

LATEX SENSITIVITY AND ALLERGY: RAISING AWARENESS IN AUSTRALIA

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ACKNOWLEDGMENT

The author would like to thank Dr Leslye Long, Director of Nursing and Patient Care Services, Royal Adelaide Hospital, for her assistance in reviewing earlier drafts of this paper.

Accepted for publication July 2000

Key Words: latex, latex-allergy, latex hypersensitivity, Australia, hospitals, glove dermatitis

ABSTRACT

Natural rubber latex allergy is a public health issue that is yet to be addressed in many Australian hospitals. It is suggested that there is a widespread lack of awareness amongst hospital staff of the implications of this relatively new health problem. Natural rubber latex allergy is a cumulative, serious and incurable occupational health problem and a disabling disease. It can result in chronic illness, disability, loss of career and even death, for nurses and other health professionals. The serious risk that natural rubber latex allergy presents to staff health and patient safety, requires that hospital-wide strategies be developed to address the prevention and management of this condition as a matter of urgency. An overview of the problem of natural rubber latex allergy is presented, and strategies for addressing it suggested. The need for further research into the scope of the problem in the Australian context is emphasised.

INTRODUCTION

The terms 'latex allergy' and 'latex sensitivity' are used to describe an allergy or sensitivity to natural rubber latex, the sap of the Brazilian rubber tree, *Hevea brasiliensis* (Moore 1995). Proteins which occur naturally in rubber tree sap are thought to be allergens (Schilling 1994) and the etiologic agents for sensitisation (Groce 1996a p.172). These proteins are present in products manufactured from natural rubber latex. Chemicals added in the rubber manufacturing process (mercaptobenzothiazole, thiurams and carbamates) may also cause hypersensitivity and allergic contact dermatitis (Sussman and Beezhold 1995 p.44) and a causal relationship between powder added to natural rubber latex gloves and irritation, contact dermatitis and allergy development has also been established (Food and Drug Administration 1997).

Types of allergy to natural rubber latex

Reactions to natural rubber latex products have been categorised into three types, the most common of which is irritation, a non-allergic condition, characterised by dryness and crustiness and which resolves on cessation of contact (Moore 1995). There are two types of allergic reaction to natural rubber latex products: delayed hypersensitivity (type IV) and immediate hypersensitivity (type I) (Sussman and Beezhold 1995 p.43).

Delayed hypersensitivity (Type IV - allergic contact dermatitis)

Delayed hypersensitivity is the most common immunologic response. It is an allergy to chemical additives in natural rubber latex which presents as allergic contact dermatitis, initially characterised by vesicular lesions which develop a thickened, crusted appearance with continued contact (Sussman and Beezhold 1995 p.44). In latex glove wearers, this characteristically affects the glove-exposed areas, with swelling, redness, pruritis, skin cracking and eczema usually occurring within 48 hours of exposure (Potter undated). This reaction is not usually systemic, however skin cracks predispose to

further sensitisation to latex proteins, and contact dermatitis can accompany an immediate hypersensitivity reaction.

Immediate hypersensitivity (Type I)

Immediate hypersensitivity reactions are mediated by latex-specific immunoglobulin-E and may present as contact urticaria, occupational asthma, rhinoconjunctivitis, or anaphylaxis (Sussman and Beezhold 1995 p.44). Immediate hypersensitivity reactions may result from contact with, or inhalation of, latex proteins.

Sensitisation

The amount of latex exposure required to produce sensitisation or allergy is not known (Centers for Disease Control and Prevention 1997), however it has been suggested that cumulatively prolonged exposure to latex increases risk of sensitisation (Reddy 1998). Progression occurs from localised reactions such as contact urticaria, to systemic anaphylactic reactions, though the relationships between dose and response in exposure, sensitisation and allergic reactions have not been fully established (Leung 1998). Intraoperative anaphylactic shock has, however, been reported in individuals with no previous adverse reaction to latex exposure (Pasquariello et al 1993 pp.983-986) and positive correlation between duration and frequency of exposure to natural rubber latex and latex allergy has been suggested (Leung 1998).

