

The impact of measures for secondary individual prevention of work-related skin diseases in health care workers: 1-year follow-up study

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Background: Specific instruction courses as a tool for secondary prevention of occupational skin disease (secondary individual prevention, SIP courses) affecting individuals have been introduced in Germany. Little is yet known about the outcome of occupational disease and related behavioural patterns following these courses.

Objectives: To investigate the outcome of occupational skin disease in health care workers (HCW) 1 year after attendance of a SIP course.

Patients/methods: Two hundred and fifty-three HCW participated in SIP courses and were contacted by telephone 1 year after attendance. Patients were interviewed about skin lesions, medical treatment, sick leave, change of occupation, skin protection, skin care and skin cleansing, and the impact of skin disease.

Results: The follow-up rate was 81%. The proportion of participants reporting skin lesions decreased significantly (68% at follow-up compared with 77% at baseline; $P = 0.02$). Seventy-two per cent reported that their skin lesions had improved. Nine per cent reported having left their occupation due to their skin disease. Skin care and skin protection had improved, while the frequency of reported hand washing was reduced. Twenty-seven per cent said their quality of life was impaired due to the skin disease, compared with 54% at baseline ($P < 0.001$).

Conclusions: Outcome parameters, including behavioural parameters, indicate a positive impact of courses for SIP on skin health of HCW 1 year after attendance.

Key words: follow-up; occupational skin disease; quality of life; secondary prevention courses; skin care. © Blackwell Munksgaard, 2009.

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In many European countries, work-related skin diseases represent the largest proportion of all confirmed occupational diseases (1). The most affected occupations are hairdressing, metalwork and construction, food industry, and health care services. In these occupations, the skin is often exposed to work-specific irritants, allergens, and water; employees in these fields have a high risk of developing irritant and/or allergic contact dermatitis, most frequently affecting the hands. The generally chronic course with long treatment periods and sick leave results in the risk of job loss (2, 3). Furthermore, there is a negative impact on the

quality of life (QL) for patients with contact dermatitis (4). Disease management of patients with severe chronic hand dermatitis is frequently inadequate (5).

To address the consequences of occupational skin diseases, prevention measures, including courses for secondary individual preventions (SIP courses), have been established in co-operation with the Accident Prevention and Insurance Association in the Health and Welfare Services (BGW, Berufsgenossenschaft für Gesundheitsdienst und Wohlfahrtspflege). Specific information about skin disease is taught and skin protection

methods demonstrated in such courses, which also address exposure to irritant and/or allergic substances in health care professions. Occupational skin diseases are particularly amenable to prevention. Following the great success of the preventive measures for hairdressers (6), such programmes have been expanded for employees in the health service (7–9).

It was the aim of this observational study (i) to investigate the course of occupational skin disease in health care workers (HCW) and (ii) to investigate to what extent a change in relevant health behaviour could be achieved 1 year after attendance of a SIP course.

Materials and Methods

This study refers to 253 individuals who participated in a SIP course for HCW (e.g. nurses, geriatric nurses, and physician's assistants) conducted between April 2004 and September 2005 (10). The structure and content of these courses have been outlined in detail elsewhere (7, 8). Briefly, the courses run over a period of 2 days and focus on basic knowledge about the skin, risk factors, and types of hand dermatitis as well as on teaching personal skin protection, skin care, use of gloves, hygiene requirements, regulations, and handling of hazardous substances.

Each participant was questioned and examined by a dermatologist. Data on occupation, course and severity of disease, skin care, use of gloves, current and past diagnostic findings, allergies, and sick leave were recorded in detail. Atopic skin diathesis was evaluated by the atopy score developed by Diepgen et al. (10, 11). Atopic skin diathesis denotes a predisposition for eczema and is a known risk factor for occupational contact dermatitis (1).

During the course, participants were asked to provide their telephone number for a future telephone interview. One year (12 ± 3 months) after attendance of the course, individuals were telephoned and asked whether they agreed to participate in a structured telephone interview (11). If they consented, they were asked about the following:

- current skin lesions
- current medical treatment
- sick leave due to skin disease
- change of occupation due to skin disease
- current skin protection measures, skin care, and use of protective gloves:
- regular (>6 times/day), irregular (2–6 times/day), too little/rare (<2 times/day)
- use of skin conditioning hand disinfectants

- frequency of hand washing
- application and passing-on of the contents of the course
- evaluation of the content of the course
- negative impact on leisure time and QL due to skin disease.

