Latex Allergy - the Australian experience

Where are we now

Prof CH Katelaris
University of Western Sydney and Campbelltown Hospital
Latex Allergy - Australian Experience

- Clinical studies - dental workers
  - nurses
  - spina bifida
  - operating room staff
  - 1st responders

- Policy development

- Evaluation of strategy effectiveness
Research

Prevalence of latex allergy in a dental school

Constance H Katelaris, Richard P Widmer and Ross M Lazarus

Adverse reactions to rubber products have been recognised for many years, and irritant reactions and cell-mediated hypersensitivity reactions such as contact dermatitis are well described. The latter are thought to be caused by one or more low-molecular-weight chemical compounds added in the rubber-making process.¹

It is now recognised that latex allergy is a particular problem for certain “at risk” groups, including health care workers, patients with spina bifida or other spinal cord abnormalities and patients who have had multiple operations. In addition, atopic individuals are more likely to develop IgE antibodies to latex protein with increased exposure.²

The clinical manifestations of type I hypersensitivity reactions to latex protein are wide ranging, from contact urticaria to life-threatening anaphylaxis and death. There is now little doubt that at least some episodes of intraoperative

Abstract

Objective: To determine the prevalence of latex allergy in dental workers.

Design: Questionnaire survey of staff of a dental school.

Setting: The Westmead Dental School, a large dental facility in western Sydney.

Participants: 230 staff members of the Westmead Dental School (consisting of general and specialist dentists, chairside assistants and registered nurses, laboratory technicians, dental therapists and hygienists) received questionnaires.

Main outcome measures: The prevalence of latex allergy, defined by prompt onset of hand urticaria with or without generalised symptoms, and the prevalence of hand dermatitis and other glove-related symptoms. Also, the relationship between latex allergy and associated atopic status.

Results: 177 staff (77%) responded by the set collection date; 33% reported symptoms related to wearing gloves and 22% satisfied the criteria for glove dermatitis. Sixteen respondents (9%) reported characteristics suggestive of latex-glove allergy.

Conclusions: Confirmation of the 9% prevalence of latex allergy among dental workers will require further studies incorporating an objective measure of IgE-mediated hypersensitivity.

MJA 1996; 164: 711-714
Latex Allergy - Westmead Dental Study
Katelaris et al, 1996

- Questionnaire survey of Westmead Dental School
- 177/230 staff members (77%) responded
- Detailed questions on:
  - hand dermatitis
  - symptoms of latex allergy
  - general allergic history
Latex Allergy - Westmead Dental Study
*Katelaris et al, 1996*

- 33% - symptoms with glove use
- 22% - glove dermatitis
- 9% - latex allergy
Symptoms reported by subjects with questionnaire based latex allergy compared to all other subjects

<table>
<thead>
<tr>
<th></th>
<th>Latex</th>
<th>Allergic</th>
<th>Non-latex</th>
<th>allergic</th>
</tr>
</thead>
<tbody>
<tr>
<td>glove dermatitis</td>
<td>15</td>
<td>94%</td>
<td>24</td>
<td>15%</td>
</tr>
<tr>
<td>(p=.02)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other contact dermatitis</td>
<td>5</td>
<td>31%</td>
<td>27</td>
<td>17%</td>
</tr>
<tr>
<td>Food allergy</td>
<td>3</td>
<td>19%</td>
<td>18</td>
<td>11.1%</td>
</tr>
<tr>
<td>Animal allergy</td>
<td>4</td>
<td>25%</td>
<td>25</td>
<td>15%</td>
</tr>
<tr>
<td>Total</td>
<td>16</td>
<td></td>
<td>161</td>
<td></td>
</tr>
</tbody>
</table>
Action taken by latex allergic subjects

- 37% - Nil
- 31% - Seen by GP
- 6% - Seen by specialist
- 25% - Changed glove brand
- 50% - Treated with medication (handcream, antihistamine)
Table 4: Selected details of some other studies which found latex allergy in health care workers by questionnaire

<table>
<thead>
<tr>
<th>Study*</th>
<th>Participants</th>
<th>Type of study</th>
<th>Latex allergy</th>
<th>% Atopic participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turjanmaa⁶</td>
<td>512 hospital employees</td>
<td>Questionnaire and skin testing</td>
<td>15/512 (2.8%)</td>
<td>(4/54 surgeons [7.4%])</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(4/71 operating room nurses [5.6%])</td>
<td></td>
</tr>
<tr>
<td>Berky, et al.⁴</td>
<td>1043/1628 dentists in US Army Dental Corps</td>
<td>Questionnaire</td>
<td>143 (13.7%)</td>
<td>35%</td>
</tr>
<tr>
<td>Rankin, et al.⁵</td>
<td>526/830 faculty and staff of dental school</td>
<td>Questionnaire</td>
<td>78 (15%)</td>
<td>64%</td>
</tr>
</tbody>
</table>