Risk factors in the health care setting

A wide range of products are manufactured from latex including many household objects such as balloons, rubber bands, elastic and condoms (Reddy 1998). Exposure to latex allergens in the health care setting is largely through the use of latex gloves and latex-containing medical products including (among many others) adhesive tapes, urinary catheters and wound drains (Reddy 1998). Exposure to latex allergens is not limited to contact as latex proteins adhere to the cornstarch powder used in latex gloves and become airborne when gloves are donned or removed, generating an allergenic aerosol (Food and Drug Administration 1997). One study has suggested a threshold air level of $0.6\text{ng}/\text{m}^3$, above which, symptoms in latex allergic individuals are induced (Baur et al 1998 p.25). This study found concentrations of latex aeroallergens of between 0.4 and $205\text{ng}/\text{m}^3$ in air samples taken in 30 rooms of different hospital units and two doctors' offices and reported a significant association between latex allergy symptoms and latex aeroallergen concentration (Baur et al 1998 p.25).

Latex allergy caused by indirect exposure to latex aeroallergens has also been reported in a hospital administrative employee, who had never worn latex gloves (Vandenplas et al 1996 pp.452-453). Exposure (both direct

and indirect) to latex gloves thus constitutes a significant risk factor in the development of latex allergy among workers in health care settings.

Disruption to the skin barrier

It is thought that disruption to the skin barrier, such as occurs in individuals with hand dermatitis, may predispose them to developing latex allergy (Sussman and Beezhold 1995 p.43). According to Bernstein (1997 p.1911) 'Primary cutaneous sensitization occurs via solubilization by sweat of proteins that leach from gloves to the skin and could be facilitated by a disruption in the skin barrier.'

Other risk factors

Atopy

A history of atopy (predisposition to allergy) is thought to increase the risk of developing latex allergy (Santos et al 1997 p.1543; Slater 1997; Centers for Disease Control and Prevention 1997). One study has reported that 77% of individuals with latex allergy had a history of atopic illness (Taylor and Praditsuwan 1996 p.266) and another has reported that 100% of individuals with positive latex skin tests were atopic to common allergens (Leung 1998). In this latter study, a relationship between atopy and symptoms of latex allergy was not demonstrated (Leung 1998).

Cross allergies

Cross allergies with many fruits, including banana, avocado, chestnut, potato, tomato, peach, papaya, fig and kiwifruit have been reported (Beezhold et al 1996 pp.416-422; Sachs 1996 p.324; Blanco et al 1994 pp.309-314; Crisi and Belsito 1993 p.248; Fernandez de Corres et al 1993 pp.35-39; Rodriguez et al 1993 pp.31-34) and can be responsible for significant, life-threatening anaphylactic reactions (Kurup et al 1994 p.215; Lavaud et al 1992 pp.492-493).

Multiple surgical procedures

Individuals who have undergone multiple surgical procedures, especially myelomeningocele patients and those with urogenital abnormalities, are at high risk of sensitisation with prevalence possibly as high as 60% due to cumulative exposure to latex products (Reddy 1998). Intraoperative anaphylaxis without prior evidence of reaction to latex has been reported in patients who have undergone multiple surgical procedures (Pasquariello et al 1993) and is particularly concerning.

