

Glove Selection as Personal Protective Equipment and Occupational Dermatitis among Japanese Midwives

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Abstract: Glove Selection as Personal Protective Equipment and Occupational Dermatitis among Japanese Midwives: Minako SASAKI, *et al.* Department of Nursing Administration, Graduate School of Medicine, The University of Tokyo—This study was conducted to 1) evaluate the personal selection and use of protective gloves against bloodborne pathogens and management of glove selection in the workplace, 2) survey the experience with occupational dermatitis and other allergic symptoms, 3) explore the relationships between occupational dermatitis experience and glove use, and 4) determine the impact of glove selection upon occupational dermatitis among midwives. Subjects were 1,150 midwives working in Japan. Participants were selected from the members of Japanese Nursing Association and 835 responded to the survey. More than 30% of respondents wore gloves only when clients had an infectious disease, 41% reported experience of occupational dermatitis, 26% associated the dermatitis with medical glove use, and 2% had a diagnosis of latex allergy. Demographic variables that were significantly associated with occupational dermatitis included history of allergic symptoms other than due to occupational exposure, age, tenure and type of working institution. Using latex gloves during administering enema, shaving, changing pads, washing perineum, receiving newborns, suctioning, and handling waste significantly increased the risk of occupational dermatitis experience compared to not using gloves. Logistic regression analysis with backward stepwise elimination revealed glove selection management, such as availability of alternative glove types, using latex gloves for washing perineum, and using latex gloves for handling waste were significant predictors of occupational dermatitis. Occupational dermatitis is a significant issue and glove use as personal protective equipment is not standardized.

Some occupational dermatitis may be preventable by managing appropriate glove selection.

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Key words: Medical gloves, Personal protective equipment, Health care workers, Midwife, Standard Precautions, Occupational dermatitis, Hand roughness, Latex allergy

Bloodborne pathogens, including HIV, hepatitis B virus (HBV), and hepatitis C virus (HCV) are major occupational hazards for health care workers. To prevent occupational infections, Standard Precautions have been introduced as infection control measures. Universal Precautions were introduced in the United States in 1985, largely because of the HIV epidemic. The current recommendation is to apply Blood and Body Fluid Precautions universally to all persons, regardless of their infection status¹. Previously, only patients diagnosed with, or suspected to have, infectious diseases were placed on isolation precautions. In 1996, the ‘Guideline for Isolation Precautions in Hospitals’ was published and Universal Precautions were included in Standard Precautions². Standard precautions are designed to reduce the risk of transmission of microorganisms from both recognized and unrecognized sources of infection in hospitals and state that gloves must be worn when touching blood, body fluids, secretions, excretions, and other potentially contaminated items².

In Japan, even though Standard Precautions have been introduced, many health care workers do not use gloves unless the patient has an infectious disease. It is suspected, but not proven, that expert midwives care for mothers and neonates without wearing gloves.

Gloves have different features, depending upon the type and the materials used³. However, some gloves are permeable to microorganisms and allow chemical breakthroughs. The result is that some gloves do not provide the expected protection. According to barrier integrity studies, latex gloves are excellent for both durability and fitness^{4,5}. However we predict that little

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attention has been given to the glove material selection among health care workers in Japan, and whether they choose gloves based on the hazard involved is unknown.

The frequent use of gloves may also cause side effects, such as irritation and latex allergy. In the United States, 8 to 12 percent of health care workers are allergic to latex⁶. Latex refers to the natural rubber latex manufactured from a milky fluid that is primarily obtained from the rubber tree. The type I (immediate) allergy caused by latex proteins includes anaphylaxis, which is a life threatening allergic reaction mediated by antibodies. Symptoms in latex sensitized workers may begin with systemic urticaria, allergic conjunctivitis, rhinitis, or asthma before progressing to anaphylaxis. With glove use, there may also be skin symptoms involving a contact dermatitis or type IV (delayed) allergic response that is caused by chemicals added during the production of the gloves. The most common occupational dermatitis reaction is irritant contact dermatitis⁷, in which dry, itchy, irritated areas develop on hands. Hand-washing, which is emphasized for infection control along with disinfectants, also causes rough hands. Healthcare workers with rough-hands are prone to either contact dermatitis or allergy, resulting in hindered working ability⁸. Furthermore, bacteria are more likely to be retained on rough, as compared to smooth, hands with the consequence of threatening infection control.