* Identified by a MEDLINE search for questionnaire studies in health care workers.
Screening for latex allergy with a questionnaire: Comparison with latex skin testing in a group of dental professionals

CH Katelaris,* RP Widmer,† RM Lazarus,‡ B Baldo§

Minimising the risks of latex allergy:
The effectiveness of written information.

FM Carrozzi RN,* CH Katelaris MB BS PhD FRACP,† TV Burke RN,* and RP Widmer MDSc, FRACDS,* Institute of Immunology and Allergy Research, Westmead Hospital,
† and Westmead Centre for Oral Health* Westmead, Sydney, Australia.

Aust Dental Journal 2002
Latex Allergy - Hobart ADA Study

CH Katelaris, RP Widmer, R Lazarus, B Baldo

- 494 Questionnaires
- 464 Questionnaires and Skin Testing
Latex Allergy - Hobart Study

- Questionnaire based glove dermatitis
  n= 79 (16%)

- Questionnaire-based latex allergy
  n = 40 (8.6%)
Latex Allergy - Hobart Study
Glove-related symptoms

151 (31.5%) had problems with gloves

% subjects with problems

- Itch: 73%
- Redness: 67%
- Hives: 33%
- Other rash: 36%
- Longterm hand problems: 44%
## Latex Allergy - Hobart Study

### Action taken for symptoms

<table>
<thead>
<tr>
<th>Action</th>
<th>% Subjects with Problems</th>
</tr>
</thead>
<tbody>
<tr>
<td>nil</td>
<td>66</td>
</tr>
<tr>
<td>GP consultation</td>
<td>28</td>
</tr>
<tr>
<td>Specialist cons.</td>
<td>11</td>
</tr>
<tr>
<td>glove change</td>
<td>43</td>
</tr>
<tr>
<td>use medication</td>
<td>51</td>
</tr>
<tr>
<td>hand cream</td>
<td>32</td>
</tr>
<tr>
<td>cotton gloves</td>
<td>15</td>
</tr>
</tbody>
</table>
# Latex Allergy - Hobart Study

<table>
<thead>
<tr>
<th>extract</th>
<th>number of subjects</th>
<th>n=464 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>wheal diameter</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>1-2</td>
<td>3-5</td>
</tr>
<tr>
<td>glove extract</td>
<td>440 (94.85)</td>
<td>18 (4%)</td>
</tr>
<tr>
<td>ammoniated latex</td>
<td>404 (87%)</td>
<td>48 (10%)</td>
</tr>
</tbody>
</table>

(Positive SPT either extract in 12 patients -2.6%)
Latex Allergy - Hobart Study

Comparison of Skin Test to Questionnaire

- Sensitivity - 7/12  (58.3%)
- Specificity - 420/452  (94%)
- Negative predictive value - 98.8%
- Positive predictive value - 18%
## Comparison of Westmead, Hobart and Perth Questionnaire Data

<table>
<thead>
<tr>
<th></th>
<th>Westmead n=177</th>
<th>Hobart n=494</th>
<th>Perth n=510</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Glove-related symptoms</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>52 (29%)</td>
<td>151 (31.5%)</td>
<td>166 (32.7%)</td>
</tr>
<tr>
<td><strong>QBLH</strong></td>
<td>16 (9%)</td>
<td>40 (8%)</td>
<td>60 (11.8%)</td>
</tr>
<tr>
<td><strong>QBGD</strong></td>
<td>39 (22%)</td>
<td>79 (16%)</td>
<td>98 (19.2%)</td>
</tr>
</tbody>
</table>
Prevalence of IgE-mediated allergy to latex in hospital nursing staff.