Epidemiology

Although dermatitis related to wearing of rubber gloves was identified as early as 1933 (Downing 1933 pp.196-

198) the first report of an allergic reaction to natural rubber latex was published in 1979 (Nutter 1979 pp.597-598). Subsequent to this report, only a few isolated cases were reported until the early 1990's when reports of latex-sensitivity and allergy increased markedly (Groce 1996a, p.170). It is widely thought that the advent of human immunodeficiency virus (HIV) in the 1980s, and the subsequent introduction of universal precautions, which markedly increased the use of latex gloves in the health care industry, may have contributed to a sharp rise in latex allergy (Reddy 1998; American Association of Occupational Health Nurses 1997; Bernstein 199 p.1911; Centers for Disease Control and Prevention 1997; Moore 1995; Sussman and Beezhold 1995 p.43). Changes in manufacturing processes, which may have resulted in lower quality and perhaps higher protein concentrations in products as manufacturers struggled to meet surging demand in response to the institution of universal precautions, are also thought to have contributed (Landwehr and Boguniewicz 1996 p.306; Moore 1995; Sussman and Beezhold 1995 p.43). By the end of 1992, the American Food and Drug Administration had received some 1000 reports of allergy and anaphylaxis and 15 anaphylactic deaths associated with the use of medical devices/products derived from latex (Schilling 1994). This figure had increased to over 1500 reports by August 1997 (Food and Drug Administration 1997).

Incidence and prevalence of latex sensitisation and allergy

Although a number of studies have reported the prevalence of latex sensitisation and allergy, the incidence of latex sensitisation is generally not known (Sussman et al 1998 p.171). One prospective study has reported an estimated incidence of sensitisation in hospital personnel using latex gloves of approximately 1% in a one-year period, although reductions in glove protein concentration during the study period may have influenced these results (Sussman et al 1998 p.178). The prevalence of latex sensitisation and latex allergy varies among populations studied and testing methodologies utilised. The following have been reported in the literature:

- Australia - 9% prevalence of latex hypersensitivity among dental workers in a Sydney dental school (Katelaris et al 1996 p.713).
- Canada - 12.1% prevalence of latex sensitisation among latex glove users in a Canadian hospital (Sussman et al 1998 p.172).
- Hong Kong - 6.8% prevalence of skin test positivity to latex extracts among health care workers in a large teaching hospital (Leung 1998).
- United States – estimated rates of latex allergy of less than 1% in the general population, 5% to 17% among

health care workers and 30% to 60% among patients with central nervous system malformations (Santos et al 1997, p.1544) have been suggested.

Latex allergy in Australia

While reports of sensitivity and allergy to latex caused alarm in the United States in the early 1990s, this condition is only just beginning to receive wider attention in Australia. Although the Australian Therapeutic Goods Administration (TGA) first issued information on latex allergy in 1994 (TGA 1994) and reissued warnings in 1996 (TGA 1996), the first Australian study of latex allergy was not published until 1996 (Katelaris et al 1996 pp.711-714). Despite TGA recommendations that suggested the best strategy to prevent latex sensitisation in staff and patients is avoidance of latex-containing devices and the use of non-powdered gloves (TGA 1996), powdered latex gloves remain commonplace in Australian health care facilities. However it is evident that latex allergy is beginning to receive wider attention in Australia. Significantly, following an extensive consultation process, the New South Wales Health Department has recently released a policy framework and guidelines for latex allergy prevention and management in NSW public health services (NSW Health 2000).

Management of latex allergy

Currently, the only effective treatment for latex allergy is avoidance of natural rubber latex (Landwehr and Boguniewicz 1996 p.310). However, the need to avoid all sources of latex has a dramatic and drastic impact on the individual's life (Free 1998 pp.42-43; Groce 1996b p.174) as it is estimated that natural rubber is present in over 40,000 products (Groce 1996a p.172). Total avoidance of such an enormous range of common articles can lead to an inability to leave the home, to work, or even socialise and individuals who have latex allergy can be so severely affected that they become confined to their homes, suffering social isolation, loss of career and financial hardship. Preventing sensitisation and subsequent allergy development also requires that exposure to latex allergens be minimised, though it is recognised that with the vast range of products that contain natural rubber latex, this can be very difficult to achieve.

Latex allergy in the Australian hospital setting

Although diagnosis of contact urticaria due to latex allergy has been reported by Australian hospital staff (albeit infrequently), powdered latex gloves remain in common use in Australian hospitals and continue to pose a significant risk to staff and patient health and safety. It is suggested that Australian hospital staff are largely unaware of the significant threat that repeated exposure to natural rubber latex allergens poses to personal health, patient health and individual careers.

