

Irritant hand dermatitis: severity of disease, occupational exposure to skin irritants and preventive measures 5 years after initial diagnosis

F. H. W. JUNGBAUER¹, P. VAN DER VLEUTEN¹, J. W. GROOTHOFF² AND P. J. COENRAADS¹

¹Department of Dermatology, Groningen University Hospital, and ²Northern Center for Health Care Research, University Groningen, The Netherlands

Irritant contact dermatitis (ICD) is often chronic; its aetiology frequently being related to occupational exposure. Management of ICD involves persistent reduction in exposure to skin irritants such as water, detergents and prolonged occlusion by gloves. The aim of this study was to determine the severity of hand dermatitis 5 years after initial diagnosis and to find out what factors were related to this outcome. A questionnaire survey was carried out on severity of hand dermatitis, exposure to skin irritants and preventive measures, 5 years after initial ICD diagnosis. Of a cohort of 201 patients with ICD, 172 received the questionnaire and 124 (72%) responded. 5 years after initial diagnosis, 50% still had medium and 32% severe hand dermatitis. Patients with severe ICD and high exposure showed low levels of prevention and difficulty in changing their occupational exposure. Use of emollients was predominantly therapeutic rather than preventive. Occupation was changed in 57% of cases, of which 46% was permanent. In this population, ICD is a chronic disease; implementation of secondary preventive measures appears to fail. In occupations with high exposure to skin irritants, implementation of permanent exposure reduction is more difficult, compared to occupations with a medium level of exposure. High exposures might have led to change of occupation; medium exposures could have been reduced to low levels. In occupations with high exposure, women were overrepresented.

Key words: gloves; hand dermatitis; irritant contact dermatitis; management; occupational; prevention; skin irritants. © Blackwell Munksgaard, 2004.

Accepted for publication 31 March 2004

Irritant contact dermatitis of the hands is diagnosed by exclusion of other relevant aetiological factors, such as a relevant contact allergy and/or atopic dermatitis (1–3). Management of hand dermatitis is complex. The diagnostic procedure includes assessment of all possibly relevant aetiological factors and all relevant exposures to potential skin irritants and allergens. Effective management includes elimination of exposure to contact allergens and, even more important, reducing the exposure to irritants. Patients often have to change the way they use their hands to a remarkable extent. Irritant hand dermatitis is frequently related to occupational exposure factors such as wet work, detergents, hairdressing products, cutting fluids, etc (4).

Reducing exposure to skin irritants is difficult, takes time before results are seen and is sometimes expensive. Patients and their employers both seek evidence before they fully accept the idea of reducing skin irritants in the occupational

environment and start to make effective changes in exposure. Because of its difficult management, irritant hand dermatitis often shows a tendency to become chronic in duration. Follow-up studies on the outcome and effectiveness of the occupational counselling in patients with irritant hand dermatitis are rare. In the Netherlands, there are few referral centres specializing in occupational dermatology. In this paper, we describe the outcome of those patients who were diagnosed with irritant hand dermatitis in 1997 and 1998 in such an occupational dermatology clinic at the Groningen University Hospital, The Netherlands. Besides thorough investigation of allergic factors, a precise evaluation of irritant factors was made in every case.

The objectives of this study were to answer the following questions:

- (1) What is the severity of disease 5 years after initial diagnosis?

- (2) Is the level of occupational exposure to skin irritants and use of personal preventive measures associated with this outcome?
- (3) Does the sex of the individual influence the ability to reduce occupational exposure to skin irritants?

Materials and Methods

Cases primarily diagnosed as irritant hand dermatitis in the years 1997/1998 were considered eligible for the follow-up study. Patients had received specialized care in both diagnostic and treatment procedures. Great effort was made in educating the patient about the kind of hazards that go with exposure to skin irritants (5–9). Only patients with hand dermatitis and without evidence of a relevant allergic contact dermatitis were included. Exclusion of a relevant contact allergic factor was done by patch testing with a standard series of allergens, specific occupational series of allergens and individual contactants containing potential allergens.

