

OCCUPATIONAL CONTACT DERMATITIS AMONG NURSES: A REPORT OF TWO CASES

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ABSTRACT

Occupational skin disease is the second most common occupational disease. Health care workers, particularly nurses, are one of the occupational groups most frequently affected by hand eczema. The prevalence of hand dermatitis (HD) among nurses is reported to range from 18% to 57%, depending on the nature of the work they perform and the department of employment, with more nurses in surgical departments and special care units affected. Owing to the nature of their job, nurses are required to wash their hands frequently, perform wet work, wear occlusive gloves for long periods, and are in regular contact with disinfectants, detergents, and medical substances. Therefore, irritant contact dermatitis is the most common type of hand dermatitis seen in this population. However, nurses are also exposed to allergens such as rubber accelerators, colophony, fragrances and preservatives which can cause Type IV contact allergy and allergic contact dermatitis. This article highlights two cases of nurses with HD; one with mixed allergic contact dermatitis and irritant contact dermatitis and another with allergic contact dermatitis; with an emphasis on how to prevent HD in this population.

INTRODUCTION

Occupational skin diseases are the second most common occupational diseases reported following musculoskeletal complaints.¹ Hand dermatitis, in particular, is the most common occupational skin disease characterised by symptoms of itching, burning, stinging or prickling and signs of dryness, erythema, fissuring, weeping, scaling, crusting, papules, vesicles, erosions and lichenification.² Hand dermatitis (HD) accounts for up to 90% of occupational skin diseases^{1,3} and is usually a manifestation of irritant contact dermatitis (ICD) or allergic contact dermatitis (ACD).²

ICD is the most common form of hand dermatitis. The main cause of ICD in the workplace is wet work, which can be due to frequent contact with water, soaps, detergents and prolonged wearing of occlusive gloves.⁴ Other workplace irritants include solvents, chemicals and physical conditions that may prevail in the work place. A study conducted to assess the prevalence and clinical relevance of occupational hand dermatitis in hospital workers reported an ICD prevalence of 94.9%.⁵

ACD, a type IV allergic reaction, may start as ICD and develop into allergic contact dermatitis. Skin barrier changes, due to irritants, facilitate the permeation of allergens into the skin predisposing to allergen sensitization.⁶

Hand dermatitis can be a disabling temporary condition or an on-going chronic illness with frequent relapses.⁷

Health care workers, particularly nurses, are one of the most common occupational groups, affected by hand eczema. The prevalence of hand dermatitis among nurses is reported to range from 18% to 57%, depending on the nature of the work they perform and the department of employment.⁶ Hospital work requiring regular hand washing and disinfection has been reported to be associated with HD.⁸ A study to determine risk factors for hand dermatitis amongst nurses reported that working in a special care unit and nursing for more than 10 years were associated with HD.⁹ HD among Japanese hospital nurses reported the highest prevalence of HD (48%) in the surgical department and lowest prevalence of HD (6%) in psychiatry.⁸

The following article highlights two cases of nurses with HD; one with mixed ACD and ICD and another with ACD.

CASE REPORTS:

CASE 1:

A 60-year-old non-atopic woman, who has been working as a nurse in the dialysis unit for 20 years, presented with a 2-month history of dry, itchy and cracked skin involving the thumb, second finger and palm of her left hand. Her work required regular hand washing using Bioscrub® (an antiseptic water based skin cleanser containing chlorhexidine gluconate (20% solution) and 4% isopropyl alcohol). D-germ® (an alcohol based hand sanitiser containing 0.5g chlorhexidine and 70ml propyl alcohol per 100ml) was used between hand washes. Although she had not changed her

allergies in the workplace

work habits, the hospital had recently acquired a new hand soap supplier.

She used nitrile or latex gloves, which she changed after 15-20 minutes of use or when she went from patient to patient. Occasionally she noticed her hands were wet when she wore gloves for longer periods. She did not notice any improvement in her skin when off work.

She does housework and cooks regularly. She is right-handed and uses her left hand for holding a stainless steel knife while eating (religious custom), a metal grater and a variety of fruit and vegetables including onions. Natural rubber gloves are worn when washing dishes and cleaning with Jik® (liquid bleach containing sodium hypochlorite and sodium hydroxide) and detergent.