This study was conducted to 1) evaluate the personal selection and use of protective gloves against bloodborne pathogens and the management of glove selection in the workplace; 2) survey the experience with occupational dermatitis and other allergic symptoms; 3) explore the relationships between occupational dermatitis and glove use; and 4) determine the impact of personal glove selection and management of glove selection in the workplace upon occupational dermatitis among midwives.

Material and Methods

The subjects were 1,150 midwives working in Japan. Participants were selected from the members of Japanese Nursing Association (JNA), which consists of 47 prefectural nursing associations. In 1998, 23,615 midwives were working in Japan and 17,412 (72%) were the members of JNA. According to the number of midwife members, 10 to 100 subjects were drawn from each local prefectural nursing association. In February 2001, a questionnaire was distributed by each local prefectural nursing association and returned by mail by the end of April 2001.

The questionnaire identified the respondents' demographic information, the frequency of conducting internal examinations, participation in direct delivery assistance during the second and third stages of labor, glove use with maternity and infant care that involves

possible contact with blood or body fluid, the nature of the glove material, the glove selection management in the workplace, hand roughness, occupational dermatitis and other allergic symptoms experience, the history of allergic symptoms other than due to occupational exposure along with suspected allergens, and the treatment experience. Demographic information included age, tenure as a midwife, identification of working unit, type of institution (national, public, or private), and the number of annual deliveries in the institution. Maternity and infant care that involved possible contact with blood or body fluid included internal examination, administration of enemas, shaving, inserting a urinary catheter, direct assistance with delivery, changing pads, washing perineum, bed bath after delivery, receiving newborn, examination of delivered placenta, care of the newborn infant, suctioning, changing diapers, drawing blood, and handling waste. Regarding glove selection management in the workplace, subjects were asked 1) whether they could choose the glove they use, 2) whether they would be able to have alternative gloves if the glove use results in rough skin, and 3) who chooses the gloves for purchase. The questions about occupational dermatitis and other allergic symptoms experience included dermatitis complaints (any rash, chapping, itching, redness, or urticaria), any other allergic symptoms (rhinoconjunctivitis exemplified by runny nose, congestion, or hay fever, respiratory problems such as chest tightening, wheezing, cough, breathing difficulty, or asthma) and the suspected cause of the symptoms. At the end of the questionnaire, a blank page was provided for additional comments.

Descriptive analysis of demographic variables, glove use during each type of care, and management of glove selection in the workplace was conducted before statistical analysis. To evaluate the relationships between occupational dermatitis and demographic variables, chi-square tests were used for categorical variables and t-tests were used for continuous variables (age and tenure). Logistic regression analysis was used to evaluate the relationship between occupational dermatitis and glove use. Each glove use category and demographic variables that were related to the occupational dermatitis were used as independent variables. Finally, to determine the overall impact of the glove selection on the occupational dermatitis experience, backward stepwise elimination in logistic regression analysis was performed, in which all of the relevant variables were used as independent variables. SPSS ver.10.0J software package was used for statistical analysis.

Results

1. Demographics

Eight hundred and thirty-five midwives (72.6%) responded to the questionnaire and 13.9% of respondents

Table 1. Demographics and the percentage of occupational dermatitis experienced

		N	%	Occupational dermatitis experienced (%)	
Age	22–29	306	37%	44.8	} †
	30–39	297	36%	43.1	
	40–49	168	20%	35.1	
	Over 50	62	7%	30.6	
Tenure as a midwife	less than 5 yr	245	29%	44.5	
	5–9 yr	204	24%	42.2	
	10–19 yr	238	29%	41.6	
	Over 20 yr	131	16%	32.1	
Type of institution	National hospitals	95	11%	53.7	} *
	Public hospitals	432	52%	38.9	
	Private hospitals	256	31%	42.2	
	Others	41	5%	29.3	
Frequency of direct assistance with delivery	not occupied in the care recently	88	11%	36.4	
	less than 1 case/wk	338	40%	39.1	
	1–3 cases/wk	360	43%	42.8	
	more than 4 cases/wk	33	4%	51.5	
Frequency of internal examination	not occupied in the care recently	58	7%	37.9	
	1–10 cases/wk	649	78%	39.8	
	11–20 cases/wk	83	10%	53.0	
	more than 21 cases/wk	18	2%	33.3	
Can you choose the gloves you use?	No, I cannot.	259	31%	42.1	} †
	Yes, I can.	366	44%	43.4	
	I do not know.	161	19%	33.5	
If you have rough skin because of glove use, can you have alternative gloves, such as synthesized rubber gloves?	I think I can.	563	67%	38.9	} †
	I think I cannot.	69	8%	53.6	
	I do not know.	179	21%	43.0	
Who chooses the gloves purchased?	Supply center/administration officer	357	43%	37.3	} †
	Head nurse/Staff nurse	228	27%	43.0	
	I do not know.	221	26%	46.6	
Allergic symptoms other than due to occupational exposure	experienced	458	57%	52.6	} **
	not experienced	348	43%	25.0	

