

Exposure of the hands to wet work in nurses

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Prevention of hand dermatitis among nurses can be achieved by reduction of wet-work exposure. A preventive programme should be based on knowledge of exposure levels. An accurate method to assess such exposure levels is needed. Duration and frequency of wet-work activities were assessed by a questionnaire, in various parts of the health care sector. In addition, a randomly chosen sample from this population was observed for the duration and frequency of wet work. In contrast to the questionnaire, the observation method showed less than half the duration of wet work. Observation detected almost double the frequency that was reported with the questionnaire. Gloves were observed to be used daily in special care units for short time periods. A questionnaire does not accurately assess the quantity of wet-work activities. On regular wards, the exposure to irritants is mainly associated with the frequency of wet hands, rather than the duration of wet hands. We assume that the short-term use of gloves on special care units does not cause an increased risk of hand dermatitis. Preventive programmes can focus on decreasing the frequency of wet hands by encouraging the use of gloves; the use of gloves should not only be advised to prevent infections but also to protect against hand dermatitis.

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Hospital work can endanger the skin of the hands in many ways. Besides the factor 'wet work', other risk factors are widely present in the occupational environment of hospital workers (1–16). Risk factors for hand dermatitis can be divided into:

- irritant factors: exposure to weak skin toxins, i.e. water and detergents
- allergic factors: exposure and sensitization to various allergens such as natural rubber latex
- endogenous factors, of which atopic disease is the most common.

'Wet' hospital work is known to increase the odds of developing hand dermatitis twofold compared to dry office work (12). The wet work risk factor significantly causes work-related health problems in the exposed population. Epidemiological studies among hospital workers report that the prevalence of hand dermatitis varies widely. Our team found that 57% of over 800 hospital/nursing home workers had an increased risk of developing hand dermatitis. Increased risk was defined

as a history of hand dermatitis and/or signs of atopic skin disease. In 15% of this population, there were signs of active hand dermatitis. A Finnish study found 44% in 617 hospital workers (7). From insurance compensation studies in North Bavaria, we know that the incidence rate for severe hand dermatitis (i.e. severe enough for disability compensation) in health care workers is 7.3 per 10 000 per year (17). Differences in determining factors such as gender, exposure and assessment methods cause these wide variations.

Although wet work causes occupational skin problems, many countries do not have regulations on wet-work exposure. Germany has guidelines on wet-work exposure; the Technische Regeln für Gefahrstoffe 531 regulates the duration of wet work. Work with more than 25% of the activities that cause the hands to become wet (more than 2 h and/or frequent; more than 20× in an 8-h shift) is considered as an occupation with a risk of hand dermatitis. For these occupations, a specific prevention programme should be in place.

Unlike the risk from exposure to allergens, the risk from irritants depends more upon the quantity

than the quality of exposure. Therefore, an accurate assessment of the quantity of exposure to irritants is important, for which several methods can be used. The most familiar way to assess the amount of wet work is by asking the exposed employees by means of a questionnaire. Little data on irritant exposure from questionnaires have been published (18). The accuracy of questionnaires for exposure measurements has not been assessed. An effective preventive programme that aims to reduce the burden of wet work should be based on knowledge of activities and workplaces that cause the highest level of exposure. We aimed to assess the amount of wet work in nursing activities and to evaluate different methods of assessment of that exposure level.

Materials and Methods

We define wet work as all occupational activities:

- (1) that cause the skin of one or both hands to be in contact with water or watery soap solutions
- (2) that involve wearing protective gloves over a prolonged period of time, causing the hand to become moist from perspiration.

In this study, we assessed the duration and frequency of wet hands and of using protective gloves with a questionnaire and an observation method.

Questionnaire

We developed a questionnaire to assess the duration and frequency of skin irritant exposure in nursing. The questionnaire distinguished different shifts, because nurses reported that morning shifts had the highest amount of wet work, compared to evening and night shifts.

