Latex hypersensitivity in Department of Veterans Affairs health care workers: glove use, symptoms, and sensitization

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Background: This report of the prevalence of latex glove allergy in 3 Department of Veterans Affairs (VA) medical centers was a collaboration of the VA, the Centers for Disease Control and Prevention, and the National Institute for Occupational Safety and Health.

Objective: To enroll and evaluate personnel from across the entire hospital workforce for latex hypersensitivity and to determine the type and extent of latex glove use.

Methods: A questionnaire was administered that covered demographics, job category, latex glove use, and current latex glove allergic symptoms. Skin testing to aeroallergens was performed to evaluate the presence of atopy. Blood was drawn for analyses of serum antilatex IgE antibody by CAP assay.

Results: Of 1,959 subjects, 158 (8.1%) had latex glove–allergic symptoms, a positive latex CAP assay result, or both. In 1,003 subjects who reported latex glove use, 915 (91.4%) used nonpowdered gloves. A total of 133 subjects reported latex glove allergic symptoms, and 36 subjects had positive CAP assay results. Latex sensitization was correlated with atopy, race, and latex glove exposure. Latex symptoms were correlated with atopy, a positive CAP assay result, and latex glove exposure. Of the 133 subjects with latex glove allergic symptoms, only 11 had positive CAP assay results, giving a prevalence of confirmed latex glove allergy of 0.6%.

Conclusions: Symptoms attributed to latex gloves and/or latex sensitization occurred in 8.1% of the employee population, with exposure, race, and atopy being the major risk factors. Few symptomatic individuals were sensitized to latex (0.6%). This low rate of confirmed latex glove allergy may have been related to nonpowdered glove use.

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INTRODUCTION

The impact of latex allergy on the health care worker (HCW) population has been well documented and recently reviewed,[1–4] with prevalence estimates for latex glove allergy ranging from 3% to 15% of the HCW population surveyed.[4] In these studies, the characteristics of the population surveyed and the method used to detect IgE sensitization to latex have had a significant influence on prevalence outcome.[5] In one of the largest surveys of 1,351 HCWs, 12% had positive skin test results to latex and a higher percentage of these had latex glove–associated allergic symptoms.[6]

This report of the prevalence of latex glove allergy in 3 Department of Veterans Affairs (VA) medical centers is the first in a series of collaborative studies of the VA, the Centers for Disease Control and Prevention (CDC), and the National Institute for Occupational Safety and Health (NIOSH). These agencies recognized areas of interest that affect the health and well-being of workers in occupational settings.[7] A central aim of this study was to enroll and evaluate hospital personnel from across the entire hospital workforce for features of latex hypersensitivity. Other major goals of the study were to determine the prevalence of, risk factors for the development of, and the job categories associated with latex glove allergy.

METHODS

Three VA medical centers participated in the study: the William S. Middleton VA Medical Center in Madison, WI, the VA Chicago Health Care System/Lakeside Division in

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Chicago, IL, and the Clement J. Zablocki VA Medical Center in Milwaukee, WI. The study was reviewed and approved by the institutional review boards of the Medical College of Wisconsin, the University of Wisconsin at Madison, Northwestern University Medical School, and the CDC. The research and development committees of the respective VA medical centers gave final review and approval. Informed consent documentation was uniform across all centers except for site-specific information. Informed consent stressed the voluntary and confidential nature of the study and that there would be no job risk for enrolling or choosing not to enroll in the study. Parameters for notification and dissemination of information about this voluntary study to hospital personnel were also reviewed and approved. All study data, questionnaire, skin test, and blood sample information were numerically coded to ensure confidentiality.

Enrollment

Before enrollment, a NIOSH team met with the medical centers' clinical and administrative leadership from all departments to explain the aims of the study and to stress the voluntary and confidential nature of the study. Three research study nurses experienced in the evaluation of allergic patients enrolled hospital personnel after study explanation and obtaining informed consent. Every attempt was made to enroll as many volunteer personnel as possible, including personnel on all hospital work shifts.