Statistical evaluation

Data were entered using Microsoft Access 2000. Statistical analysis was done using SAS 9.1 WIN and SPSS 16.0 WIN. Categorical data were analysed by absolute and relative frequencies. Continuous data were analysed by mean and standard deviation. Relative frequencies (proportions) at baseline and follow-up were compared using McNemar's test, a non-parametric method applied to 2×2 contingency tables with dichotomous dependent variables.

Results

Interview data were obtained from 206 of 253 individuals, yielding a follow-up rate of 81.4%.

Characteristics of the study population

One hundred and eighty-three participants (88.8%, $n = 206$) were female. Mean age of the participants was 37.7 years (SD = 11.5, $n = 206$). Mean duration of occupation was 13.8 years (SD = 10.4, $n = 203$). The most frequent occupations were nursing (37.4%, $n = 206$), geriatric nursing (30.6%, $n = 206$), and physician's/dentist's assistant (12.6%, $n = 206$).

One hundred and fifty-nine patients (77.2%, $n = 206$) showed skin lesions when examined at baseline. Further clinical characteristics of the study population are presented in Table 1.

Table 1. Clinical characteristics of participants ($n = 206$)

	<i>n</i> (%)
Diagnosis	
Irritant contact dermatitis	74 (35.9)
Atopic hand dermatitis	19 (9.2)
Allergic contact dermatitis	10 (4.9)
Mixed (atopic dermatitis, allergic contact dermatitis, irritant contact dermatitis)	68 (33.0)
Others (vesicular hand dermatitis, hyperkeratotic dermatitis, psoriasis, tinea manuum)	35 (17.0)
Atopic status	
Atopic skin diathesis	126 (61.2)
Flexural eczema in history	50 (24.3)
Most frequent contact allergens	
Nickel sulfate	63 (30.6)
Cobalt chloride	28 (13.6)
Fragrance mix	25 (12.1)

Telephone follow-up

Results of the telephone follow-up are comprehensively presented in Table 2. One hundred and forty individuals (68.0%, $n = 206$) reported skin lesions at follow-up. Forty-two participants (20.4%, $n = 206$) reported that their skin lesions had not changed, compared with baseline. One hundred and forty-eight participants (71.8%, $n = 206$) reported that their skin disease had improved, 16 participants (7.8%, $n = 206$) reported

Table 2. Telephone follow-up, 1 year after participation in the SIP course ($n = 206$)

	<i>n</i> (%)
Skin lesions	
None	66 (32.0)
Moderate	93 (45.1)
Medium	27 (13.1)
Severe	20 (9.7)
Participants receiving medical care	102 (49.5)
Patients using corticosteroid treatment within last 3 months	74 (35.9)
Sick leave due to skin lesions within last year	28 (13.7)
Same occupation as 1 year ago	169 (82.0)
Job loss due to skin lesions	18 (8.7)
Impairment in practising job due to skin lesions	37 (18.0)
Change in skin care/protection behaviour	181 (87.9)
Regular use of skin protection creams	51 (24.8)
Regular use of skin care creams	59 (28.6)
Regular use of protective gloves	153 (74.3)
Use of skin conditioning hand disinfectants	136 (66.0)
Frequency of hand washing/day	
<6	74 (35.9)
6–10	70 (34.0)
11–20	46 (22.3)
>20	16 (7.8)
Application of information gained during the SIP course	186 (90.3)
Passing-on of information (e.g. colleagues, family) gained during the SIP course	156 (75.7)
Impairment of QL due to skin lesion (T1)	56 (27.2)
Impairment of QL due to skin lesion (T0)	111 (53.9)
Assessment of the SIP course after 1 year	
Helpful	190 (92.3)
Not helpful	5 (2.4)
Partly helpful	11 (5.3)

QL, quality of life; SIP, secondary individual prevention.

that the state of their skin had worsened. With respect to skin lesion severity, the complete pattern of change is presented in Table 3. Only 5 of the 66 individuals who were graded as having severe skin lesions at baseline graded themselves 'severe' at follow-up. However, the cumulative incidence of self-reported severe cases was $n = 15$ (7.3%, $n = 206$). 23.9% of the individuals with dermatoses at baseline ($n = 159$) reported no skin lesions any more at follow-up.