Observation

To assess the accuracy of the questionnaire, we needed a method to measure the exposure to wet work and the wearing of occlusive gloves as accurately as possible in order to use this method as a gold standard. We used a method based on work observation techniques developed by the IMAG institute: This is a time-study method developed by Barnes (19) and adjusted for efficiency studies in agriculture by Hendrix (4). Time studies can be done by continuous observation or by interval observations. Although an interval study is far less time consuming, we decided to use continuous observation because this method is more accurate, especially in situations with a wide variety of activities like nursing. We trained 9 observers in reliably using this time-study method. For the observation, we developed a

list of nursing activities and skin exposures to irritants, in accordance with the instructions made by Hendrix (20). For our purpose, we could use the basic principles and definitions of these instructions.

With this observation method, we assessed the duration and frequency of wet work in a sample of 53 randomly chosen nurses during 112 different morning shifts. Nurses with active medical restrictions that interfered with their work, such as a history of atopic dermatitis, were excluded. Nurses with less than 1-year experience in their jobs were also excluded from the observations.

We divided the various nursing wards into 3 groups, because of the expected different kind of job activities and exposure to wet work:

- (1) nursing homes
- (2) regular hospital wards
- (3) special care units, subdivided into:
 - renal dialysis ward
 - intensive care unit.

Results

Frequency of wet work (Figs 1 and 2)

The frequency of wet hands was estimated to be highest in nursing homes and intensive care units: on average $20\times$ per morning shift. On other wards, this varied between 12 and $14\times$.

During our observations, work in nursing homes caused wet hands on average more than

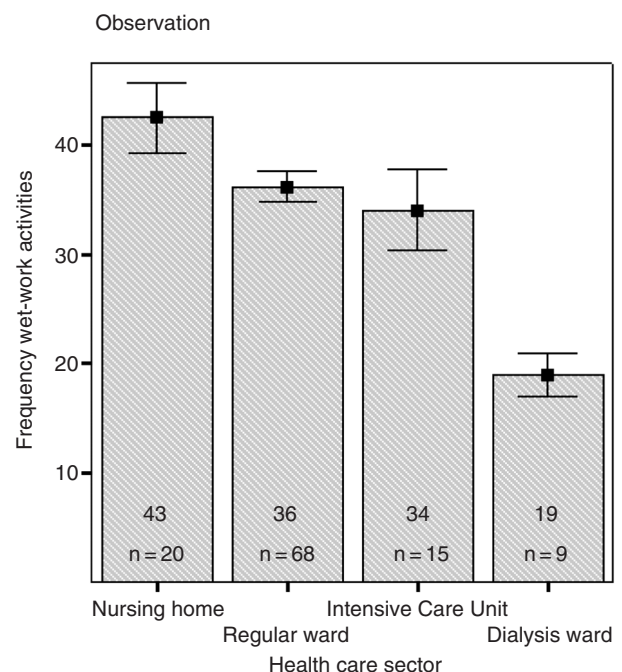


Fig. 1. Frequency of wet-work activities with observation.

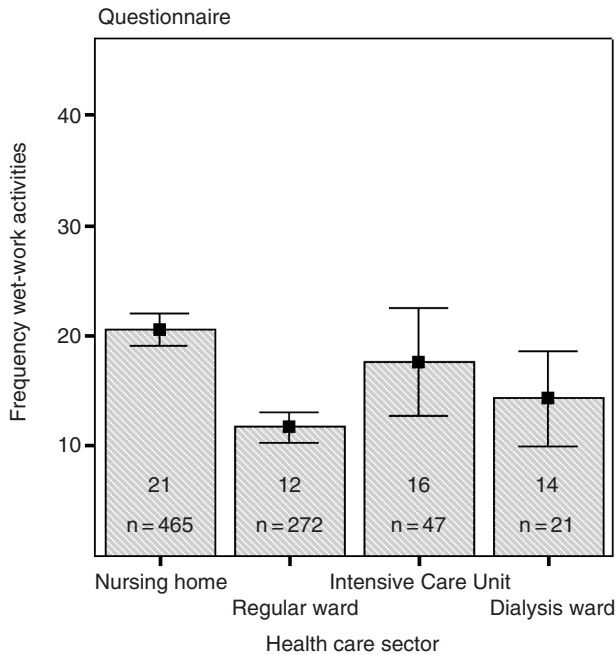


Fig. 2. Frequency of wet-work activities with questionnaire.