Subjects

From November 1999 through April 2001, VA health care personnel were evaluated for the presence of latex glove allergy and risk factors by interview, questionnaire, serum antilatex IgE antibody, and skin testing to common aeroallergens. Personnel were enrolled from 35 job categories, covering the full range of hospital staff from office workers with no latex glove use to front-line caregivers and support personnel with extensive latex glove use. The presence of latex glove allergic symptoms was targeted to symptoms present within the 12 months before enrollment to determine the current prevalence of latex glove allergy.

Questionnaire and Clinical Evaluation for Latex Glove Allergy and Risk Factors

The study nurses administered a detailed questionnaire that covered demographic data, job category, latex glove use, and allergic symptoms. Questions related to respiratory symptoms were drawn from the American Thoracic Society–Division of Lung Diseases (1978) and the International Union Against Tuberculosis and Lung Disease Bronchial Symptoms (1986) questionnaires.

Questions related to the presence of allergic symptoms of conjunctivitis-rhinitis-sinusitis, asthma, irritant and contact dermatitis, urticaria, and anaphylaxis were stratified from the general (eg, asthma) to the specific (eg, latex glove–associated asthma). Questions designed to elicit latex glove allergic symptoms asked for symptoms present within the 12 months before enrollment. Subjects were questioned about allergy to other latex products (eg, household rubber gloves, balloons, condoms, diaphragms) and for allergy to foods (kiwi, banana, avocado, chestnut, potato, tomato) associated with latex allergy. Workers classified their jobs as falling within 1 of the 35 possible job categories provided on the questionnaire. Each of the 35 job categories was assigned an estimated exposure level before the study by investigator consensus, with 1 indicating no or low latex glove use, 2 indicating moderate glove use, and 3 indicating extensive glove use.

Skin testing to common aeroallergens to evaluate the presence of atopy was performed by the puncture technique using Multi-Test (Lincoln Diagnostics Inc, Decatur, IL) devices. The wheal-and-flare size was outlined and recorded by transparent tape transfer. Allergens used included tree, grass, ragweed, mold, cat and dog, and dust mite (Greer Laboratories, Lenoir, NC). Histamine was the positive control. The mean of the crossed wheal diameters was calculated, and a mean diameter of 5 mm or greater to any 1 of the 6 aeroallergens tested defined the subject as atopic.[8] All positive skin test results were included if 2 control conditions were met: a positive response to histamine with a wheal size of 5 mm or greater and a saline control wheal size of less than 5 mm.

Blood was drawn for analyses of serum antilatex allergen IgE antibody by the UniCAP 100 assay (CAP; Pharmacia/Upjohn**,** Kalamazoo, MI)[9] and CAP class (0–3) and kU_A/L units determined. A CAP class of 1 (0.35 kU_A/L or greater) was reported as positive, and 0.35 to 0.70 kU_A/L was defined as class 1, 0.71 to 3.5 kU_A/L as class 2, and 3.6 to 17.5 kU_A/L as class 3. The identical lot of latex CAP assay reagent was used for all serum samples.

Data Analysis

Questionnaire, skin test, and CAP assay results were double-key entered into an electronic database for subsequent analysis. The study data set was analyzed with the use of the statistical program SSPS 11.5 for Windows (SSPS Inc, Chicago, IL). Significance of associations between nominal variables was documented using Cramer's V and ϕ tests, and odds ratio (ORs) and 95% confidence intervals (CIs) were determined. Risk factors were modeled with the general linear model method. SAS software (SAS/STAT version 6, 1990, SAS Institute, Cary, NC) was used to conduct logistic regression analysis with forward entry of data on demographics, exposure, atopy, asthma, glove use, tenure, work site, and smoking. $P \leq .05$ was considered to represent association unlikely to be due to chance, and $P \leq .10$ represented borderline associations.