Thirty-seven individuals (18.0%, $n = 206$) were not working in their original occupation any more. Of these, 18 individuals (8.7%, $n = 206$) reported having left their occupation due to their skin disease.

Besides use of topical corticosteroids in the previous 3 months (35.9%, $n = 206$), further treatments were reported, including topical immunomodulators, ultraviolet phototherapy, tap water iontophoresis, urea-containing topical products, oral steroids, and antihistamines.

Almost all participants had already applied skin care measures at baseline, mostly in an irregular or inadequate manner. One year later, the frequency of application had changed: 72 participants (35.0%, $n = 206$) reported intensified skin care behaviour.

The number of people who applied skin care rarely decreased significantly from 56 (27.5%, $n = 204$) to 26 (12.8%, $n = 204$) over 1 year ($P < 0.001$; Fig. 1a). Fewer people wore protective gloves on an irregular basis, and significantly fewer people reported wearing protective gloves rarely at follow-up ($P = 0.04$; Fig. 1b). However, significantly more people also reported wearing no gloves at all at follow-up ($P < 0.001$). One hundred and six participants (51.5%, $n = 206$) reduced the frequency of hand washing within 1 year (Fig. 1c). The proportions of those reporting washing their hands 11 to 20 times per day or more than 20 times per day had significantly decreased ($P < 0.001$ in both instances).

Fifty-seven participants (27.7%, $n = 206$) reported QL impairment due to their skin disease compared with 112 individuals (54.4%, $n = 206$) who retrospectively said that their QL was

Table 3. Skin lesion severity at baseline and follow-up ($n = 206$)

Skin lesions (baseline, dermatological assessment)	Skin lesions (follow-up, self-report)				Total, <i>n</i> (%)
	None	Moderate	Medium	Severe	
None	28	19	0	0	47 (22.8)
Moderate	20	43	15	15	93 (45.2)
Severe	18	31	12	5	66 (32.0)
Total, <i>n</i> (%)	66 (32.0%)	93 (45.2%)	27 (13.1%)	20 (9.7%)	206 (100.0)

