

Hospital Studies:

Improved Natural Rubber Latex Gloves Reduce Allergy Risks

The high protein/allergen content of an older generation of powdered latex gloves is widely recognized as the cause of latex protein sensitization among certain glove users. Changing to low-protein natural rubber latex gloves that are either lightly-powdered or powder-free can significantly reduce the incidence of latex protein sensitivity among hospital workers. Hospital studies also show that latex sensitive individuals wearing synthetic gloves can work alongside colleagues wearing improved latex gloves without suffering ill effects.

STUDY I:

“Management of Occupational Allergy to Natural Rubber Latex in a Medical Center: The Importance of Quantitative Latex Allergen Measurement and Objective Follow-Up” *Hunt, L.W., Kalker P., Reed, C.E. and Yunginger J.W. J. Allergy Clin. Immunol.2002; 110: S94-106.*

Intervention measures involving switching to low allergen latex gloves at the Mayo Clinic in the U.S. produced the following positive outcomes:

- “ The number of new-onset cases of latex allergy fell abruptly after the intervention measures were implemented, from 0.15% to 0.027% based on an estimated 12,000 workers per year who regularly used gloves.
- “ Latex allergic healthcare workers who had all experienced symptoms related to latex exposure at work, and several who had latex allergy problems with surgical and dental procedures and delivery of infants prior to the intervention, could now continue to carry out their work without any symptoms or complications that could be attributed to latex allergy.
- “ Removal of latex gloves with high allergen content from the Mayo Medical Center alone could reduce the number of new cases of clinical latex allergy.
- “ Replacing powdered, high allergen gloves with low allergen gloves at the Clinic resulted in a significant reduction in allergic reactions with a consequential cost saving of \$200,000 per year.

It was concluded “although latex-allergic healthcare workers need to use non-latex glove alternatives for their personal use, they can continue to work in their medical environment if their coworkers use either non-powdered latex gloves, latex gloves with lowest protein content, or latex gloves of very low allergen content. With these modifications, symptoms from latex aeroallergen exposure are prevented, and new cases of latex allergy reduced.”

STUDY II:

“A Four-Year Prospective Study to Evaluate the Efficacy of Glove Interventions in Preventing Natural Latex Sensitization in Healthcare Workers at Two Hospitals”

Kelly K.J., Klancnik M., Kurup V., Barrios-Jankol C., Fink J.N. and Peterson E.L. J. Allergy Clin. Immunol. 2003, Part 2; Vol. 111, No. 2, No.426

As reported by researchers from the Medical College of Wisconsin and the National Institute for Occupational Safety and Health (NIOSH), part of the Centers for Disease Control and Prevention (CDC), the outcome of glove interventions in two hospitals in 1998 that involved changing to powder-free latex gloves and synthetic gloves was assessed after a period of four years. Hospital A replaced all powdered latex gloves with either powder-free latex gloves or synthetic gloves. Hospital B replaced all gloves with powder-free latex gloves.

Between August 1998 and August 2002, participating healthcare workers (A-305, B-500) completed serial skin tests (A - 972, B -1803). The findings showed that initial prevalence of latex sensitization was A - 18/305 (5.9%) and B - 21/500 (4.2%).

Prior to the glove interventions, healthcare workers from both hospitals developed latex sensitization (A - 2/257, B - 5/448) over 12 months, but after the glove interventions, no healthcare workers developed latex sensitization during 32 months of observation. Before the interventions, no healthcare workers reverted from skin test positive to negative; after interventions, four reverted.

The study once again demonstrates that latex sensitization in hospitals can be controlled by the use of low-protein, powderfree latex gloves or protein-free synthetic gloves, or both.

STUDY III:

“Long-term Outcome of 160 Adult Patients with Natural Rubber Latex Allergy”

Turjanmaa K., Kanto M., Kautiainen H., Reunala T. and Palosuo T. J. Allergy Clin. Immunol. 2002; 110: S70-74.

The occupational outcome of 160 latex allergic adult subjects, of whom 71 were healthcare workers in a Finnish hospital, was monitored after all gloves in the working environment were changed to either low-allergen latex or non-latex gloves in 1990. When re-examined between 1995-1996, the following observations were reported:

- “ Prevalence of hand eczema significantly diminished, particularly for the healthcare workers;
- “ Within the healthcare sector, no employees had to change tasks within the same working place or retire because of latex allergy;

“ Most of the healthcare workers with latex allergy still use low-allergenic latex gloves. Only a few who experienced previous anaphylactic reactions needed latex-free gloves; these workers did not have symptoms from low-allergen latex gloves that were used by co-workers, even though the gloves were powdered.

