

Hand eczema among healthcare professionals in the Netherlands: prevalence, absenteeism, and presenteeism

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Summary

Background. Healthcare professionals have a high risk of developing hand eczema. Hand eczema can interfere with their work.

Objectives. To investigate the prevalence of self-reported hand eczema among healthcare professionals in the Netherlands, and to investigate absenteeism and presenteeism resulting from hand eczema.

Methods. A questionnaire-based observational study was performed. Participants were recruited from hospitals and nursing homes in the Netherlands. The study population consisted of 1232 healthcare professionals. We used the NOSQ-2002 to measure hand eczema and the PRODISQ for absenteeism and presenteeism.

Results. The 1-year prevalence of hand eczema among healthcare professionals was 12%. Among all participants, 47% reported symptoms related to hand eczema. Sick leave resulting from hand eczema was reported by 0.3% of healthcare professionals in general, and by 1.7% of healthcare professionals with hand eczema. In the group with hand eczema, 3.1% reported a large effect on presenteeism.

Conclusions. The 1-year prevalence of hand eczema among healthcare professionals in the Netherlands is low, but the prevalence of symptoms related to hand eczema is quite high. Hand eczema seems to have little impact on work in terms of absenteeism and presenteeism.

Key words: absenteeism; contact dermatitis; hand eczema; healthcare professionals; presenteeism; prevalence; productivity.

Of all occupational diseases in Europe, hand eczema is one of the most prevalent (1, 2). Healthcare professionals are at a higher risk of developing this condition than

others (3), because they handle irritants, such as water and detergents, during their work (4–6). Also, wearing occlusive gloves is a risk factor for developing hand eczema (7).

Several studies have focused on gaining insights into the prevalence of hand eczema among healthcare professionals. However, the estimates of the prevalence of this condition vary across studies (8–10). Importantly, there are very few studies on the prevalence of hand eczema in the Netherlands. The results of Dutch studies on this subject were published more than 5 years ago (11) or were performed in one centre (12). As the prevalence rate seems to differ among countries, it is necessary to

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estimate the prevalence of hand eczema in healthcare professionals in the Netherlands.

Knowing the prevalence of hand eczema among healthcare professionals is important for two reasons. First, by determining the prevalence, we gain insights into the magnitude of this health problem among healthcare professionals in the Netherlands. Second, hand eczema can cause a burden for society, as it can influence absence from work (13) and work productivity (14). Only a few studies on hand eczema have considered all of these factors. Presenteeism – lost time at work (15) – in particular has not been studied often in relation to hand eczema. In general, most studies have confirmed that the costs of presenteeism are higher than the costs of absenteeism or disability (16). The annual costs for occupational skin diseases for medical care, absenteeism and disability pensions are estimated to be €98 million in the Netherlands, not including the costs for presenteeism (17). The annual costs for occupational skin diseases might be even higher when presenteeism is taken into account.

The aims of this study were to investigate the prevalence of self-reported hand eczema among healthcare professionals in the Netherlands, and to investigate absenteeism and presenteeism in healthcare professionals with self-reported hand eczema.

Materials and Methods

Study design

This study was a questionnaire-based observational study. Baseline data from Hands4U (a two-armed randomized controlled trial) were used. More information about Hands4U can be found elsewhere (18). The Medical Ethics Committee of the VU University Medical Centre in Amsterdam, the Netherlands approved the Hands4U study.

Recruitment and data collection

Participants for this study were recruited from three university hospitals, two general hospitals, two nursing homes, and one academic centre for dentistry. These healthcare institutes are located across the Netherlands (Groningen, Stads kanaal, Nijmegen, Naarden, Haarlem, and Amsterdam). Recruitment took place at the department level. Departments were recruited between April 2011 and May 2012. We included only departments in which wet work was performed (e.g. frequent hand washing or wearing of gloves). The occupational physicians of the hospitals determined, on the basis of their expertise, whether workers at a department performed wet work.

In total, 48 departments agreed to participate in the study. A validated questionnaire was sent to all workers in the participating departments. Participants were given 1 month to fill out the questionnaire. A maximum of three reminders was sent to enhance the response rate.