Abstract
Background: IgE-mediated hypersensitivity to latex proteins has become a significant clinical problem over the last decade. Nursing and medical staff are at risk because of their occupational exposure to latex. Aims: To determine the prevalence of type I hypersensitivity to latex allergens in the nursing staff of an Australian hospital. Methods: A questionnaire which asked about symptoms associated with the use of latex gloves was completed by 140 nurses working in the Alfred Hospital (72 in general medical wards, 68 in intensive care units). Skin prick tests with eluates of five different types of latex glove as well as common aeroallergens (rye pollen and house dust mite) and banana extract were performed. Results: Thirty-one nurses (22%) were skin prick test positive to at least one of the five latex glove eluates. All of these nurses were atopic, having positive skin prick tests to rye pollen or house dust mite. Symptoms of local dryness, itch and erythema associated with glove use were reported by more than half the study group, but not more frequently by those who were skin prick test positive to latex. Urticaria associated with glove use was reported more frequently by those with positive latex skin prick tests (13% vs 4%, p=0.05). Eighty-seven per cent of the nurses who were latex skin test positive were also positive to banana extract. Conclusions: IgE-mediated hypersensitivity to latex is common in nurses working in an Australian hospital. Glove associated symptoms were frequently reported, but in most cases the symptoms were more typical of irritant or contact dermatitis rather than type I hypersensitivity reactions. However, the extent of subclinical sensitisation to latex found in this study suggests that symptomatic latex allergy is likely to emerge as an increasing problem for nursing staff in this country.
140 nurses - questionnaire and skin tests

- 22% skin test positive to at least 1 of 5 “in house” latex extracts

- Latex SPT positive:
  - atopic - 56% allergic rhinitis
    - 28% asthma
  - All skin test positive to an aeroallergen
    - 87% positive to banana skin test
      - (only one had symptoms)

- No difference with age, years worked, glove changes
Latex Allergy - First Responders

Bridgewater, Katelaris et al, 1998

- Questionnaire survey
  St John Ambulance - SA, WA
  Ambulance Service - SA

- 1,099 / 2,716 forms returned (40.5%)

- Results:
  hand dermatitis 9.37%
  latex allergy 6.37%
  atopy 14.9%
Latex Allergy - Spina Bifida Study
Valentine et al, 1999

- 104 spina bifida patients and 50 siblings
- Questionnaire and specific IgE

Abstract

Although latex (rubber) allergy was first described in 1927, it was not discussed in the medical literature again until 1979. Allergic reactions to latex have become an increasing health problem, with anaphylactic reactions to latex first described in 1987, and 1100 reported incidents of allergy to rubber and 15 cases of death related to medical exposure to latex reported worldwide from 1989 to 1992. The prevalence of latex allergy has been estimated to be 2.5% in the general population and 5%–10% in healthcare workers.

The prevalence of IgE-mediated latex allergy in children with spina bifida is known to be high. Most reports come from the United States, where in one myelodysplasia clinic 22% of spina bifida patients had reported latex allergy and 15% of those had a history of intraoperative anaphylaxis. A US study of 93 consecutive patients with spina bifida scheduled for theatre showed that 35 (38%) had latex-specific IgE at diagnosis.

Latex allergy in an Australian population of children and adolescents with spinal dysfunction

Jane F Valentine, Jennifer J Kurinczuk, Richard K S Loh and Peter J Chauvel

Objectives: To determine the prevalence of latex allergy in an Australian population of children and adolescents with spinal cord dysfunction and a comparison population of their siblings without spinal dysfunction.

Design and setting: Cross-sectional study of all patients with spinal cord dysfunction attending the single tertiary spinal dysfunction clinic in Western Australia, and of their siblings closest in age.


Main outcome measures: Prevalence estimates and adjusted odds ratio estimates of the risk of having a history of latex allergy and of testing latex-specific IgE positive.

Results: Of the patients, 15.4% (95% CI, 9.1%–23.8%) had a history of latex allergy compared with none (95% CI, 0–5.8%) of the siblings. Of the 84 patients tested, 36.9% (95% CI, 26.8%–48.1%) were latex-specific IgE positive compared with 15.4% (95% CI, 4.4%–35.9%) of the 26 siblings tested. For patients, every operation after the first increased the risk of a positive latex test cumulatively by 41% (odds ratio, 1.41; 95% CI, 1.18–1.68).