†: $p < .1$, *: $p < .05$, **: $p < .01$ (Chi-square test).

made additional comments. The mean age of the respondents was 34.5 ± 8.8 yr (mean \pm SD), with 10.2 ± 7.7 yr experience as midwives. The demographics are shown in Table 1. Forty percent of the respondents participated in delivery directly less often than once a week and more than 80% did internal examinations less often than 3 times a week.

2. Glove use and choice of glove material

Respondents were asked if they wore gloves when providing patient care that possibly involved contact with blood or body fluid and to select the material of the gloves

they usually use. Almost all the respondents wore gloves during direct assistance with delivery, internal examination, and examination of the delivered placenta (Table 2). In other situations, glove use was neither standardized nor consistent. Respondents did not always wear gloves while administering of enemas (29.8%), shaving (27.3%), washing the perineum (29.2%), handling waste (27.9%), receiving a newborn (47.4%), and suctioning (47.8%). Respondents usually did not wear gloves during changing pads (65.7%), care of the newborn infant (75.5%), and bed bath after delivery (77.2%). Many did not wear gloves when either changing

Table 2. Glove use and glove material for midwives care

	Usually worn				Not usually worn	
	Latex	non-latex			Worn for infectious patients only	Not worn
		PVC	Polyethylene	Others		
Internal examination	415 (51.2%)	216 (26.6%)	159 (19.6%)	20 (2.5%)	1 (0.1%)	0 (0%)
Direct delivery assistance	750 (92.9%)	29 (3.6%)	6 (0.7%)	18 (2.2%)	4 (0.5%)	0 (0%)
Examination of delivered placenta	331 (41.1%)	305 (37.9%)	27 (3.4%)	130 (16.1%)	10 (1.2%)	2 (0.2%)
Catheterizing	380 (47.7%)	235 (30%)	95 (11.9%)	18 (2.3%)	39 (4.9%)	29 (3.6%)
Shaving	168 (21.5%)	299 (38.2%)	92 (11.8%)	16 (2.0%)	117 (15.0%)	96 (12.3%)
Handling waste	126 (15.4%)	341 (41.8%)	64 (7.8%)	57 (7.0%)	165 (20.2%)	63 (7.7%)
Washing perineum	177 (22.6%)	295 (37.7%)	75 (9.6%)	21 (2.7%)	88 (11.3%)	140 (17.9%)
Administering of enemas	121 (15.5%)	318 (40.7%)	97 (12.4%)	13 (1.7%)	82 (10.5%)	151 (19.3%)
Receiving newborns	268 (34.3%)	139 (17.8%)	12 (1.5%)	15 (1.9%)	239 (30.6%)	131 (16.8%)
Suctioning	183 (22.6%)	151 (18.7%)	75 (9.3%)	13 (1.6%)	197 (24.4%)	189 (23.4%)
Changing pads	67 (8.2%)	168 (20.6%)	39 (4.8%)	5 (0.6%)	312 (38.3%)	223 (27.4%)
Care of the newborn infant	114 (14.2%)	74 (9.2%)	6 (0.7%)	3 (0.4%)	293 (36.4%)	314 (39.1%)
Bed bath after delivery	63 (7.8%)	92 (11.4%)	18 (2.2%)	10 (1.2%)	186 (23.1%)	435 (54.1%)
Changing diapers	7 (0.9%)	58 (7.1%)	7 (0.9%)	7 (0.9%)	128 (15.7%)	607 (74.6%)
Drawing blood	9 (1.1%)	28 (3.4%)	2 (0.2%)	4 (0.5%)	139 (17.1%)	633 (77.7%)

% indicates the percentage of all respondents.

diapers (90.3%) or blood drawing (94.8%). From 10 to 30% of respondents wore gloves only when clients had an infectious disease, during administering of enemas, washing perineum, shaving, changing diapers, drawing blood, bed bath after delivery, or suctioning. More than 30% of respondents wore gloves only when clients had infectious diseases during receiving newborns (30.6%), care of newborn infant (36.4%), or changing pads (38.3%).