Study population

The study population consisted of healthcare professionals, who were defined as workers performing patient-related tasks (e.g. nursing patients and treating patients). From the participating departments, 2597 workers were invited to fill out the baseline questionnaire (Fig. 1), and 1666 responded (64%). Inclusion and exclusion criteria are described elsewhere (18). From the 1666 participants, 1237 (74%) performed patient-related tasks and were eligible for this study. Five participants did not meet the inclusion criteria, because they worked < 8 hr a week; they were excluded. The final study population consisted of 1232 healthcare professionals.

Measures

Self-reported hand eczema (NOSQ-2002). Owing to the large sample size, it was not feasible to perform a clinical examination. Therefore, we used a questionnaire to measure the prevalence of hand eczema in the population.

We used the NOSQ-2002, a validated questionnaire, to measure hand eczema, using questions D1, D2, and D5: 'Have you ever had hand eczema' (D1), 'Have you ever had eczema on your wrists or forearms (excluding the inside of the elbow)?' (D2) (yes/no), and 'When did you last have eczema on your hands, wrists or forearms?' (D5) (I have it just now; not just now, but within the past 3 months; between 3 and 12 months ago; more than 12 months ago) (19, 20). The point prevalence was established by items D1 and D2 in combination with the answer 'I have it just now' from item D5. The 3-month prevalence was

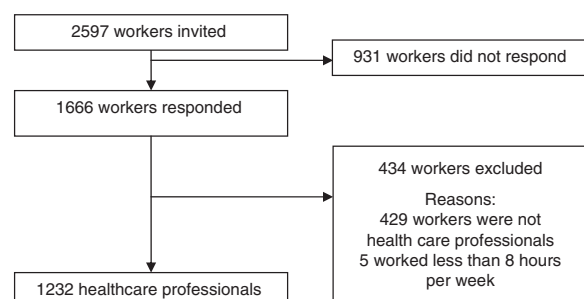


Fig. 1. Flow chart.

established by items D1 and D2 in combination with the answers 'I have it just now' and 'Not just now, but within the past 3 months' from item D5. The 1-year prevalence was established by the items D1 and D2 in combination with the answers 'I have it just now', 'Not just now, but within the past 3 months' and 'Between 3 and 12 months ago'.

Symptom-based questionnaire. A questionnaire from the Netherlands Society of Occupational Medicine (NVAB) was used that included questions about the occurrence of specific symptoms related to hand eczema in the past 3 months (21): 'Did you have one of the following complaints on your hands or fingers in the past 3 months?' The questionnaire contained the following symptoms: vesicles on palms, back of hands or side of fingers (yes/no); red and swollen hands or fingers (yes/no); red papules on hands or fingers (yes/no); scaling on hands or fingers (yes/no); itchy hands or fingers (yes/no); and hands or fingers with fissures (yes/no). We used this measure to determine whether a person reported any of these symptoms in the past 3 months.

The NVAB questionnaire also uses a score to determine hand eczema. To calculate this score, we used two additional questions from the NVAB questionnaire, i.e. 'Did these symptoms last longer than 3 weeks' and 'Did these symptoms occur more than one time during the past 3 months?' When a participant indicated that he or she had fissures, vesicles, and/or red papules, the participant received two points for each reported symptom (maximum of six points). When a participant answered 'yes' to any of the other five questions (including the two additional questions), the participant received one point per positive answer, leading to a maximum of five points. This score, ranging from 0 to 11 points, was used to identify the past 3-month history of participants with no hand eczema (0–2 points), participants who might have had hand eczema (3–4 points), and participants with hand eczema (5–11 points) (21).

Absenteeism and presenteeism. For measuring absenteeism, we included two items from the PRODISQ (22): 'Did you report sick leave over the past 3 months?' and 'Did you report sick leave because of hand eczema over the past 3 months?'

Presenteeism is considered to be lost time at work (15). In this study, we considered two aspects of presenteeism. The first aspect relates to the amount of work that healthcare professionals performed on days when they had hand eczema and went to work. The second aspect relates to the quality of their work on those days. We consider a decline in the amount of work and/or

the quality of work as presenteeism. For measuring presenteeism, we included two items from the PRODISQ (22): 'On a scale from 0 to 10, how much work did you perform on the days you were at work while having hand eczema, where 0 means you could not do anything and 10 means you could do the same as usual', and 'On a scale from 0 to 10, what was the quality of your work at days you were at work while having hand eczema, where 0 means your work was of the worst quality and 10 means your work was of the same quality as usual.'