Conclusions: The prevalence of latex sensitivity and clinical allergy in children and adolescents with spinal dysfunction in Australia is as high as that seen in the United States, and is related to latex exposure during surgery. The management policy regarding latex exposure for patients with spinal dysfunction requires urgent consideration.
<table>
<thead>
<tr>
<th>Latex Positive</th>
<th>history</th>
<th>Specific IgE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spina bifida</td>
<td>15.4%</td>
<td>36.9%</td>
</tr>
<tr>
<td>siblings</td>
<td>0%</td>
<td>15.4%</td>
</tr>
</tbody>
</table>
Latex Allergy in OT Staff
ME Hack. Anaesth Intensive Care 2001

- Operating suite in city hospital
- 102 Surgeons, nurses and wardsmen
- Questionnaire and RASTs to latex
- Operating suite had been powder-free for 18 months
32/102 had hand problems with gloves

20/102 experienced symptoms in OT

One subject (non-atopic) - systemic symptoms and 3+ RAST
Latex Allergy in OT Staff

ME Hack. Anaesth Intensive Care 2001

BUT-

- Selection bias
- Sanofi RAST used - non standardised
- Facility had been powder free for >18 months
- 4% of population stated occurrence of previous anaphylaxis
- 4 subjects declared allergy to known cross reactive fruits
Graumuller S. Schwarz F. Kramp B. Mallon D. Paul HW.

Institution
Dr. S. Graumuller, Klin./Poliklin. H.-N.-Ohrenheilkunde, Kopf- und Halschirurgie Otto Korner, Universitat Rostock, Rostock; Germany. E-Mail: sylke.graumuller@med.uni-rostock.de.

Title
Prevalence of IgE-mediated natural rubber latex allergies in health care workers (HCW) in Rostock, Germany, and Fremantle Hospital, Perth, Australia.

Source

Abstract
Introduction: Studies about the prevalence of latex allergies in health care workers (HCW) have been made worldwide and differ in the single studies between 2 and 17%. The aim of our study was to investigate and compare the natural rubber latex allergies in health care workers in Rostock and Fremantle. Material/method: In our study we examined 557 people, 276 employees of the University Hospital Rostock and of the hospital 'Klinikum Su[spacing diaeresis]'d' in Rostock as well as 281 colleagues of the Fremantle Hospital Perth, educational hospital of the University of Western Australia. We developed a questionnaire, included a present history, family history, allergy and latex anamnesis. For the prick test we used commercial test solutions made by ALK-Scherax. The in vitro diagnostic contained the determining of the latex-specific IgE by the Allergopharma specific IgE ELISA (RV). Results: The 2 groups of test persons from Rostock and Fremantle hospital did not differ in regard to age and sex. In the Fremantle group we found a significantly higher number of atopic persons (R = 25.4%; F = 50.9%). The probands from Rostock were found to have served for a longer period in their jobs (R = 15 +/- 10.7 years; F = 12.4 +/- 10 years). The use of unpowdered and latex-free gloves were more common in Rostock. On average, the wearing time and the number of the daily used gloves were significantly higher in Rostock than in Fremantle. The 2 groups from Rostock and Fremantle did not show any significant differences in the SPT (R = 4.6%; F = 3.9%), in the EAST classes >= 2 (R = 2.5%; F = 3.9%), in latex sensitization (R = 4.7%; F = 5.3%) and in natural rubber allergy (R = 3.3%; F = 3.6%). In our study we could prove that probands with atopic disease, as well from Rostock as from Fremantle, are significantly more frequent latex-sensitive than test persons without an atopic disease (p < 0.001). The risk of latex sensitization is within the persons with atopic disease 8 times higher than within those, who don't have any atopic disease. Conclusion: The results of our study, with an allergy rate of 3.3% in Rostock and 3.6% in Fremantle, show a low prevalence of latex allergy in comparison to other in literature published investigations. The risk of latex sensitization was significantly higher under the atopics.
Latex Allergy at Freemantle Hospital
Graumuller et al, Allergologie 2004

- 281 HCWs - questionnaire
  - SPT with ALK extract
  - specific IgE ELISA - allergopharma

- Results
  - SPT positive in 3.9%
  - ELISA positive in 3.9%
  - questionnaire positive in 5.3%
  - overall latex allergy in 3.6% (higher rate in atotics)
Latex Allergy - prevalence

- General population: 1%
- General atopic population: 1%-9%
Latex Allergy - prevalence

Occupational exposure

Health care workers 3-17%

Rubber industry workers 5-10%

- Approximately half with positive SPT will have symptoms
- 2%-10% prevalence of occupational asthma
Spina bifida

- 10-68%
- Children with early and frequent exposure - SPT positive in > 25% with more chance of clinical reactions
- If little exposure history - much reduced rate of sensitisation
- NRL sensitisation is very uncommon in general paediatric population
Latex Allergy - Risk Factors