Latex gloves were most frequently used for direct assistance with delivery, receiving a newborn, caring for a newborn, inserting a urinary catheter, internal examination, suctioning, and examination of delivered placenta. PVC gloves were most frequently used for changing diapers, drawing blood, changing pads, handling waste, administration of enema, shaving, washing perineum, and bed bath after delivery. Polyethylene gloves were not preferentially used for any type of care.

3. Management of glove selection in the workplace

The results of the management of glove selection in the workplace are shown in Table 1. For glove choice, 31% of respondents could not choose and 19% did not know whether they could choose or not. Alternative gloves were thought to be available by 67% of respondents if they had skin trouble because of glove use, but 8% thought they had no alternatives. For glove purchase, 26% of respondents did not know who chose the gloves to be purchased.

4. Experience with occupational dermatitis and other allergic symptoms

Hand roughness was an ongoing worry for 42% of respondents and 54% worried sometimes. More than 90% worried about hand roughness, especially in the winter season. Most suspected that the cause of hand roughness was frequent hand-washing (90%), followed by a disinfectant agent (50%), and alcohol-based handrubs (49%). Medical gloves were chosen as the cause of hand roughness by 36% of the respondents.

Symptoms of occupational dermatitis were reported by 41% of the respondents. Medical glove use was associated with symptoms by 26% of respondents and 22% associated their symptoms with antimicrobial soap. Other allergic symptoms at the workplace were reported by 18% of the respondents, and the most prevalent symptom was rhinitis. History of allergic symptoms unrelated to occupational exposure was reported by 55% of the respondents. The most prevalent symptom was rhinitis, followed by dermatitis and conjunctivitis. Major suspected allergens were pollen, ticks, and cosmetics. Among the respondents, 13% were undergoing treatment and 38% had treatment experience. Most frequent diagnoses were allergic rhinitis (21%), contact dermatitis (15%), hay fever (15%), and atopic dermatitis (10%). Latex allergy was diagnosed for 17 (2%) respondents.

5. Factors associated with occupational dermatitis

Demographic variables, frequency of hazardous jobs,

Table 3. Risk factors of occupational dermatitis

	<i>p</i>	Odd ratio (95% CI)
History of allergy symptoms unrelated to occupational exposure	0.00	3.57 (2.50 – 5.09)
Type of working institution	0.02	
National hospitals	0.03	2.99 (1.14 – 7.82)
Public hospitals	0.60	1.26 (0.53 – 2.95)
Private hospitals	0.30	1.59 (0.66 – 3.80)
Participate in more than 11 weekly cases of internal examination	0.06	1.40 (0.99 – 1.98)
Ability to select gloves ¹⁾	0.02	
No, I cannot.	0.14	0.72 (0.47 – 1.12)
I do not know.	0.01	0.51 (0.32 – 0.84)
Alternative glove availability ²⁾	0.01	
I think I cannot.	0.01	2.47 (1.31 – 4.65)
I do not know.	0.08	1.50 (0.95 – 2.36)
Glove usage for handling waste ³⁾	0.03	
Using non-latex gloves	0.62	1.11 (0.74 – 1.66)
using latex gloves	0.01	2.13 (1.19 – 3.82)
Glove usage for washing perineum ³⁾	0.07	
Using non-latex gloves	1.00	1.00 (0.65 – 1.53)
using latex gloves	0.04	1.67 (1.01 – 2.77)

The adjusted r-square (Nagelkerke R²) of the model was 0.192. ¹⁾“Yes, I can.” is the reference category. ²⁾“I think I can.” is the reference category. ³⁾“Not using gloves” is the reference category.

and the management of glove selection were analyzed for their relationship with percentages of respondents experiencing occupational dermatitis in each category (Table 1). Respondents who had allergic symptoms unrelated to occupational exposure and who were working in national hospitals had the highest levels of occupational dermatitis. Among respondents who had occupational dermatitis, allergic symptoms other than due to occupational exposure were more highly related to having urticaria as an occupational dermatitis symptom (odds ratio=3.7) than occupational dermatitis without complaining of urticaria (odds ratio=2.4). Age ($p<0.01$, *t*-test) and tenure ($p<0.05$, *t*-test) were also significantly associated with occupational dermatitis. The mean age of respondents reporting occupational dermatitis was 33.2 and those not reporting symptoms was 35.2 yr. The mean tenure as a midwife of those reporting symptoms was 9.5 yr and those without symptoms was 10.7.