Furthermore, we measured whether people went to work while they had hand eczema by means of the following question: 'On how many days during the past 3 months did you go to work, although you were bothered by hand eczema?' We based this question on question 4 from the Short Form – Health and Labour Questionnaire (SF-HLQ) (23, 24).

Population characteristics. The following socio-demographic data were assessed: sex, level of education, and age.

Data analyses

We performed descriptive analyses. We calculated prevalence rates and 95% confidence intervals (CIs) for dichotomous measures, and means, standard errors (SEs) and medians for continuous measures. Except for the medians and the descriptive data, these analyses were performed in MLwiN 2.18 (<http://www.bristol.ac.uk/cmm/software/mlwin/>). This program enables adjustment for the clustering of participants within departments and hospitals. In this study, three levels were identified: (i) participant; (ii) department; and (iii) hospital. Medians and descriptive data were calculated with IBM SPSSTM Statistics 20.0.

Results

The baseline characteristics are shown in Table 1.

Table 1. Characteristics

Variable	Healthcare professionals (n = 1232)
Women, n (%)	1004 (81.5)
Education, n (%) ^a	
Low/middle	533 (43.3)
High	699 (56.7)
Age (years), mean (SD)	40.0 (11.5)

SD, standard deviation.

^aLow/middle education: primary school, basic vocational education, secondary vocational education, high-school degree. High education: higher vocational education or university degree.

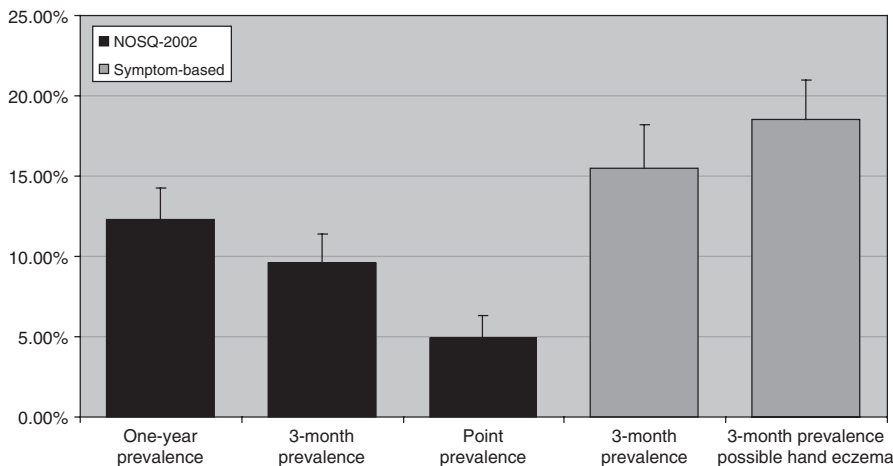


Fig. 2. Prevalence of hand eczema ($n = 1232$).

Prevalence of hand eczema

The prevalence rates of hand eczema are shown in Fig. 2. The 1-year prevalence of hand eczema among healthcare professionals was 12% (95% CI 11–14), the point prevalence was 4.9% (95% CI 3.8–6.3), and the 3-month prevalence was 10% (95% CI 8–11), according to the NOSQ-2002 ($n = 1232$). On the basis of the NVAB symptom-based questionnaire, 15% (95% CI 13–18) of the healthcare professionals had hand eczema in the past 3 months, and 18% (95% CI 16–21) might have had hand eczema in the past 3 months.

The symptoms reported by the healthcare professionals in the past 3 months are plotted in Fig. 3. The most commonly reported symptom in the past 3 months was fissures on the hands or fingers [29% (95% CI 25–33)]. The least reported symptom was vesicles on palms, backs of hand, or sides of fingers [7.2% (95% CI 5.6–9.3)]. Among all healthcare professionals, 47% (95% CI 43–50) reported at least one of the symptoms listed in Fig. 3.

Absenteeism and presenteeism

Sick leave in the past 3 months was reported by 33% (95% CI 29–38) of the total study population of healthcare professionals ($n = 1178$). Sick leave resulting from hand eczema in the past 3 months was reported by 0.3% (95% CI 0.1–0.9) of the total study population ($n = 1178$), as can be seen in Table 2. Within the group of healthcare professionals who reported sick leave ($n = 403$), 1.0% (95% CI 0.4–2.6) reported sick leave owing to hand eczema. Within the group of healthcare professionals who reported hand eczema in the past 3 months ($n = 118$), 1.7% (95% CI 0.4–6.5) reported taking sick leave because of hand eczema.