40 $\times$, on regular wards about 35 $\times$. The mean frequency of wet hands was lowest on renal dialysis wards, with less than 20 $\times$ during a morning shift.

Duration of wet work (Figs 3 and 4)

Nurses working in a nursing home facility estimated the duration of wet work to be on

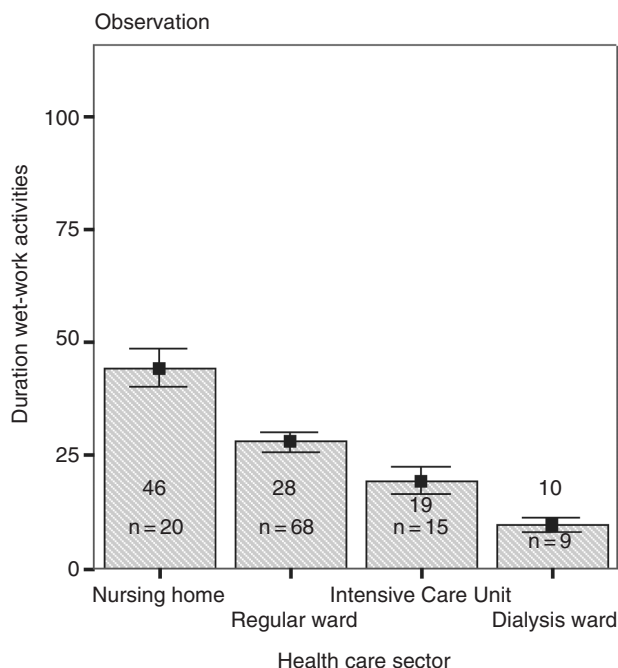


Fig. 3. Duration of wet-work activities with observation.

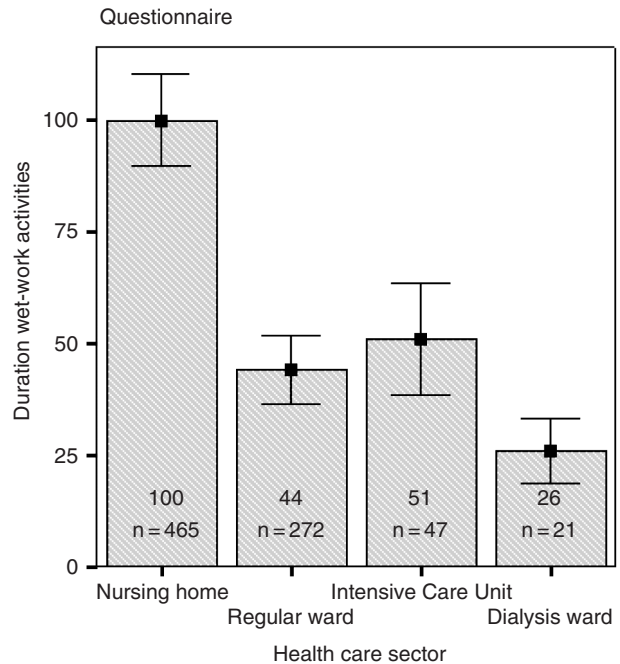


Fig. 4. Duration of wet-work activities with questionnaire.

average 100 min during a morning shift. This is more than double the duration estimated by nurses on regular wards in a hospital. Nurses on special care units estimated the duration of wet hands from 26 min on a renal dialysis ward to almost 1 h on an intensive care unit.

The observation method found the longest mean duration of wet work to be in nursing homes: almost 45 min. The mean duration of wet hands was shortest for nurses on a renal dialysis ward: we recorded on average less than 10 min during their morning shifts.