Atopic hand dermatitis is often elicited or aggravated by relevant exposure to irritants, because the atopic skin has a reduced threshold for irritant exposure; therefore, cases in which atopic disease was the prime aetiologic factor were excluded.

A questionnaire was developed to evaluate the outcome of irritant hand dermatitis 5 years after initial diagnosis (Fig. 1). This questionnaire focused on the level of disease and the level of work-related exposure to irritants.

Disease severity

The severity of their hand dermatitis was measured by asking the patients whether they still had complaints of hand dermatitis but also by asking the frequency of relapses, the frequency of visiting the dermatologist and the use of topical corticosteroids (Fig. 2). Each answer to these parameters for level of disease was given a score (Table 1). From the cumulative score for these parameters, we differentiated 3 levels of severity.

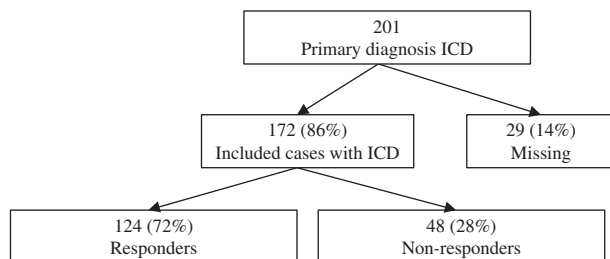


Fig. 1. Flow of diagram response to questionnaire.

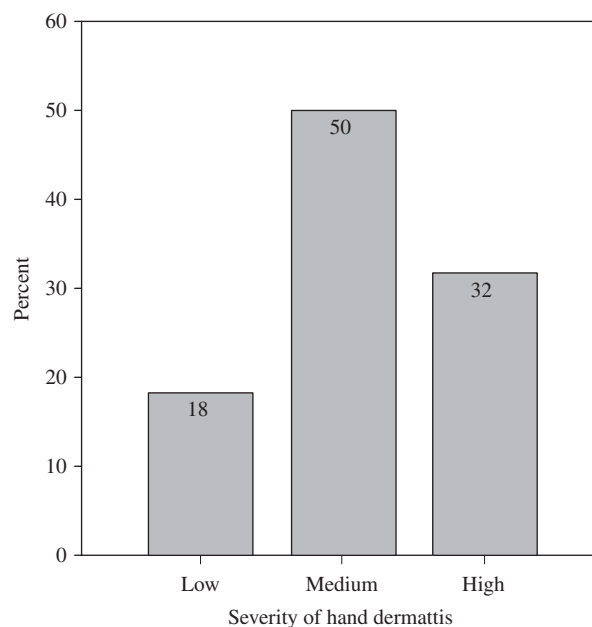


Fig. 2. Severity of hand dermatitis 5 years after initial diagnosis.

A score below 2 was considered to represent low severity, a score of 2 or 3 medium severity, while 4 and higher was considered to represent high severity.

Complaints causing disability in daily life are an important factor in determining the severity of hand dermatitis. This factor is influenced by personal interpretation. Whether complaints cause disability will also be determined by the frequency of relapses and will influence the number of visits to the dermatologist and use of corticosteroids. By this method, the factor of complaints will have a more realistic impact on the score of disease severity.

Occupational exposure to skin irritants

A scoring system was developed to assess the level of exposure to skin irritants (Fig. 3). We adopted this system from a method that was developed for evaluating the risk of occupational exposure to wet work (10). This risk assessment used a continuous scale for exposures; we transformed this into 3 categories.

From the sum of the scores for these 3 categories, the cumulative occupational exposure to skin irritants was considered to be low with a score of 0 or 1, medium with a score of 2 and high with a score of 3 or above.

Prevention of exposure to occupational skin irritants

The level of prevention was measured by asking about:

Table 1. Parameters for level of disease

Disease parameter	Category	Score
Complaints: dermatitis is causing disabilities in day-to-day life	No	0
	Yes	1
Number of relapses per year	<1	0
	1–2	1
	>2	2
	<0 >0	0
Number of visits to dermatologist per year		0
Corticosteroids in		1
Use of local steroids last 6 months	No	0
	Yes	1

- (1) Use of gloves.
- (2) Use of emollients.
- (3) Adjustments of exposure to skin irritants.