Also, we investigated whether healthcare professionals having hand eczema in the past 3 months ($n = 116$) went to work despite their hand eczema. It appeared that 97 of the healthcare professionals with hand eczema in the past 3 months went to work on at least 1 day while having hand eczema [84% (95% CI 76–89)], 22% (95%

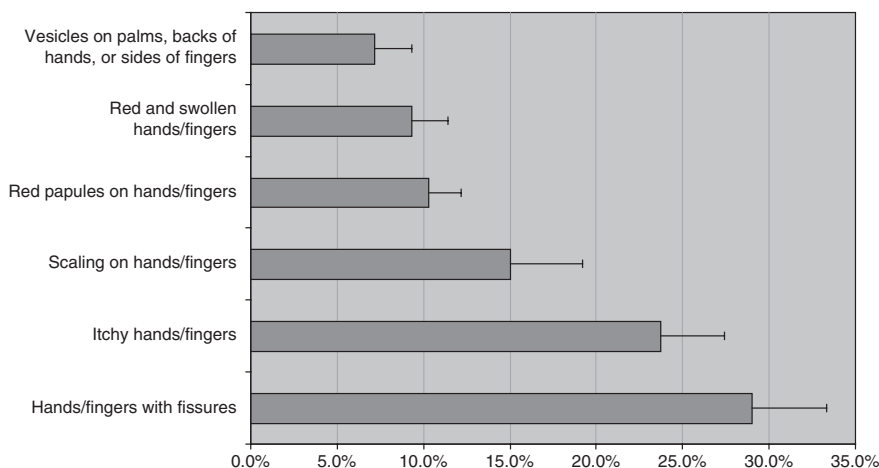


Fig. 3. Three-month prevalence of symptoms related to hand eczema ($n = 1232$).

Table 2. Sick leave and days at work while participants had hand eczema

Sick leave owing to hand eczema in the past 3 months	n (%), 95% confidence interval
Total population (n = 1179)	4 (0.3), 0.1–0.9
Sick-listed healthcare professionals (n = 403)	4 (1.0), 0.4–2.6
Healthcare professionals with hand eczema (n = 118)	2 (1.7), 0.4–6.5
Went to work while having hand eczema in the past 3 months (n = 116)	
At least 1 day	97 (84), 76–89
At least 31 days	28 (22), 13–34
At least 61 days	2 (1.7), 0.4–6.6

CI 13–34) went to work on > 30 days while having hand eczema, and 1.7% (95% CI 0.4–6.6) went to work on > 60 days while having hand eczema.

The amount of work that healthcare professionals performed on days when they had hand eczema was, on average, 9.4 (SE 0.1), with a median of 10, on a scale from 0 to 10 (n = 98). Among these healthcare professionals, 3.4% (95% CI 1.4–8.0) scored ≤ 5 , and 25% (95% CI 18–32) scored ≤ 9 . The score for the quality of work performed by healthcare professionals on the days when they had hand eczema was 9.5 (SE 0.1), with a median of 10 (n = 98). Among these healthcare professionals, 2.1% rated the quality of their work with a score of ≤ 5 (95% CI 0.7–6.2), and 26% (95% CI 17–37) rated the amount of work that they performed with a score of ≤ 9 .

Discussion

The prevalence of self-reported hand eczema in our study population was low, as were the prevalence rates of absenteeism and presenteeism related to hand eczema. Our findings showed that the self-reported 3-month prevalence of hand eczema was 10% among healthcare professionals as measured with the NOSQ-2002. In contrast, the 3-month prevalence of hand eczema was 15% according to the NVAB questionnaire, and almost half of the participants reported symptoms related to hand eczema in the past 3 months. Absenteeism resulting from hand eczema was reported by only 0.34% of the total population. Of the healthcare professionals who reported having had hand eczema in the past 3 months, 1.7% reported taking sick leave because of hand eczema in the same period. Hand eczema seemed to have had only a minor influence on the work productivity of our population.