The management of glove selection (ability to select gloves, alternative glove availability, and the person who chose the gloves purchased) had a weak relationship with occupational dermatitis experience ($p<0.1$). Respondents who were working in an ICU (53%) experienced occupational dermatitis more frequently than those working in wards (38%). However, the work unit

characteristic, such as ward, outpatients clinic, or ICU was not significantly related to occupational dermatitis experience. The number of annual deliveries in the institution, frequency of conducting internal examination, and frequency of direct delivery assistance were each unrelated to occupational dermatitis.

6. The relationship between glove selection and occupational dermatitis

Logistic regression analyses were used to evaluate the impact of glove use and selection on occupational dermatitis symptoms. To control for relevant variables, the history of allergic symptoms other than due to occupational exposure, age, type of institution, work unit characteristic (ICU or other units such as ward), the frequency of direct assistance with delivery, frequency of internal examination, ability to select gloves, alternative glove availability, and the personnel who chose the gloves that were purchased were used as independent variables in addition to each pattern of glove use. Glove use was categorized as 1) using non-latex gloves, 2) using latex gloves, and 3) usually not using gloves for administration of enemas, shaving, changing pads, washing perineum, bed bath after delivery, receiving newborns, care of the newborn infant, suctioning, and

handling waste. "Not using gloves" was used as the reference category. For changing diapers and drawing blood, uses were categorized as 1) using gloves and 2) not using gloves, because during these types of care only a few respondents used gloves. "Not using gloves" was used as the reference category. For internal examination, direct assistance with delivery, examination of delivered placenta, glove use was categorized as 1) using latex gloves and 2) using non-latex gloves, because almost all the respondents wore gloves. "Using non-latex gloves" was the reference category. Using latex gloves during enema, shaving, changing pads, washing perineum, receiving newborns, suctioning, handling waste, and examination of delivered placenta significantly increased the occupational dermatitis experience.

7. Overall impact of glove use on occupational dermatitis

Logistic regression analysis, using backward stepwise elimination, was performed using all the significant variables as independent variables to identify the predictive factors for occupational dermatitis (Table 3). History of allergy symptoms other than due to occupational exposure, working in national hospitals, having the ability to select gloves, alternative glove availability, using latex gloves for washing perineum and handling waste were the significant predictors. The adjusted r-square (Nagelkerke R²) of the model was 0.192.

Discussion

1. Respondents' demographics

The high response rate (72.6%) indicates that Japanese midwives had major concerns about glove use, hand roughness or occupational dermatitis. In Japan 71.1% of midwives were working in hospitals, 14.7% in clinics and 6.3% in maternity homes in 2001⁹; however, 94% of the respondents in our study worked in hospitals. The age distribution of the respondents was also different from the national data because many of the midwives over 60 yr of age were working in maternity homes. Although 19% of Japanese midwives were over 50 yr old at the time of the study, only 7% of the respondents were over 50. This study mainly represents Japanese midwives who were working in hospitals and is not representative of all Japanese midwives.

2. Medical glove use as Standard Precautions

Although most respondents wore gloves during management of delivery or internal examination, glove use during nursing care involving possible contact with blood or body fluid was inconsistent. Even though it is counter to Standard Precautions, only 5.3% of respondents wore gloves during blood drawing and more than 30% of respondents wore gloves only when the clients had an infectious disease, during changing pads, caring for newborns, or receiving newborns. Wearing

gloves if the client had an infectious disease means that the midwife thinks that the care might result in a bloodborne infection. In many of Japanese hospitals, pregnant women are routinely screened for bloodborne pathogens during visits to the obstetric clinics. If the infectious status is known, care of pregnant women without wearing gloves is feasible. However, because there is a "window" of incubation, during which time bloodborne pathogens are undetectable by routine testing, the recommendation is to follow standard precautions and use gloves for all clients.