On examination she had small areas of thickened cracked dry skin on the ventral surface of the thumb, distal phalanx of the second finger and mid palm on her left hand. This localised pattern of chronic hyperkeratotic eczema was suggestive of ACD or repeated physical insults such as pressure to the areas.

The results of a patch test, using a series of 45 common commercial allergens known to cause ACD, indicated that she reacted weakly to nickel (1+). She did not react to chlorhexidine gluconate, preservatives or fragrances, which could have been present in the hand-wash and sanitiser. Nickel is present in many items and is reported to be one of the most prevalent contact allergens, with a median pooled prevalence of nickel sensitivity being 8.6% in the general population.¹⁰ The patient's weak reaction and the ubiquitous nature of nickel exposure made it difficult to attribute this reaction to occupational exposure alone.

As no seemingly relevant occupational allergens were identified from the commercial allergen testing, a work visit was done, but no additional workplace allergens were identified in the gloves, hand-wash or hand sanitisers. She was not exposed directly to any obvious nickel-containing instruments.

The patient was diagnosed with mixed ACD (unidentified allergen) and ICD or ICD with an additional physical insult. She was advised to reduce irritant exposure by washing her hands with aqueous cream instead of the antiseptic skin cleanser, and to use emollients frequently. Of her own accord, she stopped using the hand sanitiser too. She was reviewed after 2 months and her skin had improved significantly. She was left with only a small amount of scale on her left palm.

A more in depth activity of daily living and home survey is necessary to identify additional allergen exposures of

potential relevance. Nickel exposure at home is not excluded and the various metal items handled with her left hand need to be tested for nickel release using the digloxyamine spot test.

CASE 2:

A 54-year-old woman presented with a 1 year history of recurrent itchy red rashes on the dorsal aspect of both hands, which occasionally blistered. She was trained as a nurse but had worked in the textile industry as a merchandise designer for 18 years before being retrenched. One year prior to her presentation, she had returned to work as a theatre nurse, assisting in plastic and urology surgical procedures. She had a background of mucosal atopy and suffered from both hayfever and asthma.

She used Betadine® (a disinfectant containing povidone iodine as an active ingredient) and Hibi-scrub® (a disinfectant containing chlorhexidine gluconate as an active ingredient) for scrubbing her hands, and wore powdered latex gloves for several hours at a time during surgical procedures. She noted the rash worsened when latex gloves were used and improved slightly with nitrile gloves. She responded well to topical steroids prescribed by her general practitioner, but the problem recurred when they were discontinued.

On examination, the skin on both hands was scaly with no active lesions at the time of presentation. The patient had been on annual leave and off work for 3 weeks, and thought that this may have contributed to the improvement of her skin. Although not seen or photographed, the pattern of dermatitis described by this nurse, is classic for glove allergy which typically involves the dorsum of the hands as illustrated in Figure 1.



Figure 1. Erythematous plaques on the dorsum of the hand classic of glove dermatitis.

The occupational clinic, at her workplace, had performed serology tests which showed a total IgE of 341 kU/L (compatible with her atopy) and specific IgE to latex protein within the normal range (0.06 kU/L). HD, due to glove allergy, was strongly suggested from the clinical and history findings. Skin patch testing was done using 45 commercial allergens commonly found to cause ACD. After 48 hours of skin contact, the patch was read at 72 hours and a 1+ skin reaction to carba mix and thiuram mix was recorded. Specific patch tests, using work substances, revealed a 1+ skin reaction to latex gloves. Although all reactions were weakly positive, they were all relevant to a glove allergy. Given the temporal relationship between exposure to latex gloves and onset of her symptoms, the positive patch tests and resolution of her dermatitis when she was away from exposure for 3 weeks, she was diagnosed with occupational ACD to rubber accelerators present in gloves.

Accelerator-free surgical gloves were suggested for the patient. Alternately, it was recommended that she should be removed from theatre and placed in a nursing role which did not require her to wear rubber gloves, possibly in an outpatient setting or ward work.

At last contact her hands were better despite continuing in her same job. This was facilitated with the introduction of an alternate glove type, neoprene, and cotton gloves were on order for her to use as liners to the outer occlusive neoprene ones. She continued to practise good skin care and limited irritant exposure to a minimum.