Prevalence of hand eczema

The 1-year self-reported prevalence that we found in this Dutch population is remarkable, as it is quite low when

compared with studies conducted in other countries. Flyvholm et al. (8) reported a 1-year prevalence of between 16% (physicians) and 32% (assistant nurses) among healthcare professionals. Ibler et al. (25) reported a 1-year prevalence of 21% among healthcare professionals. Both studies used the NOSQ-2002, the same measure as in the present study. Also, larger point prevalence rates were reported in studies on healthcare professionals, the lowest of which was 12% and the highest of which was 18% (25, 26), contrasting with the point prevalence of 5% in our study. Therefore, our data suggest that hand eczema is less prevalent among healthcare professionals in our sample than in other studies. Several hypotheses can be formulated to explain this finding.

First, our study population may already be complying with (part of) the recommendations to prevent hand eczema, which would explain the difference between the prevalence found here and in other studies. However, we have no data with which to confirm or reject this hypothesis.

Another explanation for the low prevalence could be that our study population is not aware of certain symptoms that are related to hand eczema. Almost half of the participants in this study reported symptoms related to hand eczema in the past 3 months, whereas only 10% reported hand eczema in the same period. Several studies have suggested that people consider some skin symptoms to be normal (27, 28), which may explain why they do not report hand eczema while having hand eczema symptoms (27).

Also, in the Netherlands, healthcare professionals might be less aware of the causal relationship between their work and (symptoms of) hand eczema, because of the Dutch workers' compensation system. In contrast to many other countries, in the Netherlands there is no distinction between work-related diseases and non-work-related diseases with respect to receiving sickness or disability benefits (29). As Dutch workers can receive a sickness or disability benefit regardless of the nature of their complaint, there is no financial incentive to make work-related claims (30). In other countries, where workers receive benefits for work-related health problems only, hand eczema symptoms may be recognized earlier, as these constitute a work-related cause of absenteeism.

The healthy worker effect could be a fourth explanation for the low prevalence of hand eczema among healthcare professionals in our study. Several studies have suggested that people change their jobs or lose their jobs because of hand eczema (13, 31, 32). It has been suggested that these job changes occur early in the course of the disease (31, 33). Consequently, we may have measured fewer cases of hand eczema in our population because

these healthcare professionals had already changed or lost their jobs. However, this does not explain the difference in the prevalence between our study and other studies, as the healthy worker effect may also have influenced the prevalence rates in other studies.

Absenteeism and presenteeism

Only a small proportion of our study population reported taking sick leave because of hand eczema in the past 3 months. The few existing studies on absenteeism related to hand eczema reported larger percentages of sick leave. In a study by Cvetkovski et al., 57% of patients with occupational hand eczema reported taking sick leave because of this condition in the past 12 months (13). A study by Burnett et al. found that 14% of the cases of occupational dermatitis resulted in > 10 days away from work, and 6.6% of the patients were away from work for > 20 days (34). The compensation system in the Netherlands might also influence the percentage of healthcare professionals who are sick-listed because of hand eczema. In the Netherlands, the employer pays for sick leave, and so employers do not have a financial incentive to report work-related diseases. Therefore, in the Netherlands, there is less attention to work-related diseases than in other countries (29). This could lead to under-reporting of absenteeism resulting from hand eczema, as the healthcare professionals perceive no need to consider their sickness absence as work-related.

In this study, we also investigated presenteeism resulting from hand eczema. Only a minority of the healthcare professionals with hand eczema reported a large decline in the amount and quality of their work on days when they went to work with hand eczema (3.1%). For other healthcare professionals with hand eczema, their condition did not seem to contribute (or contributed only a little) to the quality and amount of their work. Other studies did find an effect of hand eczema on productivity. Hemp et al. reported an average productivity loss of 5.2% resulting from dermatitis or other skin conditions (16). Furthermore, a review on the impact of occupational contact dermatitis showed that most studies found an effect on work activities for patients with occupational contact dermatitis. The studies in the review used different methods to measure an impact of hand eczema on functioning at work, such as accomplishing less work than expected, difficulties in performing work, and work impediment. However, some studies in this review found no effect on work activities (35). The effects of hand eczema on presenteeism therefore seem to be unclear. We do not know why only a small proportion of our study population reported presenteeism. It is possible that hand eczema

simply did not interfere with the work that healthcare professionals had to perform on days when they had hand eczema. In a recent study on hand eczema in healthcare workers, the severity of hand eczema was mild to moderate in almost 90% of the cases (25). Perhaps the severity of hand eczema is also low in our study population, thereby minimizing the interference with work.