RESULTS

Demographics, Job Categories, and Exposure

The characteristics of the surveyed personnel are shown in Table 1. There were 1,959 subjects enrolled in the 3 medical centers, representing 50% of the total employee population at the Madison and Milwaukee sites and 60% at the Chicago site. There was a predominance of female subjects, with the Chicago site having more male subjects enrolled. There was

Table 1. Demographic Data

Demographic	Subjects, %			
	Madison, WI (n = 429)	Chicago, IL (n = 520)	Milwaukee, WI (n = 1,010)	Total or average (n = 1,959)
Participation	50.0	60.0	50.0	53.3
Sex				
Male	26.8	43.8	29.0	32.5
Female	73.2	56.2	71.0	67.5
Age group, y				
<20	0.7	0.4	0.9	0.7
20–29	9.3	6.2	8.6	8.1
30–39	18.6	12.3	18.5	16.9
40–49	36.7	38.1	38.1	37.9
50–59	25.1	34.0	26.4	28.3
60–69	7.2	6.7	6.1	6.5
≥70	1.4	2.3	1.3	1.6
Race				
White	94.6	27.7	81.1	69.9
African American	1.4	50.6	11.9	19.9
Asian	1.6	16.0	3.5	6.4
Other	2.3	5.8	3.5	3.9
Exposure level				
1 (no to low)	48.9	46.3	47.3	47.5
2 (moderate)	42.6	44.0	42.2	42.6
3 (extensive)	8.5	9.6	10.5	9.9
Atopy	49.4	45.8	50.3	48.9
Current smokers	38.3	55.3	40.6	43.6

age predominance from 30 to 59 years of age, with Chicago having a higher percentage of subjects in the 50- to 59-year age group. The population was predominantly white (69.9%), with representation of African Americans (19.9%) and Asians (6.4%). These data resemble the distribution of employee characteristics in the Veterans Health Administration as a whole based on a recent national census. The Chicago site had more African Americans and Asians enrolled. There was a higher percentage of current smokers at the Chicago site. Exposure level and atopy were uniform across the centers.

Table 2 shows the distribution of subjects in 11 major job categories consolidated from the 35 individual job categories in the questionnaire. It demonstrates participation across the medical center workplace, with 47.5% of the subjects from jobs that had no or low work-related latex glove use.

Table 2. Job Categories of the Studied Population with Exposure Class

Aggregated job category	No. (%) of subjects	Exposure class
Physicians or dentists	71 (3.7)	2–3
Nurses	602 (30.8)	2–3
Clinical or research laboratory technicians, phlebotomists, or dental hygienists	263 (13.5)	2–3
Housekeeper	91 (4.6)	2
Rehabilitation therapists or pharmacists	127 (6.5)	1
Facility, maintenance	122 (6.2)	1
Office worker or clerk	410 (20.9)	1
Administrator	93 (4.7)	1
Food service	66 (3.4)	1
Social worker	41 (2.1)	1
Other	73 (3.7)	1
Total	**1,959 (100)**	

Latex Glove Use

In subjects who reported any latex glove use, nonpowdered gloves were used by most of the subjects. Of 1,003 subjects who reported any glove use, 915 (91.4%) reported nonpowdered glove use and 780 (77.8%) used only nonpowdered gloves. A total of 222 (22.2%) reported powdered glove use, with 86 (8.6%) using powdered gloves only. A total of 134 (13.4%) used both powdered and nonpowdered gloves.

The mean number of pairs of powdered gloves used per day in subjects who reported any glove use was 2.31, with infrequent use indicated by a modal use of 0 and the 80th percentile use of only 1 pair per day. In contrast, nonpowdered glove users reported a mean of 11.64 pairs per day, with a modal use of 10 pairs per day and an 80th percentile use of 20 pairs per day (Table 3).

There was a strong correlation between the prestudy exposure level 1–3 assigned to each of the job categories and the reported number of pairs of latex gloves used per day by the study subjects (Spearman rank order correlation, ρ =

Table 3. Latex Glove Use by Glove Type in 1,003 Subjects Who Reported Any Glove Use

	Pairs of powdered gloves used per day	Pairs of nonpowdered gloves used per day	Hours of glove use per day
Mean	2.31	11.64	2.78
Median	0.00	6.00	2.00
Mode	0.00	10.00	1.00
SD	8.47	18.78	3.21
Percentiles			
20	0.00	2.00	0.53
40	0.00	4.00	1.35
60	0.00	10.00	2.50
80	1.00	20.00	4.00

0.545, $P < .01$, for nonpowdered glove use and $\rho = 0.240$, $P < .01$, for powdered glove use). In addition, hours of glove use per day were highly correlated with job category exposure level ($\rho = 0.563$, $P < .01$).