Occupational subgroups

The level of skin exposures to irritants differs between occupations. We formed 6 occupational subgroups, classified by differences in skin exposures: housekeepers, food suppliers, healthcare workers, industrial and handicraft labourers, office workers and hairdressers.

Results

Response

Of the cases seen in 1997/1998, we identified 201 primarily with irritant contact dermatitis (ICD), of whom 172 could be contacted. To our questionnaire, we received a response of 124/172

(72%). We could not contact 14% of the 201 included, because we had no current address.

In 2003, the mean age of the responders was 42 and of the non-responders was 55. In the group of responders, 46% were male, and in the group of non-responders, 48% were male. Table 2 shows occupational subgroups, comparing responders to non-responders.

Severity of hand dermatitis

5 years after initial diagnosis, 50% had medium and 32% severe hand dermatitis.

Exposure to skin irritants

Exposure to skin irritants 5 years after the initial diagnosis, with a focus on occupational exposure, was examined. The level of exposure to different irritants was categorized. Table 3 shows the frequencies of these categories (Table 4).

Prevention of exposure to skin irritants

Table 5 shows the frequencies of the parameters for prevention of exposure to skin irritants.

Use of gloves

Of those persons (49) who were categorized as still with a high level of occupational exposure, 47% used gloves less than 3 times a day (Fig. 4).

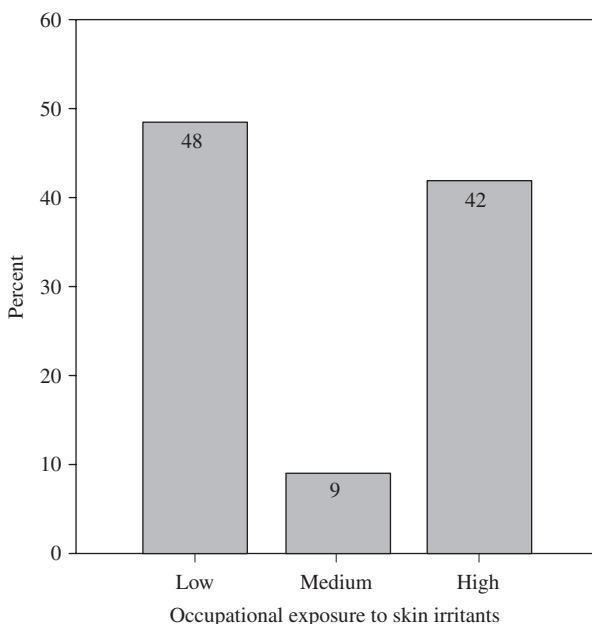


Fig. 3. Current level of occupational exposure to skin irritants.

Table 2. Occupational subgroups: responders compared to non-responders

Occupational subgroup	Responders	Non-responders
Housekeepers	100% (24)	0% (0)
Food suppliers	77% (17)	23% (5)
Healthcare workers	84% (16)	16% (3)
Industrial and handicraft labourers	56% (19)	44% (15)
Office workers	100% (4)	0% (0)
Hairdressers	41% (7)	59% (10)
Other or unknown	58% (21)	42% (15)

Table 3. Irritant exposures

Irritant exposure	Category	Score
Frequency of hand washing per day	<10	0
	10–24	1
	>24	2
Duration of wet hands per day	< ½ h	0
	½ h–1 h	1
	>1 h	2
Frequency of exposure to soap and detergents per day	<10	0
	10–24	2
	>24	4

Use of emollients

Even though our patients had participated in a special education program that gives special attention to promoting the use of emollients, 5 years after initial diagnosis, 38% of the patients with ICD still did not use emollients at all. A mean use of emollients of 2.3 a day was reported. This becomes 3.5 a day when we do not take into account the 42 patients who do not use emollients at all. The use of emollients is significantly related (Pearson correlation = 0.215 significant at 0.05 level, two-tailed) to the frequency of complaints but shows no relation with the total burden of work irritant to the skin.