Despite the inconsistencies in choice of glove materials, there were some tendencies. Latex gloves were chosen most for procedures that required sterile techniques. PVC gloves were chosen mainly for procedures not requiring sterile techniques. The use of gloves in medicine should prevent transmission of pathogens from healthcare workers to a patient, from patients to healthcare workers, and from patient-to-patient via hands of healthcare workers. The result of this study suggests that Japanese midwives select gloves mainly for the purpose of preventing transmission from their hand to patients. However, gloves are very important personal protective equipment and the choice of latex gloves is recommended when care involves possible contact with blood or body fluid¹⁰.

3. Management of glove selection in the workplace

Even though many midwives worry that medical gloves causes hand roughness or dermatitis, 19% of respondents did not know whether or not they could choose the gloves they use, 20% did not know whether they could use alternative gloves if they experienced skin problems, and 26% did not know who chose the gloves that were purchased. One interpretation is that many midwives are unconcerned about glove materials. Moreover, less than one-third replied that nursing staff participated in choosing gloves for purchase. It might reflect that midwives have limited opportunity to participate in glove management and cannot inform front-line staff concerns to hospital managers. It is recommended that midwives be empowered by providing education about the properties of glove materials and consequences of glove selection.

More than one-third of respondents did not have the ability to choose medical gloves and 8% thought they could not have alternative gloves even if they had skin problems resulting from glove use. In the additional comments section, respondents wrote about the difficulty of getting alternative gloves. "Because the alternative glove which fits my hand is very expensive, I cannot ask to purchase them. So, I personally purchased the glove through my dermatology clinic." "A doctor with hand allergy uses alternative gloves; however, I am afraid that I, as a midwife, could not get expensive alternative

gloves.” The results and comments suggest either midwives have little interest in the nature of personal protective equipment or are not assertive enough in acquiring equipment that best suits their personal needs. To control the growth of medical care expenditures, Central Social Insurance Medical Council decided to adjust the main part of the fees by $\pm 0\%$ and pharmaceutical prices, etc. by -1.0% , before medical fees were revised in FY2004. It is anticipated that hospital budget problems will increase as a result. It is likely that considerable effort will be required to establish a healthy working environment for Japanese midwives. Action by a professional union is preferable because of the limitations of personal appeal.

4. Experiences with dermatitis and allergic symptoms

Almost all the respondents experienced hand roughness, especially in the winter season and 41% experienced occupational dermatitis; 26% of the respondents related dermatitis to medical gloves, and 2% were diagnosed with latex allergy. It is unclear whether the diagnoses of latex allergy were made by dermatologists or physicians specialized in allergic diseases because it was based on the self-administered questionnaire. However we assume that midwives, as medical professionals, are capable of recognizing a latex allergy.

In past studies, among general healthcare workers, occupational allergy was experienced by 19% (Japanese hospital nurses)¹¹, 29% (Japanese physicians)¹², and 35% (Polish nurses)¹³ of subjects, and hand contact dermatitis was reported in 30% (Italian female hospital workers)¹⁴. Symptoms associated with glove use were reported by 17.5% of Japanese physicians¹² and 29% of Polish nurses¹³. Among hospital workers who use latex gloves routinely, occupational dermatitis was reported by 40% of U.S hospital workers¹⁵ and 48% of Japanese operating room workers¹⁶. Especially, symptoms associated with latex glove use were reported by 16% of Japanese operating room workers¹⁶ and 80% of Korean operating room nurses¹⁷. The percentage of workers who experienced dermatitis in this study was higher than general hospital workers but lower than operating room nurses. This result might be consistent with frequency of latex glove use.

The frequency of diagnosed latex allergy (2%) was smaller than that reported in other studies. Specifically, in a review of latex sensitization in developed countries, frequency among health care workers was about 5–12%¹⁸. Among hospital workers who use latex gloves on a regular basis, such as operating room, ICU/CCU, and HCU workers, 6.6–14% were diagnosed as having latex allergy by either the prick or use test^{17, 19–21}. One of the reasons for the low frequency of latex allergy among midwives is that they do not use latex gloves to the same extent as

operating room nurses. The low frequency may also be related to the fact that allergies were not diagnosed by a prick test and not all respondents had a confirmed diagnosis of latex allergy.