DISCUSSION

Although HD is known to affect people in different occupations, nurses have been reported to have a higher risk when compared to the general population.^{1,2} In a study to assess the prevalence of HD in different occupations, nurses were three times more likely, than the general population, to suffer from hand eczema.¹¹ A study conducted among Dutch apprentice nurses reported a 1-year period prevalence of HD of 23% compared to a 1-year period prevalence of 9% to 14% in the general population between 18 and 69 years of age.⁵

Exposure to skin irritants, such as water, detergents and disinfectants, has been shown to be a major aetiological factor for developing HD in people performing wet work.¹² A cohort study to assess the influence of wet work on the risk of developing hand eczema in apprentice nurses, reported an incidence rate of 36.7/100 person years.⁵ Wet work refers to a job that requires spending approximately a quarter of the shift or more than two hours daily with wet hands.^{12,13} Wet hospital work has been shown to have a strong correlation with HD and is reported to cause a two-fold increase in risk when compared to dry office work.¹⁴

Owing to the nature of their job, nurses are required to wash their hands frequently, perform wet work, wear occlusive rubber gloves for long periods, and are in regular contact with disinfectants, detergents, and medical substances.^{1,2,6} Constant exposure to these irritants may lead to cumulative damage to the skin barrier, which manifests initially as dryness and discomfort and progressively worsens to eczema. This ICD can be acute (wet weepy red vesicular lesions) or chronic (thickened lichenified lesions). Importantly, disruption of the skin barrier may predispose a person to allergen sensitization and ACD.¹³

Some of the most common causes of irritant and allergic hand dermatitis among health care workers are summarised in Table I.

HD symptoms, in the first case, resolved favourably within two months of avoiding excess exposure to irritants, even though a specific exposure was not identified in her work place. This highlights the importance of good skin care in managing HD. The patient has been able to continue with her work until further non-occupational investigations can be arranged.

The second patient was diagnosed with ACD secondary to thiurams and carbamates, common rubber accelerators added to speed up rubber vulcanisation during rubber glove manufacture. These chemicals have been reported to be the most common cause of ACD in health care workers, usually due to frequent glove use (Table I).¹⁵

As in our case, studies have shown that most patients who have a positive patch test reaction to carbamates also react to thiurams.¹⁶ This may be due to co-reaction (concomitant sensitisation to both chemicals) or cross-reaction since these two chemicals have similar chemical structure.¹⁷

Although topical and systemic therapies may be useful in treatment of ACD secondary to glove rubber chemicals, the only definite management is to avoid gloves or alternatively, using gloves that are free of established allergens for the patients.¹⁸ It is also important to inform patients of alternate exposures to the offending chemicals, to prevent on-going unrecognised exposures and HD.

Workers have been reported to need prolonged sick leave, change jobs and sometimes quit work entirely, due to hand dermatitis related problems.¹⁹ An international literature review and survey, to assess the prognosis of hand dermatitis among workers generally, reported that 75% of the workers had to change their jobs due to problems related to hand dermatitis.²⁰ A case series of patients with ACD to synthetic rubber gloves reported clearing of contact dermatitis when patients were removed from jobs that required them to wear rubber gloves.¹⁸ In our case, we recommended our patient

Table I. Common agents causing contact dermatitis among health care workers*

Irritants	Allergens
Water and "wet work"	Glove allergens including carbamates, thiurams, 2-mercaptobenzothiazole (MBT), 1,3-diphenylguanidine (DPG) and black rubber mix chemicals (p-phenylenediamines)
Antiseptic skin cleansers and soaps	Colophony - found in sticking plasters
Drying of the skin using paper towels	Various preservatives including formalin and formalin releasing preservatives, used in many products such as moisturisers, cosmetics and skin cleansers, including wet-wipes
Heat and sweating, especially if wearing occlusive gloves for long periods	Coconut diethanolamide - found in many skin cleansers especially hand washes
Low humidity	Fragrances and other excipients - used in skin cleansers and moisturisers
Glove powder	Latex - proteins in natural rubber latex (glove powder may facilitate both transfer of latex particles to skin and aerosolisation of latex particles)

* Modified from Amanda Noonan and Mignon Moyle¹³

to be moved from her job in theatre; however she was able to continue in her job with a change in glove material to neoprene, which is free of accelerators.