“ All healthcare workers with latex allergy could continue in their old work assignments; most of them even continued using low-allergen latex gloves.

It was concluded that the use of low-allergen latex or non-latex gloves throughout the healthcare sector seems to be an adequate step for healthcare workers who have natural rubber latex allergy.

STUDY IV

“Primary Prevention of Natural Rubber Latex Allergy in the German Health Care System Through Education and Intervention” *Allmers H., Schmengler J. and Skudlik C. J. Allergy Clin. Immunol. 2002; 110(2): 318-323.*

The effects of intervention by switching to low-protein, powder-free natural rubber latex gloves to reduce the incidence of latex allergy in personnel working in healthcare facilities (60% of all German hospitals) were assessed. The timing of the introduction of intervention strategies, such as education of both physicians and administrators, together with regulations demanding that healthcare facilities purchase only low-protein, powder-free latex gloves, were examined. Findings indicated that:

“ Despite increased recognition of latex allergies, education about latex allergies in healthcare facilities combined with the introduction of powder-free gloves with reduced protein levels has been associated with a nationwide decline in the number of suspected cases of occupational allergies caused by latex in Germany.

“ Primary prevention of occupational latex allergies can be achieved if these straightforward and practical interventions are properly carried out and maintained.

STUDY V:

“Outcomes of a Natural Rubber Latex Control Program in an Ontario Teaching Hospital” *Tarlo S.M., Easty A., Dubanks K., Min F., and Liss G. University Health Network and Department of Medicine and Public Health Sciences, University of Toronto. J.Allergy Clin. Immunol. 2001; 108: 628-633.*

Switching to low-protein, low-powder latex gloves at a teaching hospital in Toronto, Canada, in 1995 resulted in:

“ A significant drop in the incidence of latex allergy, from 45 cases in 1995 to three in 1997 and one in 1999.

.. Two of three nurses who had stopped work due to latex protein allergy were able to return to work alongside coworkers wearing low-protein, low-powder latex gloves.

.. The hospital was able to reduce expenses related to missed work days and workers' compensation claims, without incurring additional costs for gloves.

STUDY VI:

“Parameters of Natural Rubber Latex [NRL] Sensitization Decrease in Healthcare Workers (HCW) Following Reduction of NRL Exposure” Rueff F., Schopf P. and Przybilla B. *Klinik und Poliklinik für Dermatologie und Allergologie, Ludwig-Maximilians-Universität, Munich, Germany. Presented at the 56th annual meeting of the American Academy of Asthma, Allergy and Immunology (AAAAI) in 2000.*

Replacing powdered latex gloves with low-protein, powder-free latex gloves in a university hospital in Munich, Germany, showed the following improvements after 13.9 ± 3.6 months:

.. Of the 61 healthcare workers previously testing positive according to skin prick tests (SPT), 8 (13%) showed no SPT reactions.

.. Of the 57 healthcare workers who previously had latex-specific IgE antibodies involved in allergic reactions in their serum, 13 (22%) had no such antibodies. For the others, these antibodies had declined by at least one class in 19 (33%) cases, had risen in one (< 2%), and remained the same in 24 (42%).

.. None of the workers originally diagnosed with latex allergy symptoms had developed the allergy.

.. The 20 workers without positive initial SPT reactions and the 24 without initial latex-specific IgE antibodies remained non-reactive when tested.

STUDY VII:

“Reduction of Latex Aeroallergens and Latex-specific IgE Antibodies in Sensitized Workers After Removal of Powdered Natural Rubber Latex Gloves in a Hospital” Allmers H., Brehler R., Chen Z., Raulf-Heimsoth M., Fels H., and Baur X. J. *Allergy Clin. Immunol. 1998; 102: 841-846.*

Intervention involved the replacement of powdered latex gloves with powder-free latex gloves in five areas of a hospital: pediatrics ward, general surgery, orthopedics operating room, surgical clinic and adult intensive care unit. Powdered latex gloves continued to be used on one floor of a surgical ward, which served as a control area; non-latex gloves were used in the pediatrics intensive care unit. Seven of the 90 participating healthcare workers were found at the outset to be latex sensitive and wore synthetic, non-latex gloves throughout the study.

The intervention not only improved the condition of latex sensitive workers, but also allowed them to continue working with their other colleagues. The following positive effects were reported:

- “ Atmospheric loads of natural rubber latex antigen were reduced to undetectable levels almost immediately (within 24 hours) in the areas where the switch to powder-free gloves was made; they eventually also were reduced in the control area, where powdered latex gloves continued to be used.
- “ Two of the seven latex-sensitive workers initially required antihistamines or inhalers at work. After the switch, both workers’ symptoms disappeared and their medication could be terminated.
- “ Six of the seven latex-sensitive healthcare workers initially had latex-specific IgE antibody concentrations > 1kU/L. Within one year after the switch, concentrations were reduced by 50 percent in five of the workers and by 25 percent in the sixth.
- “ No new cases of sensitization could be detected in the other participants.