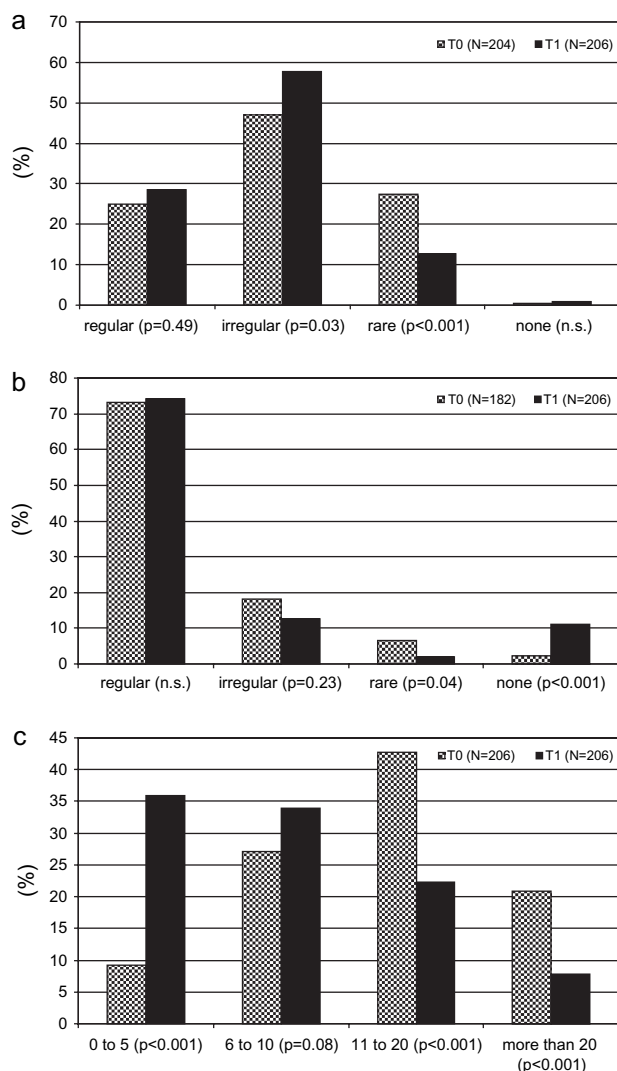


Fig. 1. (a) Frequency of skin care application on the hands per day (statistical comparisons refer to $n = 204$). (b) Frequency of wearing protective gloves per day (statistical comparisons refer to $n = 182$). (c) Frequency of hand washing procedures per day.

impaired at baseline ($P < 0.001$; Fig. 2). Twenty-nine participants (14.1%, $n = 205$) reported sick leave in the previous year due to skin disease at follow-up; retrospectively, 91 individuals (44.2%, $n = 206$) said they had ever been on sick leave due to their skin disease prior to the course ($P < 0.001$; Fig. 2).

Discussion

The main finding of this study is that it provides evidence for the positive impact of SIP courses in suspected occupational dermatoses in HCW through various parameters, including behavioural variables. More than two thirds of the participants reported that their skin disease had improved. At the same time, reported QL impair-

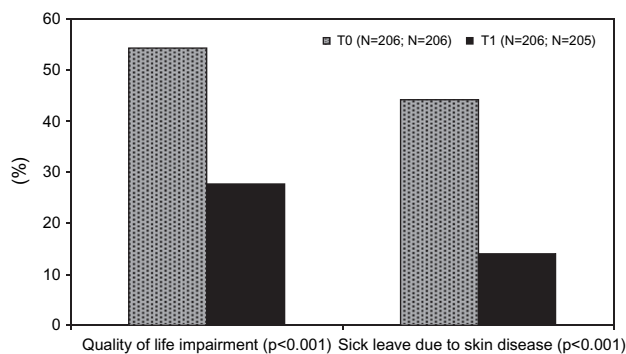


Fig. 2. Quality of life impairment and sick leave in participants of secondary individual prevention courses (statistical comparison refers to $n = 205$ in case of sick leave).

ment and reported sick leave due to the skin disease had significantly decreased. On the other hand, skin care, skin protection, and skin cleansing patterns seem to have improved in the course of the observation period.

Clinical and demographical characteristics of the study population are largely in line with our previous findings (8, 9). The most important commonalities were: the study population was predominantly female, on average less than 40 years old; irritant contact dermatitis was the most frequent diagnosis; nickel sulfate was the most frequent contact allergen; and about 60% of the HCW showed an atopic skin diathesis. Despite the frequency of sensitization to nickel sulfate, nickel is generally not of occupational relevance in HCW (12). It is well documented that atopy, that is the tendency to become sensitized and develop one or more of the atopic diseases (eczema, asthma, and hay fever), is the most important predisposing endogenous factor for occupational skin disease (5, 13). A population-based register study in Northern Bavaria showed that as much as 37.4% (95% CI 31.8–43.0%) of occupational skin disease in HCW could be ascribed to atopic skin diathesis (14).

The prognosis of occupational contact dermatitis is generally poor. A review found that 9 of 15 studies reported a clearance rate of occupational contact dermatitis of between 18% and 40% (15). The clearance rate in our study (23.9%) is exactly in this range. It is certainly not surprising that around 70% of the telephone interview participants still reported skin lesions at follow-up. Hand dermatitis, by far the most frequent manifestation of occupational contact dermatitis, often presents as a disease with a remitting and relapsing course (5). One also needs to take into account that 15 participants reported severe dermatitis, not having been diagnosed with severe dermatitis at baseline. However, the more important figures

to consider are that 72% of the participants reported improvement of their skin condition, 20% reported a stable skin disease, and the proportion of people with skin lesions at baseline had significantly decreased by approximately 10%.