As most health care facilities are shifting from using natural rubber latex to synthetic rubber gloves, people require knowledge on the various rubber chemicals present in these alternate synthetic rubber gloves, to which the skin may be exposed during use. This will be helpful in managing rubber glove chemical induced ACD and sensitisation.¹⁸

HOW IS HAND DERMATITIS PREVENTED AMONG HEALTH CARE WORKERS?

Prevention of skin diseases is an important part of occupational health services management and programs especially in the health care industry. Damage to the skin barrier puts the worker at risk of infectious disease and predisposes to micro-organism carriage and risk to patients.

Hand dermatitis, in particular, can be prevented by a combination of collective as well as individual measures.²¹

Since irritant dermatitis has been reported to be a risk factor for allergic dermatitis, preventing ICD will simultaneously minimise the risk of ACD.²¹ Prevention of ICD does not necessarily mean complete avoidance of irritants, but rather the reduction in frequency and duration of contact. This can be achieved by correct use of appropriate gloves, which must be supported by correct training in their use

and maintenance.¹⁹

In the nursing profession, where frequent hand washing is the major cause of ICD, individuals need to be trained on the proper hand hygiene measures in order to prevent this problem. Cumulative low irritation caused by frequent hand washing can be avoided by washing only when hands are soiled, and using alcohol sanitisers to reduce micro-organism transfer between patients and staff. Contrary to older findings,²² alcoholic hand sanitisers have been shown to cause less irritation than regular hand washing.^{19,23}

As proper hand hygiene is a crucial part in the prevention of HD, nurses and other health care workers need to learn these techniques earlier on in their professional training and this should be included early in the training programs.

Recommendations for the prevention of occupational contact dermatitis among nurses is summarised in Table II.

CONCLUSION

Both our patients had occupational hand dermatitis, with ICD significantly contributing to the HD in the first case and ACD predominating in the second. HD in nurses is a well-known problem and is mainly caused by performing wet work and regular hand washing. Proper skin care and hand hygiene is the mainstay of prevention of HD, and this should be taught early during professional training for all health care workers.

Table II. Recommendations for the prevention of occupational skin diseases among nurses*

- Hands should be washed in lukewarm water, rinsed and dried thoroughly after washing.
- Manual wet working procedures should be limited if possible.
- Protective gloves with long cuffs (extending above the elbow if arms are lifted or bent during tasks) should be used when doing wet work to prevent fluid draining into the glove.
- Occlusive gloves must be worn, for limited periods, to prevent skin maceration from sweating. When protective gloves are used for more than 10 minutes, cotton gloves should be worn underneath, to absorb sweat.
- Chemical-resistant gloves, chosen to protect from material damage and penetration relative to the chemical being used, should be used for cleaning tasks.
- Hand alcohol based sanitisers should be used before and after contact with patients.
- Hands should be washed when they are dirty or soiled.
- Moisturisers should be used for skin-care as often as possible during the working day and after work. Moisturisers should be applied all over the hands, including webs of the fingers, fingertips and on the back of the hand. Select moisturisers which are lipid rich, free from fragrance and with preservatives having the lowest allergen potential. Personal preference of the worker should be respected for best adherence.
- Jewellery on the hands or wrists should not be worn during work, as this predisposes to chemical and moisture accumulation and skin maceration and irritation.
- The same skin care and protection exercised at work needs to be observed at home, on the sport's field and with hobbies. Protective gloves should be worn when performing dishwashing, gardening or cleaning. Insulating gloves may be used when the weather is cold with low humidity.