The above paragraphs indicate that self-reported absenteeism and presenteeism resulting from hand eczema do not seem to constitute a significant problem in our study population. However, a more alarming problem is suggested by our data. Our data indicate that most healthcare professionals go to work despite their hand eczema, as almost one-quarter of the participants with hand eczema went to work for > 30 days while having hand eczema. Although this does not seem to affect their work in terms of presenteeism, it may have unfavourable consequences for their patients. According to a recent review by Visscher and Wickett, healthcare workers with irritated hands have more colony-forming units, such as those of *Staphylococcus aureus* and *Staphylococcus hominis*, than healthcare workers with healthy skin. Also, they pointed out that one of the major reasons for non-compliance with hand hygiene protocols in healthcare workers is skin irritation (36). Therefore, healthcare workers continuing work and patient-related tasks while having hand eczema can pose a risk for their patients. It is thus important that, when healthcare professionals with patient-related tasks have hand eczema, they temporarily perform work that does not require patient contact.

Working while having hand eczema creates a risk not only for the patients, but also for the healthcare professionals. The long-term follow-up studies of Meding et al. (33) and Mätkönen et al. (32) showed an improvement in hand eczema prognosis for employees who changed their high-risk occupation for another occupation. This suggests that working while having hand eczema can have an impact on the course of hand eczema (33).

Strengths and limitations

This study is one of the first in the Netherlands to investigate the prevalence of self-reported hand eczema among healthcare professionals. To estimate the prevalence, we used a large cohort of healthcare professionals ($n = 1232$). In general, our study population appears to be representative of the healthcare sector with regard to average age and the male/female ratio. A report on women's participation in the labour market in the Netherlands showed that 81% of all employees in the healthcare sector are women (37). Also, the average age of employees in this sector was 41.5 years in 2010

(38). These numbers correspond well with our data. Furthermore, the healthcare professionals were spread throughout the Netherlands, thereby providing a representative geographical range. Another strength is that we did not select the healthcare professionals according to their job title, but rather on task level. For instance, a nurse does not necessarily have patient-related tasks, but instead could be in a management position. Also, we not only investigated the prevalence of hand eczema and hand eczema symptoms, but also described the effects of hand eczema on absenteeism and presenteeism.

A limitation of this study is that all of the data were self-reported, and this could have led to an underestimation of hand eczema (39) and an overestimation or underestimation of absenteeism and presenteeism. Second, most healthcare professionals worked in university medical centres, which could have influenced the results, as the exposure to water, for example, in this group of healthcare professionals might have been different from the exposure of healthcare professionals working in nursing homes. Third, we used the NOSQ-2002 to determine the prevalence of hand eczema. This measure has not been validated within the Dutch context. As the perception of hand eczema or hand eczema symptoms might differ among countries, for example as a result of differences in social security systems, it is difficult to compare prevalence rates among countries. Another limitation is that we measured hand eczema only once per person. The prevalence of hand eczema could therefore have been influenced by the time of year and seasonal fluctuations. However, the recruitment of healthcare professionals was spread throughout a whole year, thereby minimizing potential seasonal influences. Finally, our study population seems to be representative of the healthcare sector in general with respect to age and gender. However, there are, of course, many other characteristics that may or may not correspond to the general population of healthcare professionals, which cannot be determined.

Implications for research and practice

The large discrepancy between people who report hand eczema and people who report symptoms related to hand eczema indicates that a more accurate instrument is needed to measure hand eczema. Also, research should focus on the comparability of results for studies on hand eczema. When studies are compared, it is important to take into account that various populations might perceive symptoms related to hand eczema in distinct ways. Therefore, it is necessary to investigate how the perceived hand eczema in various populations relates to a gold standard, such as a clinical examination. On the basis of such studies, the comparability of prevalence data could improve across populations and countries. Furthermore, in the field of dermatology, presenteeism and absenteeism are topics that have not been studied often. We advise further and more thorough study to determine whether and how hand eczema influences one's work.

Conclusion

The 1-year self-reported prevalence of hand eczema among healthcare professionals in this Dutch study was 12%, which seems low as compared with other studies. Hand eczema at a population level seems to have had little impact on absenteeism and presenteeism in our study population. However, many healthcare professionals did report symptoms related to hand eczema. This indicates that we might have underestimated the prevalence, and that we need better instruments to investigate the prevalence and consequences of hand eczema across study populations and countries.