Although occupational hand dermatitis entails functional impairment and psychological strain, QL is rarely measured in occupational skin disease (16). We have not included a multi-item measure of QL, but a single-item question asking whether participants are currently impaired in their QL by their skin disease and another single-item question asking whether participants were impaired at the course/during their skin disease. The answer to the latter question might be biased by recall problems or by the fact that the QL impairment might be less well memorable if the course actually led to improvement. However, it is impressive that the percentage of participants reporting current QL impairment was half than that of reporting QL impairment at the course/during their skin disease. The improvement in reported sick leave is impressive as well but is clearly hampered by the fact that the follow-up question referred to the previous year (since attendance of the SIP course), whereas the question at baseline referred to sick leave ever before attending the SIP course.

We hypothesize that the improvement of skin disease and its severity as well as the improvement of QL can be explained by improvement in skin care, skin protection, and hand washing habits. The finding that more people reported irregular skin care behaviour or not wearing protective gloves any more at follow-up could be explained by the number of people with completely healed skin lesions. When we looked at those reporting no use of protective gloves at follow-up, we found our hypothesis confirmed: of the 23 individuals who reported not wearing protective gloves, 18 of them did not report any skin lesions.

We have previously reported results from a similar study looking at cleaning and kitchen employees (CKE) (17). The follow-up rate was slightly higher in this study (88%). Compared with the study reported here, fewer participants reported improvement of their skin disease in the CKE study (65% CKE; 72% HCW) and a higher number of people reported currently receiving medical care at follow-up (64% CKE; 50% HCW). The difference might be explained by differences in disease characteristics and/or differences in the impact of the courses on skin health relevant behaviour. Indeed, the proportion of interviewees reporting moderate skin lesions at follow-up was lower in CKE compared with HCW (39 versus 45%). In addition, however, fewer CKE reported change of skin care behaviour (82% CKE; 88%

HCW). Despite less improvement in skin lesions, more need for medical treatment, and more severe skin lesions, CKE reported less QL impairment, both at baseline (43% CKE versus 54% HCW) and at follow-up (23% CKE versus 27% HCW). One possible explanation of this finding might be that HCW are perhaps more aware of health impairment and tend to report more QL impairment compared with other professions.

A closer look at the behavioural parameters showed the following: more CKE washed their hands more than 20 times a day (12 versus 8%). Skin conditioning hand disinfectants were only used by 34% of CKE, compared with 66% in HCW. However, more CKE tended to regularly apply skin protection (35 versus 25%) and skin care creams (35 versus 29%). The same high percentage in both populations (90%) reported that they were able to apply what they had learnt in their occupational environment, so there did not seem to be a difference with respect to implementation barriers.

There are limitations in this study, mostly arising from the fact that the data obtained at follow-up are self-reports, while data obtained at baseline come from a thorough recording of dermatological findings. There is evidence that the agreement between self-reported and dermatologists' diagnoses is poor in common dermatoses as reported in a French study (18). However, the direction of this bias seems to be unclear; whereas self-reports overestimated the prevalence for eczema, there was an underestimation of seborrhoeic dermatitis compared with the dermatological diagnosis. It is difficult to assess the degree to which there was misclassification in our study. There might have been a degree of social desirability bias as there is a vested interest of the Accident Prevention and Insurance Association to retain people in their jobs by offering SIP courses. This might have biased people to respond in a favourable way. On the other hand, there might be an interest in some people to report less favourably if they in turn have a vested interest to discontinue work. Another limitation of the study is that we do not have information on the 47 participants that were lost to follow-up. However, only six participants of these refused participation, the remainder could either not be contacted following several attempts ($n = 14$) or had changed address with the consequence that telephone numbers were not available ($n = 27$). We are, therefore, confident that there is actually little attrition bias in this study.

Finally, it is obvious that a control group study design would have been methodologically superior to a before–after study. However, implementing such a study design is incompatible with the German social security system. Each German

citizen is insured with a occupation-specific Accident Prevention and Insurance Association. This is a fundamental principle of the German social security system. There is a legal requirement for the Accident Prevention and Insurance Association to prevent occupational skin disease and to implement measures to obtain this goal. Skin protection courses are examples of such measures. It would, therefore, not be possible to withhold such measure from patients. Likewise, it would also be impossible to force patients to participate in a clinical trial in this context.

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