*Modified from Dulon M *et al*²⁴ and Held E *et al*²⁵

REFERENCES

1. Lan C-CE, Tu H-P, Lee C-H, Wu C-S, Ko Y-C, Yu H-S, *et al*. Hand dermatitis among university hospital nursing staff with or without atopic eczema: assessment of risk factors. *Contact Dermatitis* 2011;64(2):73-9.
2. Luk N-MT, Lee H-CS, Luk C-KD, *et al*. Hand eczema among Hong Kong nurses: a self-report questionnaire survey conducted in a regional hospital. *Contact Dermatitis* 2011;65(6):329-35.
3. Smith DR, Smyth W, Leggat PA, Wang R-S. Prevalence of hand dermatitis among hospital nurses working in a tropical environment. *Aust J Adv Nurs* 2005;22(3):28-32.
4. Visser MJ, Verberk MM, Van Dijk FJH, Bakker JG, Bos JD, Kezic S. Wet work and hand eczema in apprentice nurses; part I of a prospective cohort study. *Contact Dermatitis* 2014;70(1):44-55.
5. Stingeni L, Lapomarda V, Lisi P. Occupational hand dermatitis in hospital environments. *Contact Dermatitis* 1995;33(3):172-6.
6. Szepletowski J, Salomon J. Hand dermatitis: a problem commonly affecting nurses. *Rocz Akad Med Bialymst* 2005;50 Suppl 1:46-8.
7. Meding B, Swanbeck G. Consequences of having hand eczema. *Contact Dermatitis* 1990;23(1):6-14.
8. Smith DR, Ohmura K, Yamagata Z. Prevalence and correlates of hand dermatitis among nurses in a Japanese teaching hospital. *J Epidemiol* 2003;13(3):157-61.
9. Lan C-CE, Feng W-W, Lu Y-W, *et al*. Hand eczema among University Hospital nursing staff: identification of high-risk sector and impact on quality of life. *Contact Dermatitis* 2008;59(5):301-6.
10. Thyssen JP, Linneberg A, Menné T, Johansen JD. The epidemiology of contact allergy in the general population - prevalence and main findings. *Contact Dermatitis* 2007;57(5):287-99.
11. Smit HA, Burdorf A, Coenraads PJ. Prevalence of hand dermatitis in different occupations. *Int J Epidemiol* 1993;22(2):288-93.
12. Lee SW, Cheong SH, Byun JY, Choi YW, Choi HY. Occupational hand eczema among nursing staffs in Korea: Self-reported hand eczema and contact sensitization of hospital nursing staffs. *J Dermatol* 2013;40(3):182-7.
13. Noonan A, Moyle M. Nurses and occupational contact dermatitis. *Aust Nurs J* 2005;12(11):29-31.
14. Nilsson E. Individual and environmental risk factors for hand eczema in hospital workers. *Acta Derm Venereol Suppl* 1986;128:1-63.
15. Heese A, Peters KP, Hornstein OP. Anaphylactic reaction to unexpected latex in a polychloroprene glove. *Contact Dermatitis* 1992;27(5):336-7.
16. Knudsen BB, Menné T. Contact allergy and exposure patterns to thiurams and carbamates in consecutive patients. *Contact Dermatitis* 1996;35(2):97-9.
17. Von Hintzenstern J, Heese A, Koch HU, Peters KP, Hornstein OP. Frequency, spectrum and occupational relevance of type IV allergies to rubber chemicals. *Contact Dermatitis* 1991;24(4):244-52.
18. Cao LY, Taylor JS, Sood A, Murray D, Siegel PD. Allergic contact dermatitis to synthetic rubber gloves: changing trends in patch test reactions to accelerators. *Arch Dermatol* 2010;146(9):1001-7.
19. Kampf G, Löffler H. Prevention of irritant contact dermatitis among health care workers by using evidence-based hand hygiene practices: a review. *Ind Health* 2007;45(5):645-52.
20. Hogan DJ, Dannaker CJ, Lal S, Maibach HI. An international survey on the prognosis of occupational contact dermatitis of the hands. *Derm Beruf Umwelt* 1990;38(5):143-7.
21. Löffler H, Effendy I. Prevention of irritant contact dermatitis. *Eur J Dermatol* 2002;12(1):4-9.
22. Steere AC, Mallison GF. Handwashing practices for the prevention of nosocomial infections. *Ann Intern Med* 1975;83(5):683-90.
23. Girard R, Amazian K, Fabry J. Better compliance and better tolerance in relation to a well-conducted introduction to rub-in hand disinfection. *J Hosp Infect* 2001;47(2):131-7.
24. Dulon M, Pohrt U, Skudlik C, Nienhaus A. Prevention of occupational skin disease: a workplace intervention study in geriatric nurses. *Br J Dermatol* 2009;161(2):337-44.
25. Held E, Wolff C, Gyntelberg F, Agner T. Prevention of work-related skin problems in student auxiliary nurses: an intervention study. *Contact Dermatitis* 2001;44(5):297-303.