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References

- Diepgen T L, Coenraads P J. The epidemiology of occupational contact dermatitis. *Int Arch Occup Environ Health* 1999; **72**: 496–506.
- Koch P. Occupational contact dermatitis. Recognition and management. *Am J Clin Dermatol* 2001; **2**: 353–365.
- Nicholson P J, Llewellyn D, English J S. Evidence-based guidelines for the prevention, identification and management of occupational contact dermatitis and urticaria. *Contact Dermatitis* 2010; **63**: 177–186.
- Thyssen J P, Johansen J D, Linneberg A, Menné T. The epidemiology of hand eczema in the general population – prevalence and main findings. *Contact Dermatitis* 2010; **62**: 75–87.
- Diepgen T L. Occupational skin-disease data in Europe. *Int Arch Occup Environ Health* 2003; **76**: 331–338.
- Ibler K S, Jemec G B E, Agner T. Exposures related to hand eczema: a study of healthcare workers. *Contact Dermatitis* 2012; **66**: 247–253.
- Ramsing D W, Agner T. Effect of glove occlusion on human skin (II). Long-term experimental exposure. *Contact Dermatitis* 1996; **34**: 258–262.
- Flyvholm M A, Bach B, Rose M, Jepsen K F. Self-reported hand eczema in a hospital population. *Contact Dermatitis* 2007; **57**: 110–115.
- Luk N M T, Lee H C S, Luk C K D et al. Hand eczema among Hong Kong nurses: a self-report questionnaire survey conducted in a regional hospital. *Contact Dermatitis* 2011; **65**: 329–335.