Prevalence

Determining the prevalence of latex sensitivity or allergy among hospital staff is difficult, as occupational health and safety incident classification systems may not lend themselves to reporting or monitoring this condition. 'Cause of injury' categories in occupational health and safety reports relating to the cause of incidents into which latex sensitivity/allergy may fall may include 'contact dermatitis'; 'skin infection/allergy'; 'recurrence'; 'affected by indoor environment' and 'medical condition'. These categories do not discriminate by causative agent and are poor indicators of the prevalence of this condition. While occupational health and safety incident reports may indicate a problem of minor proportion when considered as a proportion of total hospital staff, it is this author's experience that hand dermatitis in particular, is significantly under-reported by nurses. This seems largely due to a perception that reporting mechanisms are both time-consuming and tedious and a prevailing belief that this condition is of minor significance. For example it is this author's experience that nurses frequently request the supply of alternative glove or hand-washing products without having considered either reporting, or seeking treatment for, hand dermatitis. Unless an alert manager actively encourages the reporting of hand dermatitis when such requests are made, many cases may not be reported.

Implications for hospital staff

Lack of awareness of the potential for development of severe allergy following sensitisation by latex proteins may contribute to dismissal of 'minor' skin irritations, particularly those which resolve over a period of a few days' absence from the workplace. Similarly, lack of awareness of a possible connection between environmental exposure to airborne allergens in the workplace and the development or exacerbation of asthma, may reduce the likelihood of reporting of respiratory complaints. Hospital managers who investigate occupational health and safety issues having only limited knowledge about the nature of latex allergy may implement ineffective strategies for dealing with latex allergic individuals in the workplace.

Implications for hospital patients

Lack of awareness about the nature of latex allergy and hypersensitivity also poses risks for hospital patients. As previously discussed, patients who are at highest risk of developing latex-sensitivity and allergy include current or former health care workers and individuals who have undergone frequent surgical procedures. Exposure to the hospital environment poses a serious threat to the health of latex allergic individuals who must avoid all contact (skin, mucosal and respiratory) with natural rubber latex. It is necessary to provide an environment free of latex aeroallergens and to have available, non-latex alternatives

to all medical products for these patients. As the ability of allergic individuals to avoid sources of latex in the hospital environment is dependent on staff awareness and knowledge of this condition, raising awareness and improving knowledge of hospital staff about latex allergy should be regarded as a matter demanding urgent attention.

Prevention strategies

Latex sensitivity and latex allergy are largely preventable conditions. The following strategies focus on both the primary and secondary preventative measures which can be undertaken in health care facilities to reduce the development of latex-sensitivity and allergy, and minimise the threat that exposure to latex poses to latex-sensitive and allergic staff and patients.

Primary prevention

Primary prevention aims to prevent sensitisation of individuals to natural rubber latex proteins. Achievement of this goal therefore requires that exposure to latex allergens be prevented. While it may be impractical, at least in current circumstances, to prevent *any* contact with latex from occurring, minimisation of exposure is an achievable goal.

Suggested strategies for minimisation of exposure and subsequent sensitisation include:

- Removal of powdered natural rubber latex gloves from all areas of the hospital and replacement with non latex alternatives.
- Decontaminating work areas from latex dust and monitoring latex dust levels.
- Raising staff awareness and knowledge about this potentially life-threatening condition.
- Encouraging early reporting of hand dermatitis and work-related asthma.
- Creating a 'latex allergy task force' with multi disciplinary and hospital-wide representation (Sussman and Gold 1996) to assist both in raising awareness and encouraging 'localisation' of this issue.

Secondary prevention

Secondary prevention aims to prevent the exposure of latex-sensitised and latex allergic individuals to latex antigens (thus minimising associated risks). Suggested secondary prevention measures include:

Development of hospital policies for the management of patients with latex sensitivity or allergy which involve:

- Introduction of systematic pre-operative screening of patients for history of latex allergy and fruit allergy.