Study Overview and Analysis Structure

There were 158 subjects, 8.1% of the surveyed population (1,959), with latex glove–associated allergic symptoms, a positive latex CAP assay result, or both. Of the 1,959 enrolled subjects, 133 (6.8%) reported latex glove allergic symptoms, and 36 subjects (1.8%) had positive CAP assay results. Of the 133 subjects with latex glove allergic symptoms, 11 had positive CAP assay results, giving a prevalence of confirmed latex glove allergy of 0.6% (11/1,959).

The results of this survey were analyzed and reported using criteria that were defined before the initiation of the study that placed surveyed personnel into 1 of 4 possible groups: CAP assay result positive with latex glove allergic symptoms (confirmed latex glove allergic); CAP assay result negative with latex glove allergic symptoms (latex glove symptomatic); CAP assay result positive without latex glove allergic symptoms (latex glove sensitized asymptomatic); and CAP assay result negative without latex glove allergic symptoms (latex glove nonallergic).

Latex Glove–Associated Symptoms

There were 133 subjects with latex glove–associated symptoms (Table 4). Glove dermatitis and urticaria were the most frequent glove allergic symptoms reported. Fifty-six (42%) of these 133 subjects reported symptoms of glove contact dermatitis as their only latex glove–related symptom. Seventy-seven subjects (58%) reported latex glove anaphylaxis or urticaria or conjunctivitis-rhinitis-sinus or asthma symptoms consistent with an IgE-mediated sensitivity. Ten (13%) of these 77 had positive CAP assay results compared with 26 (1.4%) of the 1,856 subjects without these symptoms ($\phi = 0.168$; $P < .001$; OR, 10.6; 95% CI, 4.9–23.0).

There were significant correlations among reported latex glove allergic symptoms. Conjunctivitis-rhinitis-sinus and asthma symptoms were highly related ($\phi = 0.542$, $P < .001$; OR, 169.5; 95% CI, 69.7–411.8). Symptoms of glove urticaria were highly related to symptoms of glove-induced anaphylaxis ($\phi = 0.228$; $P < .001$; OR, 47.7; 95% CI, 13.3–171.4).

Table 4. Latex Glove–Associated Symptoms of the 1,959 Subjects

Latex glove symptoms	No. of subjects (% with symptom)	No. (%) with positive CAP assay results
Dermatitis	74 (3.8)	3 (4.1)
Urticaria	45 (2.3)	6 (13.3)
Anaphylaxis	10 (0.5)	4 (40.0)
Conjunctivitis-rhinitis-sinus	33 (1.7)	5 (15.2)
Asthma	29 (1.5)	4 (13.8)
None	1826 (93.2)	25 (1.4)

Of all the demographic and measured variables, 3 factors were the best predictors of latex glove–associated symptoms: job exposure categories 2 and 3 ($F = 33.6$, $P < .001$), a positive CAP assay result ($F = 13.1$, $P < .001$), and atopy ($F = 9.4$, $P = .002$). The corrected factor model using all 3 variables, exposure, atopy, and a positive CAP assay result, was highly correlated with glove allergic symptoms ($F = 20.5$, $P < .001$). Logistic regression analysis confirmed that job exposure categories 2 and 3, a positive CAP assay result, and atopy were independent variables most closely correlated with latex glove allergic symptoms.

CAP Assay Results

Thirty-six subjects had positive CAP assay results, 11 with and 25 without latex glove–associated symptoms. Subjects with positive CAP assay results were significantly more atopic (76%) compared with subjects with negative CAP assay results (48%) ($\phi = 0.074$; $P = .002$; OR, 3.3; 95% CI, 1.5–7.4).