- Level of exposure
- Route of exposure
- Atopy
  - this association strong in Australian studies
- Certain food allergies
  - Melbourne study showed high degree of SPT positivity to banana but clinical reactivity rare in that study
- Hand dermatitis
  - our dental studies have shown this to be a powerful risk factor - almost all dental workers with symptoms of latex allergy had hand dermatitis preceding their symptoms
POLICY

- ASCIA Guidelines
- Area Health Service Guidelines
- NSW Dept of Health Policy
ASCIA Guidelines

Subcommittee

first edition 1996

revision 1998
GUIDELINES FOR THE MANAGEMENT OF LATEX-ALLERGIC INDIVIDUALS IN HEALTH CARE FACILITIES AND FOR THE MINIMISATION OF CONTINUING LATEX SENSITISATION

This document has been prepared by a Working Party of The Australasian Society of Clinical Immunology and Allergy (1996)

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Latex Allergy-ASCIA Guidelines

Public Health Issues

- universal adoption of powder-free gloves
- low-allergen containing gloves
- good hand washing and hand-care techniques
- specific information available to “at risk” individuals
Latex Allergy

Guidelines

- Guidelines for Hospital Management of Latex Allergic Patients including Operating Suite Guidelines
- Guidelines for General Practice Management of Latex Allergic Patients
- Guidelines to Promote Safe Practice in the Dental Environment for Latex Allergic Patients
- Latex free List
- Advice for Latex Allergic Individuals
Nearly all sensitised health care workers can continue working with the appropriate environmental modification which is feasible and effective.
Latex Allergy - NSW Health Department

1st met Nov 1997

Final policy released Dec 2000 (Jan 2001)!!!
Each Health Service shall:

“Develop strategies for the prevention of latex allergy in health care workers, early identification where it does occur and its effective management. Prevention strategies are to include the change to powder free latex gloves.”
Latex Allergy
Health consumers - identification and management of latex allergy

Each Health Service is to:

Include strategies for the identification and effective management of latex allergic health consumers in the various clinical settings
Latex Allergy - Policy Formulation
NSW Health Department

- Record Keeping
- Evaluation
- Implementation strategies
- Information, recommendation for manufacturers, suppliers
Latex Allergy-Documentation

Each Health Service shall:

Generate and manage appropriate documentation systems for each aspect of the policy
2. Policy

2.1 Policy

Health service employees and clients are to be protected from adverse health effects arising from exposure to latex. Each health service is to develop and implement a policy and appropriate procedures for the prevention and effective management of latex allergy in health consumers and health care workers.

As a minimum, health services are required to:

- Recognise the importance of reducing latex exposure by allocating appropriate funding and resources to ensure the effective implementation of this policy.
- Ensure timely and relevant consultation with employees and their representatives, occupational health and safety committees, and consumer groups in formulating local policy and procedures.
- Develop strategies for the prevention of latex allergy in health care workers, early identification where it does occur and its effective management. Prevention strategies are to include as a minimum the change to powder free low protein latex gloves.
- Include strategies for the identification and effective management of latex allergic health consumers.
- Provide appropriate information, education and training for health care workers and health consumers.
- Develop emergency procedures.
- Generate and manage appropriate documentation.
- Conduct ongoing monitoring and review of local policies, procedures and guidelines to ensure their continuing relevance and validity.

The objectives of this policy are to:

- reduce the incidence of sensitisation to latex and prevent the occurrence of allergic reactions in sensitised individuals;
- meet the duty of care to all health care workers and health consumers;
- satisfy legislative requirements;
- provide safe and efficient health services;
- contain costs;
- eliminate the use of latex in NSW public health care facilities as far as possible by 2003; and
- eliminate the use of powdered latex gloves in the first instance.

2.2 Accountabilities

2.2.1 NSW Department of Health

The NSW Department of Health is responsible for setting policy direction for the health and safety of all staff in NSW Health.
Latex allergy prevention
Have policies been successful?

- Some overseas studies
- Australian experience - indirect evidence
Latex allergy - progress since preventative measures adopted

- Lab requests
- Clinical presentations
- Perioperative anaphylaxis data
- Restudied Westmead Dental school
Latex Allergy - 20 years on....
Has the epidemic come and gone?

- Mechanisms of sensitisation well understood
- Much is known about the allergens at a molecular level
- Role for immunotherapy under investigation

**BUT**

- Natural history of latex allergy is still not clear
- Need to assess prevention/avoidance strategies and their efficacy in Australia

*Need revision of health dept policy in line with advances in manufacturing*