Education, recognition of work exposure and adaptation of work exposure

At the time of initial diagnosis of irritant hand dermatitis, the dermatologist found in 96% of cases a positive relation between occupational exposure to irritants and complaints of dermatitis. At the time of this survey, the patients themselves recognized in 66% of cases an aetiological relation between occupational exposure to irritants and current complaints of hand dermatitis. Occupation had been changed in 57% of cases: 38% of these changes were temporary and 46% permanent; in 16% of cases, data on duration of adjustment being missing. In 31% of cases with

job adjustments, eventually exposure still was high and other employment was found. At the time of the survey of those 42% who were categorized with a high level still of occupational exposure, 63% had adjusted their work because of the dermatitis and 22% had changed employer. In 15% of cases with a high level of occupational exposure to skin irritants, even though ICD was diagnosed, no changes were made. Of those who had adjusted their work, 58% had current complaints of hand dermatitis at the time of the survey, compared to 64% of those who had not adjusted their work.

Adjustments of exposure to skin irritants

For both hairdressers (high occupational exposure) and office workers (no or very low occupational exposure), we saw no permanent change in occupational exposure to irritants. Handicraft labourers, industrial workers and healthcare workers were more successful in achieving permanent exposure changes (Fig. 5).

In this population, women have significantly more trouble in achieving permanent changes in their occupational exposure level (Spearman's rho = 0.283 significant at 0.01 level, two-tailed).

For occupations in which workers are most successful in achieving permanent exposure reduction, women are relatively less represented (Fig. 6).

Table 4. Exposure to irritants

Irritant	Category	Results (%)
Frequency of hand washing per day	<10	68 (55)
	10–24	43 (35)
	>24	13 (10)
Duration of wet hands per day	< ½ h	71 (57)
	½–1 h	26 (21)
	≥1 h	27 (22)
Frequency of exposure to soap and detergents per day	<10	73 (59)
	10–24	37 (30)
	>24 ≥ 25	14 (11)

Table 5. Frequencies of parameters for prevention of exposure to skin irritants

Prevention parameter	Category	Results (%)
Use of occlusive gloves per day	1–2	69 (56)
	3–6	29 (23)
	≥7	26 (21)
Use of emollients per day	0	46 (37)
	1	16 (13)
	2	16 (13)
	3	16 (13)
	4	8 (7)
	5	8 (7)
	>5	11 (9)
	Missing	3 (2)

Severity of hand dermatitis, correlated factors

In this population, no significant correlation between severity of disease, 5 years after initial diagnosis of hand dermatitis, and parameters for exposure, sex or occupation was found.

Discussion

Our data highlight the difficulties of achieving permanent changes in (occupational) exposure levels. The prognosis of occupational contact dermatitis is notoriously poor (11). In working populations, the percentage of patients with hand dermatitis who have relapses varies between 35% and 80%, depending on the severity, period of follow-up and intensity of exposures (5, 12). We consider a percentage of 32% patients with severe hand dermatitis, 5 years after initial diag-

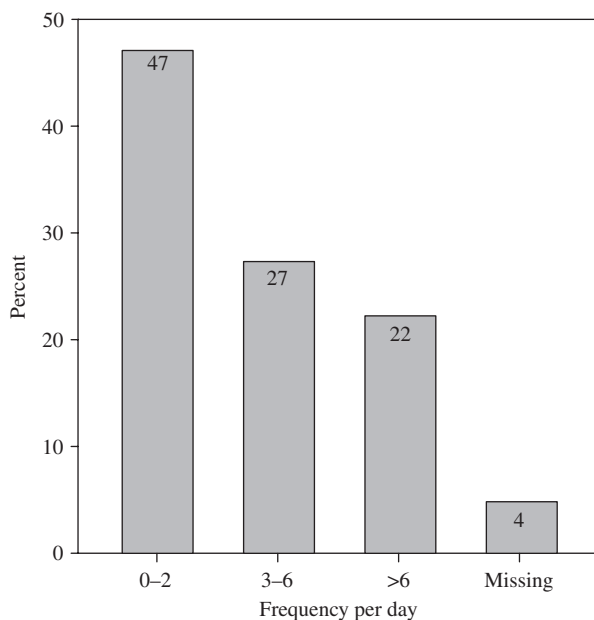


Fig. 4. Use of gloves by those with a high level of occupational exposure to skin irritants.

