Wet work in relation to occupational dermatitis
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100 Wet work in relation to occupational dermatitis
Summary

This thesis describes the nature and the quantity of work-related skin exposure in occupations where ‘wet work’ is performed. Activities that cause one or both hands to become wet, in contact with detergents or other skin irritating substances or activities that need to be done with occlusive gloves are considered to be wet work. Employment sectors with much wet work are known to have many employees with skin complaints caused or worsened by the occupational exposures. In the first chapters the occurrence of occupational dermatoses in some typical wet work occupations are described. In The Netherlands the occupational physician should recognise occupational relevant health problems, such as occupational dermatoses, and give advice on primary, secondary and tertiary prevention. Unfortunately many occupational physicians, also in industries with much wet work, are not confronted with employees with occupational dermatoses. Skin complaints lead to sick leave in a late stage of the disease, therefore occupational physicians who only focus on absenteeism will miss many of these occupational diseases.

The occupational physician will have to use other methods than absence registration to detect patients with work related skin diseases. A method enabling an occupational physician to screen employees on work related skin diseases and on a predisposition for developing such skin diseases, was studied. The findings of these assessments were translated into an advice, aimed at avoiding hand dermatitis. The efficacy of this advice in terms of reducing skin irritation was evaluated in a laboratory situation. The focus was on the health-care sector, which is one of the sectors which have a high prevalence of work-related skin complaints (from here onwards in the text the term ‘skin complaints’ will be used for current skin problems as well as skin problems in the last year).

Chapter 2
Irritant contact dermatitis is often chronic and usually originates from frequent and long-term work related exposure to wet work. Wet work is defined as exposure to water, soap, disinfectants, and occlusion caused by wearing gloves. This chapter describes the severity of irritant contact dermatitis in patients at five years following diagnosis, and to what extent their work-related exposure to skin-irritating substances has been reduced.

The irritant contact dermatitis turned out to run a chronic course, with 32% still suffering from serious skin problems after five years. The causal work-related exposure factors had not been reduced or only a little, particularly in professions with an average level of exposure to skin irritants. Employees with a profession that had a high exposure at the time of diagnosis tended to have left the profession. This appeared to be mostly women, and might be explained by a higher percentage women working in these occupationed compared to men.
Chapter 3
Chapter 3 describes a study in health-care institutions, where the prevalence of hand dermatitis is studied with a questionnaire as a screening method for early detection of hand dermatitis. The results are verified with a physical examination. This investigation is done to evaluate the questionnaire and at the same time describes the prevalence of hand dermatitis in health care institutions. In this population 25% of the employees have hand dermatitis, 14% have current symptoms. With the questionnaire 15% of the employees have atopic dermatitis, of these 26% have hand dermatitis. The physical examination confirmed 58% of the results of the questionnaire. It is concluded that the questionnaire is a useful tool for screening hand dermatitis and atopic dermatitis.

This chapter shows that the number of employees with an atopic constitution or manifest atopic dermatitis in a working population can be greater than expected on the basis of the prevalence in the general population. The findings in this chapter support the literature, which shows that among employees with a possible atopic constitution the chance of developing hand dermatitis complaints at a particular workplace is greater than in those who are not atopic. A complete assessment of the risks to the skin requires not only a quantitative and qualitative assessment of exposure risks, but also an assessment of the number of exposed atopers.

Chapter 4
In chapter 4 the prevention of skin complaints in employees in a cardboard factory is studied. In paper mills the work is predominantly wet, and employees run an increased risk of developing irritant contact dermatitis. In a cross-sectional study, the point prevalence of skin complaints was 26% for contact dermatitis and 36% for mycosis of the feet. All skin complaints could be related to the exposure to skin-irritating working conditions. In contrast to what was expected because of a healthy worker effect, the percentage of employees with atopic dermatitis in this population is not lower than in the general population. The phenomenon of a ‘healthy worker selection’, selecting employees without atopic dermatitis, is not seen here.