The quantitative CAP values in the 11 symptomatic subjects with positive CAP assay results were compared with the quantitative CAP values of the 25 false-positive subjects with a positive CAP assay result and no symptoms. The mean ± SEM of the false-positive group was 1.5 ± 0.52 kU_A/L (range, 0.39–13.6 kU_A/L). The mean ± SEM of the symptomatic group was 3.6 ± 1.50 kU_A/L (range, 0.51–16.4 kU_A/L). Although there was a trend to higher levels in the symptomatic group, this was not statistically significant by *t* test analysis.

Regression analysis was used to determine the adjusted, independent variables, which were associated with latex-sensitized (CAP assay–positive) subjects. Atopy, exposure, and nonwhite (African American and other) race were the independent variables associated with latex sensitivity. Job exposure categories 2 and 3 were related to an increased risk of sensitization ($\chi^2 = 3.1$; $P = .08$; OR, 2.0; 95% CI, 0.9–5.0) as were atopy ($\chi^2 = 8.7$; $P < .01$; OR, 4.0; 95% CI, 1.6–10) and nonwhite race ($\chi^2 = 14.7$; $P < .01$; OR, 4.6; 95% CI, 2.0–10.3). African American ($\chi^2 = 12.2$; $P < .01$; OR, 4.4; 95% CI,

2.0–12.4) and other race ($\chi^2 = 8.8$; $P < .01$; OR, 4.6; 95% CI, 1.7–12.0) were significantly different from white race after adjusting for exposure and atopy. The number of pairs of latex gloves used per day, asthma, age, sex, work site, tenure, work area that was classified as high risk, and smoking were not significantly associated with latex sensitization.

In addition, 18 (50%) of the 36 subjects with positive CAP assay results were at the Chicago site, a cluster that was statistically significant ($\phi = 0.074$, $P = .004$) compared with the other 2 sites. Twenty-five of these individuals with positive CAP assay results reported no latex glove–associated symptoms. Of this latex glove–sensitized, asymptomatic group, 80% were atopic ($\phi = 0.074$; $P = .002$; OR, 4.3; 95% CI, 1.6–11.4).

Measures of Glove Use and Exposure Related to Latex Glove Symptoms and Sensitization

There were significant correlations among measures of glove use, job exposure category, and subjects who reported latex glove allergic symptoms and subjects with a positive CAP assay result (sensitization). Subjects with a positive CAP assay result and latex glove allergic symptoms were more likely to have glove use as either pairs per day or hours per day. Subjects with a positive CAP assay result and latex glove allergic symptoms were very likely to be in job exposure categories 2 and 3 (Table 5). Of interest is that one third of subjects who reported latex glove allergic symptoms reported no current latex glove use.

Confirmed Latex Glove Allergy

Of the 133 subjects with latex glove allergic symptoms, only 11 had positive CAP assay results, giving a prevalence of confirmed latex glove allergy of 0.6% (11/1,959). Several factors characterized the 11 subjects with confirmed latex glove allergy. Eight (78%) of the 11 reported allergy to fruits associated with latex allergy or allergy to other latex-containing products ($\phi = 0.242$; $P < .001$; OR, 59.1; 95% CI, 15.4–227.0). In addition, 6 of 11 reported latex glove urticaria ($\phi = 0.262$; $P < .001$; OR, 58.8; 95% CI, 17.2–200.6) and 4 of 11 reported latex glove–associated anaphylaxis ($\phi = 0.378$; $P < .001$; OR, 185.0; 95% CI, 42.7–801.8). In this group, 62.5% were atopic and 82% (9/11) were in high-exposure job categories. The 2 subjects in no or low-exposure job categories were surgical nurses who had been reassigned to administrative positions. Five of these subjects reported no current latex glove use, including the 4 subjects with latex glove anaphylaxis. There was no association with medical center work site, with 3 subjects with confirmed latex glove allergy at the Madison site and 4 each at the Milwaukee and the Chicago sites.

Latex Glove Symptoms with a Negative CAP Assay Result

A total of 122 subjects had negative CAP assay results with latex glove allergic symptoms, giving a prevalence of 6.2% (122/1,959). Of this group, 4.9% reported anaphylaxis with latex glove use, 32% had latex glove–associated urticaria, 23% had latex glove–associated conjunctivitis-rhinitis-sinus symptoms, 20.5% reported glove-associated asthma, and 58% reported glove-associated dermatitis. In this group, 65% were atopic ($\phi = 0.081$; $P = .001$; OR, 2.0; 95% CI, 1.3–3.0), 21% reported allergy to other latex products or fruits associated with latex allergy, and 79% were in high-exposure job categories.