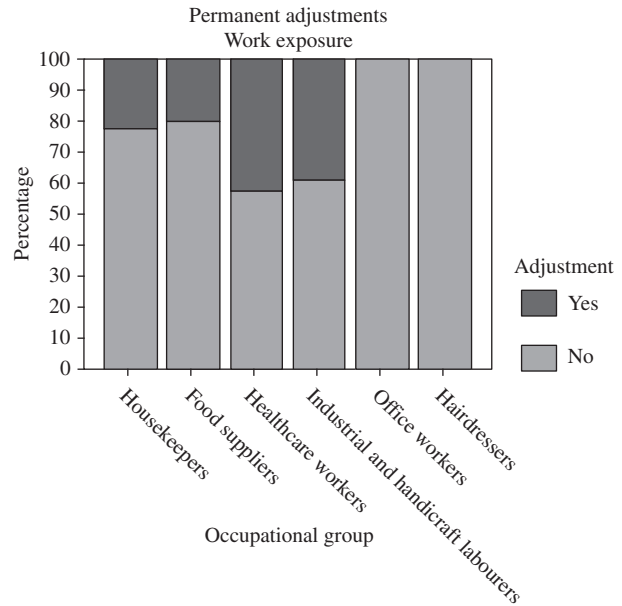


Fig. 5. Percentage able to achieve permanent adjustment in occupational exposure to skin irritants.

nosis, as high; it shows that irritant hand dermatitis is chronic in duration, despite all efforts in education (6, 13, 14). Because of hand dermatitis, local corticosteroids were used over the last 6 months. A mean frequency of 10 episodes a year of hand dermatitis, with a mean frequency of visits to the dermatologist of 1.8 times a year, was reported. During the 5 years after initial diagnosis of hand dermatitis, 31(25%) reported loss of workdays because of dermatitis, with a

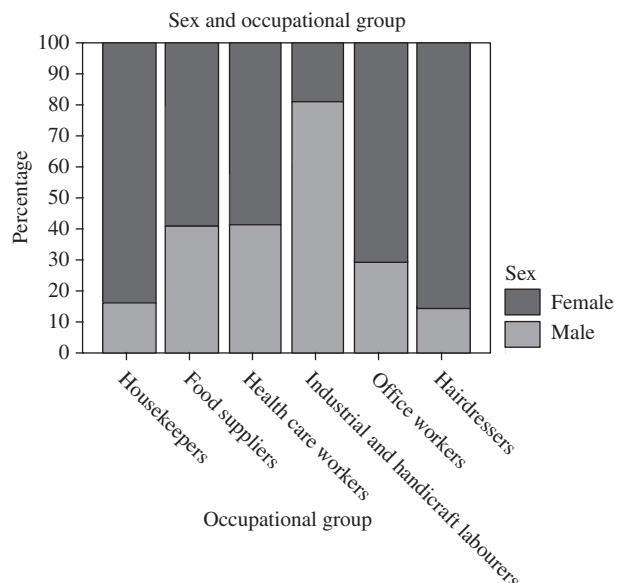


Fig. 6. Occupational group and sex distribution.

mean of 5.2 episodes with loss of workdays a year and a mean duration of 68 days a year.

In 7 cases (6%), a compensation pension (Dutch law: Wet op de Arbeids Ongeschiktheidsverzekering) because of dermatological impairment to perform their occupation was awarded.