Chapter 5
This chapter describes a study that examines the degree of exposure to wet work by means of a questionnaire and by means of continuous observations. The results of the questionnaire are compared with the findings from the observations, whereby the continuous observation method is used as the gold standard. Exposure to wet work is correlated with the German standard for this kind of work as outlined in TRGS 531. Although the questionnaire method is by far the easier method, our results show that this is not a reliable method to measure the exposure level. A questionnaire does not give accurate information on exposure to skin irritants and skin occlusions. For wet work the duration of exposure in this
population was approximately overestimated by a factor of 2, while frequency of exposure to wet work was underestimated by about this same factor. Accurate data on exposure to skin irritants can be obtained with an observation method, albeit it is more expensive and too time-consuming for routine risk assessments. In addition it is concluded that wet work on a regular ward is characterised primarily by the frequency of the wet activities and less by the total duration of wet hands.

Chapter 6
In order to formulate a substantiated advice on adjustments at the workplace, it is essential to know which tasks and activities cause the exposure to wet work. Chapter 6 describes the tasks and activities that cause exposure to wet work in nurses.

The characteristics of wet work in nurses differ substantially depending on the ward. According to the German regulation TRGS 531 our observations classify nursing as a wet work occupation due to the frequency of the wet work exposure incidents rather than the duration. Trained observers have monitored the duration and frequency of different wet work activities in 45 randomly chosen nurses from different wards during a morning shift using a method of continuous observation based on labour-observation techniques. Wet work in Intensive Care units accounts for 24% of the overall morning shift duration with a frequency of 49 incidents. This is 16% in dialysis wards with a frequency of 30 incidents and 9% on regular wards with a frequency of 39 incidents. With our observations nursing can be classified as a wet work occupation because of the frequency of wet activities rather than the duration of wet work.

The mean duration of occlusion by gloves is short: 3.1 minutes on regular wards and 6.7 minutes in Intensive Care units. A mean duration of occlusion of about 3 minutes in nursing, on a regular ward, makes a skin-irritating effect of occlusion-induced perspiration by using gloves doubtful. The skin-protective effect of glove use by preventing exposure to water and soap may be greater than its irritating effect. Reduction in wet work exposure in nursing on regular wards should focus on the reduction of the frequency of hand-washing and patient-washing activities. It is suggested to promote the use of gloves for patient washing. Although this will increase exposure to occlusion from gloves, it may reduce the frequency of exposure to water and soap by about a quarter.

Chapter 7
Chapter 7 describes the exposure to wet work in cleaners on the basis of continuous observations. The nature of the exposure and the type of activities that cause the exposure are described.

This chapter also discusses the observed exposures in the context of the German wet work regulation TRGS 531. It is concluded that an assessment of wet work exposure on the basis of questionnaires is unreliable compared with the observation method. It is clear that an accurate assessment requires an observation method.

Both the observed cleaning work and the observed nursing work have a higher
exposure to wet work than regulated by the German TRGS 531. It is relatively easy to reduce the exposure in order to conform to the German guidelines. For nursing work, the level of exposure is primarily exceeded because of the frequency of wet work. In cleaning work, wet work exposure is largely determined by the unnecessarily long duration of wearing gloves, and the inadequate habit of wearing gloves. The observation that the exposure to wet work exceeds the standard does not automatically spell out the details of a prevention advice. Occupational health has a principal rule that the level of occupational exposure should be adjusted to the individual human exposure capacity. An effective prevention program must be based on the working methods in a particular branch of industry and on information about the activities that cause the wet work exposure.

A prevention program in the health care sector should not influence the nature and productivity of the work. It is easy to reduce the exposure to wet work in nursing by advising nurses to stop washing their hands. But, such an advice would bring the nurse in an unworkable dilemma. On implementation of the prevention advice, the activities should be the same where possible, but the manner in which they are carried out should be less taxing to the skin.

In terms of cleaning work there should be a more comprehensible explanation to the workers about the use, the need and the risk of wearing gloves must be explained better. By not using gloves for work that is unnecessarily carried out with gloves, skin irritation can be reduced. For nursing work, the exposure studies have made clear that prevention must be aimed at adapting the hand-washing procedure and that prevention must be aimed at the advice that work with water and soap should be done with gloves where possible.