In this latex glove symptomatic subgroup, latex glove allergic symptoms had significant correlations. Conjunctivitis-rhinitis-sinus and asthma symptoms were highly related ($\phi = 0.399$; $P < .001$; OR, 7.5; 95% CI, 2.9–19.9)

Negative CAP Assay Result and No Symptoms

The latex glove nonallergic group made up the largest number of surveyed personnel (91.9%, 1,801/1,959). The 1,801 subjects in this group were less likely to be atopic (47.3%; $\phi = -0.11$; $P < .001$; OR, 0.44; 95% CI, 0.30–0.63) and more likely to be in low or no latex glove use job categories (50.3%; $\phi = -0.147$; $P < .001$; OR, 0.30; 95% CI, 0.21–0.44).

DISCUSSION

There was a low number (158) and percentage (8.1%) of subjects with latex glove–associated allergic symptoms and/or a positive CAP assay result from the surveyed population of 1,959 individuals. This is somewhat lower than many reports in the literature and may reflect our surveyed

Table 5. Latex Glove Use and Job Exposure Category Related to Latex Glove Symptoms and Subjects with a Positive CAP Assay Result

Latex glove use	No. (%) of subjects with latex glove symptoms	OR (95% CI)	*P* value	No. (%) of subjects with positive CAP assay results	OR (95% CI)	*P* value
Glove use as pairs per day						
Any (n = 1,003)	90 (9.0)	2.1 (1.4–3.0)	<.001	24 (2.4)	1.9 (1.0–3.8)	.06
None (n = 950)	43 (4.5)			12 (1.3)		
Glove use as hours per day						
Any (n = 999)	89 (8.9)	2.0 (1.4–2.9)	<.001	24 (2.4)	1.9 (1.0–3.9)	.06
None (n = 955)	44 (4.6)			12 (1.3)		
Job exposure category						
2 or 3 (n = 1,028)	105 (10.2)	3.7 (2.4–5.6)	<.001	26 (2.5)	2.4 (1.1–5.0)	.02
1 (n = 931)	28 (3.0)			10 (1.1)		

Abbreviations: CI, confidence interval; OR, odds ratio.

population, which included a large cohort of subjects (47.5%, 931/1,959) who had no or low glove use and were therefore unlikely to develop latex glove allergy. However, other studies that included a hospital-wide employee population, with high participation rates, have reported higher levels of latex sensitization and symptoms.[10,11] Reporting bias is likely to cause a higher rather than a lower prevalence, so the true prevalence is likely to be lower than that reported.

There was a low prevalence of subjects with latex glove–associated allergic symptoms (7.0%, 133/1,959), and of this group, only 11 (0.6%) had confirmed latex glove allergy as detected by elevated serum antilatex IgE antibody levels as determined by the CAP assay. A low prevalence of confirmed latex glove allergy has been reported in other recent surveys of HCWs.[12,13] Our study focused on current latex glove allergic symptoms (within 12 months of enrollment), which may have resulted in a lower point prevalence of latex allergy.

The VA had established a system-wide policy in July 1998 that mandated restricted use of latex gloves only for universal precautions and to use nonpowdered, low–latex protein gloves. In this regard, we found that 91.4% of subjects in this study reported use of nonpowdered gloves. Use of powdered gloves in this population was low related to both frequency of use and the number of users compared with nonpowdered glove use (Table 3). Institutional use of nonpowdered, low–latex protein content gloves, as in this study, is associated with a lower-than-expected prevalence of latex glove allergy and sensitization.[14,15] Such cross-sectional studies are subject to limitations of association rather than causal relationships, but a direct cause, although speculative, is the most likely explanation.