Regardless of the diagnosis, cracked skin compromises the skin's inherent protective barrier and increases sensitization to latex protein. Midwives who experienced glove-related dermatitis are thought to be at high risk for developing latex allergy. In the comment section of the questionnaire, midwives described distress about hand roughness or a desire for smooth skin. “I want to touch patients with a smooth hand (not rough skin). Especially when touching mother's breast or listening to a baby's heart, we touch patients skin directly, so hand roughness is of much concern.” “I am afraid that my hand roughness will never heal unless I stop working as a midwife.” It is, however, essential for midwives to wash hands, use disinfectants, and wear gloves. Some respondents reported that she knew midwives who actually quit the occupation because of hand dermatitis. “I know a midwife who retired because of hand dermatitis, though I do not know whether it was caused by gloves.” “My friend with latex allergy gave up being a midwife. I hope we can choose gloves without any restriction.” Hand roughness and dermatitis are real problem for midwives.

At the time this survey was conducted, few midwives strictly kept Standard Precautions. Yet, Standard Precautions are being enforced with increasing strictness because infection control has become a very important issue in medical institutions. To prevent occupational dermatitis, management of glove selection in the workplace should be improved along with enforcement of Standard Precautions.

5. Demographic variables that were significantly related to occupational dermatitis

The history of allergic symptoms unrelated to occupational exposure, age, tenure, and type of working institution were significantly associated with occupational dermatitis. The history of either allergic symptoms or atopic dermatitis has been reported as being the most prevalent risk factor for occupational dermatitis and latex allergy^{11, 13, 14, 17, 20, 21}. Individuals belonging to the younger generations^{7, 15}, especially subjects under the age of 30¹⁴, were also reported to have a high rate of occupational contact dermatitis. The data obtained in this study confirms the previously reported association between atopy, age and occupational dermatitis. Moreover, having allergic symptoms in private life was highly related to having urticaria as occupational dermatitis. It can be interpreted as pre-existing allergic diseases, such as hay fever, having a stronger relationship to type I allergic responses than either type IV allergic response or irritant contact dermatitis.

The frequency of latex glove use has also been reported

to be related to latex allergy^{11, 15, 20}. However, frequency of direct assistance with delivery and internal examination was not significantly related to occupational dermatitis experience even though there was a trend in the direction of a positive relationship. There was a significant relationship between the frequency of direct assistance with delivery and age. Consequently, the relationship between the frequency of having a hazardous job and occupational dermatitis might be concealed by the interaction with age.

6. The relationship between glove selection and occupational dermatitis

Glove selection during enema, shaving, changing pads, washing perineum, receiving newborns, suctioning, handling waste and examination of delivered placenta were significantly associated with occupational dermatitis. However, the result can only indicate an ambiguous relationship between latex glove use and occupational dermatitis because the other significant confounding factors, such as frequency of hand washing and disinfectant use, were not taken into account. Nevertheless, controlling for the work unit and frequency of hazardous jobs, it was quite likely that the risk of occupational allergy was increased with the use of latex gloves.

The overall impact of glove use on occupational dermatitis also suggests that management of glove selection and use of latex gloves for washing perineum and handling waste were significant risk factors, in addition to personal factors. The model predicted about 19% of the variation in the experience of occupational dermatitis. The coefficient of determination was low because there are many materials that can cause occupational dermatitis in medical institutions other than gloves. The significant relationship of management of glove selection to occupational dermatitis suggests that a good working environment in which alternative glove choices are available is likely to decrease occupational dermatitis. However, it can also be interpreted as meaning that respondents who experienced occupational dermatitis were aware of the limitations of glove selection.

Even though using latex gloves increases the risk of occupational dermatitis, handling waste without using gloves is not recommended. Gloves are very important to prevent infection from patient to patient and from patient to healthcare workers. Therefore, we recommend a clarification of priorities, such as ease-of-donning, barrier protection, durability, tactile sensitivity, comfort, non-irritating and cost, before selecting gloves for a certain procedure²². Handling waste, changing diapers, changing pads, washing perineum or administering enema usually do not require tactile sensitivity. Also, comfort and durability are unnecessary because such procedures do not take a long time. Latex gloves that are durable

and with tactile sensitivity should be used only for procedures in which there is a high level of contact with blood or body fluids⁶. All hospitals or clinics should have a glove policy for their unit or department to ensure the correct types of gloves are worn in appropriate situations. Healthcare organizations need to establish a glove policy, based on current evidence, to ensure that risks for both staff and patients are minimized.

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