In situations with a medium level of exposure to skin irritants at the onset of the disease, it might be easier to make changes, compared to situations with occupations with a high level of exposure. We recognized healthcare workers, labourers in industrial plants and handicraft labourers as more successful in achieving changes in exposure levels compared to the other occupational groups. We saw more men being successful in achieving these changes compared to women, although men are also overrepresented in occupations that are more successful in implementing changes. The success in achieving occupational adaptations in skin exposures might be more related to occupation than to sex. Opinions about the effect of a change of occupation on the prognosis of hand dermatitis are divided. Fregert noted that most of those who changed their work had the most severe dermatitis, which might explain its persistence. In his 10-year follow-up study, Fregert (15, 16) did not find a better result in healing of the dermatitis for those who changed their occupation compared to those who continued their jobs. Other investigators have since then found a better prognosis after job change (3, 17, 18). In most studies, the initial dermatitis improved after job change, but a prolonged follow-up period is missing, causing lack of information about relapse rates. A quarter of such patients who changed jobs chose occupations in which the work environment aggravated their dermatitis.

A significant correlation between severity of hand dermatitis and occupational exposure level was not found, although ample data in the occupational dermatology literature are available on the relation between exposure to irritants and the risk of developing dermatitis (4, 19–21). After a period of dermatitis, only profound changes in exposure to irritants might have enough influence on the severity of hand dermatitis. Both hairdressers and office workers, occupations at opposite ends of irritant exposure spectrum, performed worse in achieving exposure changes. Occupational exposure to skin irritants for hairdressers is high; decreasing the level of exposure will often interfere with the results of their work.

Office workers probably have no real occupational exposure to skin irritants; reduction at this low level is not realistic. The occupational relevance of hand dermatitis is doubtful for office workers. The high score of 96% with an occupa-

tional ICD, with 10% of them office workers, may be too high. Non-occupational exposures to skin irritants in some ICD cases might be underestimated. Another reason why office workers are diagnosed with occupational ICD might be pre-diagnosis change in occupation to low-exposure office work. Uter et al. (22) found an incidence of about 4 cases of ICD (caused by a previous occupation) in 100 office workers per year. A history of hand dermatitis, whether or not in a previous occupation, results in a reduced threshold for irritant exposure similar to the reduced threshold for irritant exposure in atopic skin disease and can promote the choice of jobs with less skin irritation.

In the case of the subgroup of hairdressers, occupational relevance is clear. Hairdressers are probably not able to achieve a significant decrease in occupational exposure to skin irritants. Almost all hairdressers changed employer in the 5-year period after initial diagnosis of irritant hand dermatitis. Apparently, this did not lead to lower exposure levels.

Patients with occupations with medium exposure to skin irritants could effectively change exposure to a lower level.

In this population, the use of emollients increases with the frequency of complaints. Although use of an emollient is associated with preventive measures, use is probably more related to therapy than to prevention.

Preventive measures

In the model for measuring occupational exposure to skin irritants, the use of gloves is not assessed. The use of protective gloves can be a good preventive measure against hand dermatitis, although can also be an irritant factor when used for prolonged periods of time. Because of this dilemma and the lack of information about the level of irritant effect, using gloves was not included in the cumulative score of occupational exposure to skin irritants. The level of protection with the use of gloves was low; even in those situations with high exposure, 47% of the respondents used gloves less than 3 times a day. Probably a substantial number of activities with exposure to skin irritants are performed with unprotected skin.

Patients diagnosed with ICD must adjust their exposure to skin irritants and increase the use of skin care and personal protective equipment to prevent relapses of dermatitis. Prevention of exposure to occupational skin irritants is partly determined by the level of knowledge about risk factors of occupational skin disease. All subjects received an education program at the onset of

the diagnosis of ICD from a nurse trained in healthcare education. In what way knowledge about risk factors of ICD eventually influences the outcome of the disease is difficult to measure. Knowledge about risk factors may lead to changes in work attitude, work environment, employer or even occupation, although these changes may also be induced by other factors (socio-economical, personal, etc.). With the questionnaire, we studied the change in occupational exposure to skin irritants, not the motivation for this change.

Our scoring system for severity of hand dermatitis has not been validated. Although self-reporting questionnaires for scoring occupational hand dermatitis have been described (23), none has so far been adequately validated.