It is possible that the CAP assay used in this study had a low sensitivity and therefore missed subjects with latex glove allergy. However, the assay had been validated before the present study and had a sensitivity of 75% and a specificity of 98% in agreement with other published studies related to the sensitivity and specificity of the CAP assay method.[9] With a sensitivity of 75%, the CAP assay used in this study would have missed only 3 true-positive subjects.

Several factors characterized the 11 subjects with confirmed latex glove allergy, a high percentage of whom reported allergy to fruits associated with latex allergy and allergy to other latex-containing products. In addition, a high percentage reported latex glove–associated urticaria and latex glove anaphylaxis. These associations were highly significant by statistical analysis and supported the fact that these subjects matched the clinical profile of latex allergic individuals. Five of these subjects reported no current glove use. These factors and atopy have characterized HCWs with confirmed latex allergy in other reported surveys.[11,16]

The epidemiology literature of latex allergy in HCWs has given conflicting results related to the association of glove use measures, job category, and latex glove allergic symptoms and sensitization.[17] Our study found statistically significant positive correlations between subjects' reported glove use (pairs per day and hours per day) and CAP positivity (sensitization) and latex glove allergic symptoms (Table 5). This analysis also revealed that one third of subjects who reported latex glove allergic symptoms reported no current latex glove use. These subjects may well have stopped using latex gloves because of associated allergic symptoms.

In addition, the use of a prestudy-assigned estimated exposure level[1–3] to each of the 35 job categories served as a useful tool to analyze the relationship of job category to latex glove allergic symptoms and sensitization. Univariate, multivariate, and factor analysis demonstrated that job exposure category was an independent predictor of latex sensitization and glove allergic symptoms.

In the total group of 133 subjects with latex glove–associated symptoms and in the subgroup of 122 with latex glove symptoms and a negative CAP assay result, we found striking statistical linkages between conjunctivitis or upper airway symptoms and asthma and between glove-associated urticaria and anaphylaxis. In addition, the subgroup, latex glove symptomatic and no confirmative CAP assay results, reported a high prevalence of glove-associated symptoms of contact dermatitis (58%), which would not be linked to an IgE response. It is possible that these CAP assay result–negative, latex glove symptomatic, predominantly atopic individuals attribute allergic symptoms from other causes to latex glove use.

Similar to our findings, other large surveys of HCWs have found that subjects with allergic symptoms attributed to latex gloves exceed the actual number with confirmed latex glove allergy by a latex allergen skin test, serologic test, or both.[4] In a recent study of 304 subjects given a documented questionnaire, 15% gave a false-positive latex allergy history.[18] This is clearly an area for further investigation.

The 25 subjects who had positive CAP assay results but were without symptoms had a prevalence of atopy of 80%. These individuals are of interest in that they may have been sensitized to latex glove allergens or alternatively to food and pollen allergens that cross-react with natural latex allergens with the induction of IgE antibody but without latex glove symptoms. They may represent a group at risk for development of latex glove–associated symptoms in the future. The 1,801 subjects in the latex glove nonallergic group were less likely to be atopic and more likely to be in no or low latex glove use job categories.

We found a statistically significant cluster of subjects with positive CAP assay results, 18 at the Chicago site, representing 50% of CAP assay–positive individuals in this study. These differences may have been due to selection of populations, such as more African Americans at the Chicago site, or in variations in exposure, such as might occur with variability in air exchanges of ventilation systems. Studies of the ventilation system at the 3 study sites have been completed and will be the subject of another report. The dispersion of latex allergen in health care facilities is an area of recent interest.[19]

CONCLUSION

This study demonstrates that allergic symptoms attributed to latex gloves and/or latex sensitization occurred in 8.1% of the

hospital employee population, with exposure, race, and atopy being the major risk factors. Of those with allergic symptoms self-attributed to latex glove use, only 11 (8%) of 133 had IgE sensitization to latex as detected by the CAP assay. Thus, confirmed latex glove allergy was infrequent in this population, occurring in only 11 (0.6%) of the 1,959 study subjects. These results emphasize the importance of confirming the diagnosis of latex allergy with an objective measure of IgE sensitization and the possible impact of nonpowdered latex glove use in reducing the prevalence of latex allergy.

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