Chapter 8
Chapter 8 of this thesis describes an experimental study which simulates exposure to wet work and occlusion. Experimental exposure of volunteers is used to test one of the proposed preventative measures. An effective program for the prevention of hand-dermatitis in nurses must be based on, at least experimental, evidence that the instructions lead to fewer skin irritations. The instructions must be concrete, clear and easily applicable. On the basis of the exposure studies described in Chapter 5 and 6 and on the basis of the theoretical finding that hand alcohol (ethanol 70% or isopropyl alcohol) irritates the skin less and disinfects better than water and soap, the following advice has been formulated:

1. use of hand alcohol when the hands are not visibly dirty
2. use of gloves during activities where the hands could become wet and/or dirty

In this study the effectiveness of these recommendations is investigated in a model. Mean daily wet work exposure during nursing work is modelled: ‘regular model’. Exposure to skin irritants in combination with the implementation of these recommendations is also modelled: ‘prevention model’. The hands of healthy volunteers are exposed to the regular or the prevention model during 3 weeks 5 days a week. Change in TEWL
(transepidermal water loss, as a parameter of skin damage) of the back of the hands is measured after 3 weeks exposure to these wet work simulations. The results make clear that implementation of these instructions could contribute to reducing skin irritation in nursing work. In nursing-work hand-alcohol is recommended as the preferred disinfectant. Although the prevention model implies increased occlusive exposure to gloves, this has no additional irritating effect, probably because of the absence of soap exposure.

Chapter 9, Discussion
Preventive actions to reduce occupational skin diseases need improvements on the primary, secondary as well tertiary level. In The Netherlands occupational physicians do not play an active role in the treatment of occupational dermatitis. By changing this role, and becoming more involved with the treatment the occupational physician can contribute in the struggle against this occupational disease. Screening methods for hand dermatitis and its predisposition (especially atopic dermatitis), can help the occupational physician to detect the affected workers and those who have an increased risk to become affected. The two step method described in this thesis can help to increase awareness of work related skin diseases from both the worker and his occupational physician. In order to give effective advice on the management and reduction of these skin complaints the occupational physician must have an understanding of the pathophysiology and etiology of occupational skin diseases. For a good understanding of these diseases the occupational physician must regularly see patients with dermatitis. In the Netherlands this leads to a vicious cycle: many occupational physicians are not confronted with occupational skin disease; while many workers do not seek their advice because occupational physicians are not experienced on this topic. Because of this lack of experience Dutch occupational physicians do not recognise the risks for occupational dermatitis at the work place and they therefore do not detect workers with skin diseases. Occupational contact dermatitis is a widespread disease. A screening method for occupational skin diseases could break this cycle by detecting the right patient for further consultation at physician’s occupational clinic. In occupations (such as nursing and operating a paper mill) that are classified as a risk occupation according to the German regulations, screening for occupational skin diseases should be a regular activity. Prevention of occupational skin disease means reduction of wet work exposure. The characteristics of wet work are diverse and lead to different kinds of occupational skin diseases. Because of the diverse characteristics of wet work exposure an effective prevention program needs to be tailor made and based on accurate assessments of these exposures in the different occupations. Assessments with an observation method are more accurate compared to a questionnaire method, but also more difficult to implement. We recommend that measures to reduce wet work exposure are based on observation studies. Using the German regulations on wet work (TRGS 531) in The Netherlands can be useful in evaluating the exposure levels that are described by such observations.
Based on observation studies and an experimental study two additional measures for reducing exposure to skin irritants in nursing are postulated:

- Use a hand alcohol in stead of water and soap in disinfection procedures, when the hands are not visibly dirty;
- Use of gloves in wet activities such as patient washing, to prevent hands to become wet and visibly dirty.

This thesis shows that Semmelweis’ insight about the need for hand hygiene in heath care did bring about a spectacular progress of medical science, but that it does have a drawback when it is not applied judiciously.