered gloves in the workplace in the UK has resulted in a decline in the incidence of type 1 latex allergy in workers. However, cases of type 1 allergy in workers still exist and our review clarifies their management in an occupational setting. Further studies on the clinical and cost-effectiveness of sublingual immunotherapy in workers with type 1 latex allergy are warranted.

Key points

- Where possible, individuals with type 1 allergy to latex should avoid natural rubber latex in the workplace.
- When the nature of work requires employees to wear latex gloves, most of those with type 1 latex allergy can safely be provided with powder-free low-protein latex gloves provided that their co-workers use the same or non-latex gloves.
- Current evidence is too weak to support the use of personal protective equipment or immunotherapy to prevent or treat latex allergy in the workplace.

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Conflicts of interest

None declared.

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