References

1. Lammintausta K, Kalimo K. Atopy and hand dermatitis in hospital wet work. *Contact Dermatitis* 1981; 7: 301–308.
2. Rystedt I. Atopic background in patients with occupational hand eczema. *Contact Dermatitis* 1985; 12: 247–254.
3. Rystedt I. Work-related hand eczema in atopics. *Contact Dermatitis* 1985; 12: 164–171.
4. Dickel H, Kuss O, Schmidt A, Kretz J, Diepgen T L. Importance of irritant contact dermatitis in occupational skin disease. *Am J Clin Dermatol* 2002; 3: 283–289.
5. Hogan D J, Dannaker C J, Maibach H I. The prognosis of contact dermatitis. *J Am Acad Dermatol* 1990; 23: 300–307.
6. Hogan D J, Dannaker C J, Maibach H I. Contact dermatitis: prognosis, risk factors, and rehabilitation. *Semin Dermatol* 1990; 9: 233–246.
7. Koch P. Occupational contact dermatitis. Recognition and management. *Am J Clin Dermatol* 2001; 2: 353–365.
8. Löffler H, Effendy I. Prevention of irritant contact dermatitis. *Eur J Dermatol* 2002; 12: 4–9.
9. Wigger-Alberti W, Maraffio B, Wernli M, Elsner P. Training workers at risk for occupational contact dermatitis in the application of protective creams: efficacy of a fluorescence technique. *Dermatology* 1997; 195: 129–133.
10. Jungbauer F H W, Coenraads P J, Lensen G J, Bruynzeel D P. Zorg voor handeczeem, geen natte vingerwerk! Groningen: NECOD, 2002.
11. Rycroft R J G, Menne T, Frosch P J, Lepoittevin J P. *Textbook of Contact Dermatitis*, 3rd edn. Berlin: Springer-Verlag, 2002.
12. Williamson K S. A prognostic study of occupational dermatitis cases in a chemical works. *Br J Ind Med* 1967; 24: 103–113.
13. Hogan D J, Dannaker C J, Lal S, Maibach H I. An international survey on the prognosis of occupational contact dermatitis of the hands. *Derm Beruf Umwelt* 1990; 38: 143–147.
14. Adishes A, Meyer J D, Cherry N M. Prognosis and work absence due to occupational contact dermatitis. *Contact Dermatitis* 2002; 46: 273–279.
15. Fregert S. Occupational contact dermatitis patients have a poor prognosis. *Contact Dermatitis* 1976; 2: 355.
16. Fregert S. Occupational dermatitis in a 10-year material. *Contact Dermatitis* 1975; 1: 96–107.
17. Pryce D W, Irvine D, English J S C, Rycroft R J G. Soluble oil dermatitis: a follow-up study. *Contact Dermatitis* 1989; 21: 28–35.
18. Wall L M, Gebauer K A. A follow-up study of occupational skin disease in Western Australia. *Contact Dermatitis* 1991; 24: 241–243.
19. Dickel H, Kuss O, Blesius C R, Schmidt A, Diepgen T L. Occupational skin diseases in Northern Bavaria between 1990 and 1999: a population-based study. *Br J Dermatol* 2001; 145: 453–462.
20. Diepgen T L, Coenraads P J. The epidemiology of occupational contact dermatitis. *Int Arch Occup Environ Health* 1999; 72: 496–506.
21. Dickel H, Kuss O, Schmidt A, Schmitt J, Diepgen T L. [Incidence of occupation-related skin diseases in skin-exposure occupational groups]. *Hautarzt* 2001; 52: 615–623.
22. Uter W, Pfahlberg A, Gefeller O, Schwanitz H J. Hand eczema in a prospectively-followed cohort of office-workers. *Contact Dermatitis* 1998; 38: 83–89.
23. Susitaival P, Flyvholm M A, Meding B et al. Nordic Occupational Skin Questionnaire (NOSQ-2002): a new tool for surveying occupational skin diseases and exposure. *Contact Dermatitis* 2003; 49: 70–76.

Address:

F. H. W. Jungbauer
Occupational Physician
Department of Dermatology Academic Hospital Groningen
P.O. Box 30.001
9700 RB Groningen
The Netherlands
Tel: +31 50 361 2520
Fax: +31 50 361 2624
e-mail: f.h.w.jungbauer@derm.azg.nl