- Development of policies for the management of latex allergic patients in all areas of the hospital, especially in high risk areas such as operating theatres, the emergency department, the intensive care unit, and the X-ray department (Sussman and Gold 1996).
- Provision of latex-free equipment for both routine and emergency management of latex-allergic patients.
- Preparation of a compendium of hospital products which contain latex proteins (Sussman and Gold 1996).

Development of hospital guidelines for the protection of latex allergic staff by the:

- Provision of staff education sessions to increase awareness and encourage early reporting of hand dermatitis, allergic reactions and respiratory problems. These should include information on recognising the signs and symptoms of allergic reactions in sensitised individuals and information on allergen transmission mechanisms, including air and touch.
- Refinement of occupational health and safety data collection to enable determination of the prevalence of latex allergy.
- Institution of routine screening for latex sensitivity in workers who report glove-related dermatitis.
- Removal of powdered latex examination gloves and replacement with non-latex alternatives (preferable), or low-protein non-powdered latex examination gloves.
- Cessation of the use of *all* powdered latex gloves in the identified high-risk areas of the intensive care unit, operating theatres, X-ray department and emergency department.
- Decontamination of work areas from latex dust and monitoring of latex dust levels.
- Improved accessibility to non-latex gloves, for use by latex-allergic staff. Access to these supplies should be provided in all areas where gloves are used.

In addition to the measures outlined above, it is suggested that research be undertaken to determine latex sensitisation rates among nurses and other populations of hospital staff, to assist in addressing the Australian research deficit and in determining the extent of this problem in Australian hospitals.

Issues associated with implementation of prevention strategies

Cost is the major issue likely to influence the implementation of prevention strategies. The cost differential between powdered latex gloves and their non-powdered alternatives is significant, as is the cost differential between most latex products and non-latex alternatives. This must, however, be weighed against the

potential costs associated with lost productivity and workers' compensation payments for staff who develop latex sensitivity and allergy through exposure to latex allergens in the workplace, and the risk posed to patients exposed to latex allergens in the hospital environment. Litigation has occurred in the United States, where some health care workers have successfully sued latex glove manufacturers for damages (Asplund 1998; Reuters 1998; Goldstein 1998 p.A12). Although litigation against glove manufacturers is unlikely to impact significantly on a hospital, failure to take steps to provide a safe environment for staff or patients with latex allergy, in an environment of well-documented evidence of association between exposure and life-threatening anaphylaxis, could well leave an organisation at risk of litigation.

Another issue requiring consideration is that of ensuring staff compliance with latex-minimisation strategies. Opposition to removal of latex gloves from hospital supplies may occur among some groups of staff, as powdered latex gloves are thought to have superior comfort, tactile and barrier qualities (Sussman and Beezhold 1995 p.43) on which many health care workers rely. Encouraging the participation of those likely to oppose latex glove removal in a 'latex allergy task force' may assist in raising awareness, localising this issue and encouraging staff to 'buy in' to these strategies.

CONCLUSION

Health care providers have a responsibility to safeguard the health and safety of staff, patients and the public at large. The threat that natural rubber latex allergy poses to the health and safety of patients, staff and visitors alike requires that this problem be afforded serious attention, particularly in the hospital setting. Although total avoidance of latex-containing products is difficult to achieve, minimisation of exposure is achievable if the significance of the risks associated with sensitisation and allergy are recognised. Natural rubber latex allergy is a life-threatening, disabling condition and as such, the need to raise Australian health professionals' awareness about latex sensitisation and allergy should be addressed as a matter of urgency. Strategies aimed at preventing sensitisation and minimising risks for both employees and patients of Australian hospitals should be developed as a matter of priority. Research designed to determine the prevalence of latex-sensitisation among Australian hospital staff would add significantly to an understanding of the extent of this problem in Australia.

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