STUDY VIII

“A Significant Decrease in the Incidence of Latex-Allergic Health Care Workers Parallels With a Decreasing Percentage of Highly Allergenic Latex Gloves in the Market in Finland” *Reunala, T. Turjanmaa, K., Alenius, H., Reinikka-Railo, H. and Palosuo, T. J. Allergy and Clin. Immunol. 2004; 113(2): S60, Abstract # 140.*

This study shows that the national strategy of Finland to regularly measure the allergen content of medical latex glove and provide information from these surveys to the public seems to be an efficient way to reduce presence of high-allergenic glove brands in the market. A parallel and significant decrease in the incidence of latex-allergic health care workers suggests that the strategy employed also has marketed effects on primary prevention of occupational latex allergy.

STUDY IX

“Challenge Tests With Powder-Free Natural Rubber Latex (NRL) Gloves in Health Care Workers With a History of NRL-Induced Asthma” *Allmers, H., Beezhold, D., Hamilton, R.G. Sutherland, E.R. J. Allergy Clin. Immunol. 2004; 113(2): S60, Abstract #138*

The amount of NRL-allergen produced by handling up to 20 powder-free NRL-gloves was not sufficient to induce any clinically observable allergic reactions in the skin, mucosa or bronchi of latex allergic asthmatics. Powder-free NRL-gloves can be safely used by other personnel without inducing injury in NRL-allergic co-workers.

STUDY X

“Conversion to Low-protein, Powder-free Surgical Gloves – Is it worth the cost?”

Korniewicz D.M., Chookaew N., Elmasri M., Mudd K., Bollinger M.E., J. AAOHN 2005; 53(9): 388-393.

The study was a 2-year, longitudinal design with retrospective and prospective aspects developed to determine health care worker use of powder-free, low-protein NRL gloves, sensitization, cost, and glove satisfaction. The study involved 103 healthcare workers.

Prior to glove conversion, nearly one-half (44%, 36 of 82) of the operating room staff reported symptoms related to NRL exposure. By T4, only 27% (22 of 82, McNemar test = .007) reported symptoms related to NRL exposure. Additionally, a cost savings of \$10,000 per year for gloves was evident with reports of increased user satisfaction.

This study demonstrated that conversion to the use of powder-free, low-protein NRL gloves not only reduces health care worker NRL symptoms, but also positively effects the costs of glove purchases and worker compensation.

STUDY XI

“Latex allergy: a follow up study of 1040 healthcare workers” Filon, F. Larese Radman, G., J. Occupational and Environmental Medicine, 2006 Feb; 63(2):121-5.

In the years 1997-99, 1040 healthcare workers exposed to latex allergen for latex related symptoms and sensitization were evaluated. Three years after changing over to powder-free gloves with low-latex release, although 19 new subjects (2.4%) complained of itching erythema when using gloves, but none was prick positive to latex. Symptoms significantly improved and in most cases disappeared ($p < 0.0001$).

It was concluded, “Simple measures such as the avoidance of unnecessary glove use, the use of non-powdered latex gloves by all workers, and use of non-latex gloves by sensitised subjects can stop the progression of latex symptoms and can avoid new cases of sensitisation.”

STUDY XII

“Prevention of IgE sensitization to latex in health care workers after reduction of antigen exposures. Kelly-KJ; Wang-ML; Klancknik-M; Petsonk-EL ., *J Occup. Environ Med* 2011 Aug; 53(8):934-940

Glove intervention designed to reduce latex allergen exposure in health care workers resulted in the following positive outcome:

Latex antigen concentrations in work area air ducts were measured before the intervention. Symptoms and latex sensitization were monitored annually before and after the intervention in 805 HCWs, using questionnaires and skin prick testing.

The prevalence of latex sensitization before the intervention correlated with air duct latex antigen measurements, for HCWs exposed to low (9/413, 2%), intermediate (23/292, 8%), and high (11/67, 16%) antigen levels, $P < 0.0001$. After the intervention, new latex sensitization rates declined 16-fold, and 25% of previously sensitized employees reverted to negative skin tests. It was concluded that airborne antigen exposure is a major source of latex sensitization among HCWs. Use of powder-free latex gloves markedly reduces the risk of sensitization.”