- 10 Özyazicioglu N, Sürenler S, Tanriverdi G. Hand dermatitis among paediatric nurses. *J Clin Nurs* 2009; **19**: 1597–1603.
- 11 Jungbauer F H W, Lensen G J, Groothoff J W, Coenraads P J. Handeczem in de zorgsector [Hand eczema in the healthcare sector]. *TBV* 2004; **12**: 138–142. Available at: <http://nvab.artsennet.nl/Artikel-3/Contacteczem-1.htm>. (last accessed 6 August 2012).
- 12 Groenenberg B, Senden Th. Actief beleid opsporing handeczem in het werk. Ervaringen met preventief medisch onderzoek handeczem in een universitair medisch centrum. *TBV* 2009; **17**: 349–353.
- 13 Cvetkovski R S, Rothman K J, Olsen J et al. Relation between diagnoses on severity, sick leave and loss of job among patients with occupational hand eczema. *Br J Dermatol* 2005; **152**: 93–98.
- 14 Elston D M, Ahmed D D F, Watsky K L, Schwarzenberger K. Hand dermatitis. *J Am Acad Dermatol* 2002; **47**: 291–299.
- 15 Brooks A, Hagen S E, Sathyanarayanan S, Schultz A B, Edington D W. Presenteeism: critical issues. *J Occup Environ Med* 2010; **52**: 1055–1067.
- 16 Hemp P. Presenteeism: at work – but out of it. *Harv Bus Rev* 2004; **82**: 49–58.
- 17 Koningsveld E A P, Zwinkels W S, Mossink J C M, Thie X M, Abspoel M. *Maatschappelijke Kosten van Arbeidsomstandigheden van Werknemers in 2001*. Rapport aan Ministerie van Sociale Zaken en Werkgelegenheid, Hoofddorp, 2003.
- 18 van der Meer E W C, Boot C R L, Jungbauer F H W et al. Hands4U: a multifaceted strategy to implement guideline-based recommendations to prevent hand eczema in health care workers: design of a randomised controlled trial and (cost) effectiveness evaluation. *BMC Public Health* 2011; **11**: 1–11.
- 19 Flyvholm M A, Susitaival P, Meding B. *Nordic Occupational Skin Questionnaire – NOSQ-2002 Nordiq Questionnaire for Surveying Work Related Skin Diseases on Hand and Forearms and Relevant Exposures*: Copenhagen, Nordic Council of Ministers, 2002: pp. 1–186.
- 20 Susitaival P, Flyvholm M A, Meding B. Nordic occupational skin questionnaire (NOSQ-2002): a new tool for surveying occupational skin diseases and exposure. *Contact Dermatitis* 2003; **49**: 70–76.
- 21 Jungbauer F H W, Piebenga W P, ten Berge E E et al. NVAB-richtlijn: preventie contacteczem [NVAB-guideline: prevention of contact dermatitis], 2006.
- 22 Koopmanschap M A. PRODISQ: a modular questionnaire on productivity and disease for economic evaluation studies. *Expert Rev Pharmacoecon Outcomes Res* 2005; **5**: 23–28.
- 23 Hakkaart-van Roijen L. *Manual Short Form – Health and Labour Questionnaire (SF-HLQ)*: iMTA Erasmus University, 2010.
- 24 van Roijen L, Essink-Bot M L, Koopmanschap M A, Bonsel G, Rutten F F. Labor and health status in economic evaluation of healthcare. The Health and Labor Questionnaire. *Int J Technol Assess Health Care* 1996; **12**: 405–415.
- 25 Ibler K S, Jemec G B E, Flyvholm M A, Diepgen T L, Jensen A, Agner T. Hand eczema: prevalence and risk factors of hand eczema in a population of 2274 healthcare workers. *Contact Dermatitis* 2012; **67**: 200–207.
- 26 Skudlik C, Dulon M, Wendeler D, John S M, Nienhaus A. Hand eczema in geriatric nurses in Germany – prevalence and risk factors. *Contact Dermatitis* 2009; **60**: 136–143.
- 27 Baumeister T, Uter W, Weistenhöfer W, Drexler H, Kütting B. On the lookout for precursor lesions: where does dry skin end and slight hand eczema begin? *Contact Dermatitis* 2011; **66**: 63–71.
- 28 Löffler H, Bruckner T, Diepgen T, Effendy I. Primary prevention in health care employees: a prospective intervention study with a 3-year training period. *Contact Dermatitis* 2006; **54**: 202–209.
- 29 Kuunders M M A P. *Beroepsziekten: Zijn er Verschillen Tussen Nederland en Andere Landen?*: Bilthoven, RIVM, Volksgezondheid Toekomst Verkenning, Nationaal Kompas Volksgezondheid, 2009.
- 30 Cassidy J D, Carroll L J, Coté P, Lemstra M, Berglund A, Nygren A. Effect of eliminating compensation for pain and suffering on the outcome of insurance claims for whiplash injury. *N Engl J Med* 2000; **342**: 1179–1186.
- 31 Cvetkovski R S, Zachariae R, Jensen H, Olsen J, Johansen J D, Agner T. Prognosis of occupational hand eczema. A follow-up study. *Arch Dermatol* 2006; **142**: 305–311.
- 32 Mäklönen T, Alanko K, Jolanki R et al. Long-term follow-up study of occupational hand eczema. *Br Assoc Dermatol* 2010; **163**: 999–1006.
- 33 Meding B, Wrangsjö K, Järholm B. Fifteen-year follow-up of hand eczema: persistence and consequences. *Br J Dermatol* 2004; **152**: 975–980.
- 34 Burnett C A, Lushniak B D, McCarthy W, Kaufman J. Occupational dermatitis causing days away from work in US private industry, 1993. *Am J Ind Med* 1998; **34**: 568–573.
- 35 Lau M Y Z, Burgess J A, Nixon R, Dharmage S C, Matheson M C. A review of the impact of occupational contact dermatitis on quality of life. *J Allergy* 2011; **2011**: 1–12.
- 36 Visscher M O, Wickett R R. Hand hygiene compliance and irritant dermatitis: a juxtaposition of healthcare issues. *Int J Cosmet Sci* 2012; **34**: 402–415.
- 37 Merens A, van den Brakel M, Hartgers B, Hermans B. *Emancipatiemonitor 2010 [Emancipation Monitor 2010]*: Den Haag, Sociaal en Cultureel Planbureau, 2010: pp. 1–258.
- 38 Centraal Bureau voor de Statistiek. *Werkzame beroepsbevolking: vergrijzing per bedrijfstak [Employed labour force: aging by industry]*. [Statistics Netherlands], 2012. Available at: <http://statline.cbs.nl/StatWeb/publication/?VW=T&DM=SLNL&PA=80802NED&D1=a&D2=0&D3=0&D4=0&D5=0&D6=0-1,3-6,8-12,14-17&D7=0&D8=0,2,4,6,8,12,16,20,25,29,32-33,I&HD=120307-1319&HDR=G1,G2,G3,G4,G6,T,G7&STB=G5> (last accessed 6 August 2012).
- 39 Meding B, Barregard L. Validity of self-reports of hand eczema. *Contact Dermatitis* 2001; **45**: 99–103.