Duration and frequency of use of gloves (Figs 5 and 6)

On questions about duration and frequency of glove use, the nurses showed a poor response. Only the frequency of glove use by nurses in nursing homes and regular wards could reliably be estimated by the questionnaire method. In the other departments, the response was too low and the standard deviation too large to report any reliable data (Fig. 5). In nursing homes (mean of 0.3 $\times$ during morning shift) and regular wards (mean of 0.6 $\times$ during morning shift), gloves are used about once every 2 days or less.

During the observation, we saw gloves being used more frequently and for longer periods in special care units, compared to nursing homes and regular wards in hospitals: in nursing homes, a mean of 2 $\times$ a day with, on average, a total duration of 5 min. This implies a duration of

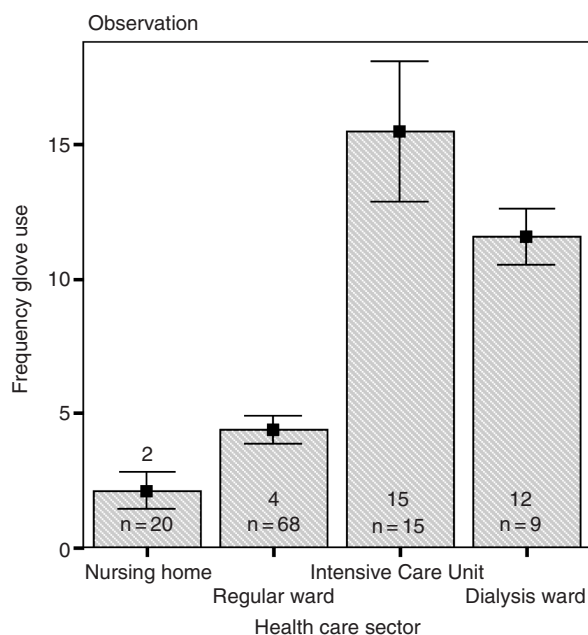


Fig. 5. Frequency of glove use with observation.

only 2–3 min each time that gloves are used. The total duration of glove use on intensive care units is almost 1.5 h, with a mean frequency of 15 $\times$ per morning shift. On intensive care units, gloves are used with a mean duration of 6 min each time that they are used.

Discussion

Nursing activities carry a risk of developing hand dermatitis from exposure to irritants such as skin

contact with water and detergents and prolonged use of occlusive gloves. This study shows that these exposures vary in different parts of the health care sector. In nursing homes and on the regular wards of a hospital, the frequency of wet work is the most important factor, while on special care units the wearing of gloves is more prominent.

According to German legislation, nursing would require special regulation because of the frequency of wet hands. On intensive care units, the combination of wearing gloves (88 min) and having wet hands (19 min) comes close to the German limit of 2 h.

On all the wards, wearing gloves was on average less than 6 min each time that they were used. In nursing homes and on regular wards, gloves are used for shorter periods and less frequently than in special care units. We assume that perspiration inside the glove is normally not a major problem for the first 10 min but that it can reduce the frequency of wet-hand incidents.

In Malten's (21) working hypothesis, the pathogenesis of irritant contact dermatitis is based on the frequency of irritating events. Dermatitis occurs when the sequence of events that irritate the skin rises above a certain frequency for a certain period of time (9, 21). The risk of hand dermatitis from wet work might be related to the frequency of wetting-and-drying cycles, rather than the total duration of wet work.

Although prolonged occlusion can be a risk factor for hand dermatitis, our data suggest that the use of gloves in the health care sector should be promoted. It seems that gloves are mainly used for infection prevention, while they should also be used as personal protection against developing irritant contact dermatitis. Decreasing the frequency of wet hands by the short-term use of protective gloves would significantly lower the burden to the skin.

We used 2 methods to evaluate the degree of exposure to skin irritants in nursing activities. The questionnaire method is by far the easier method, though 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 the 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.

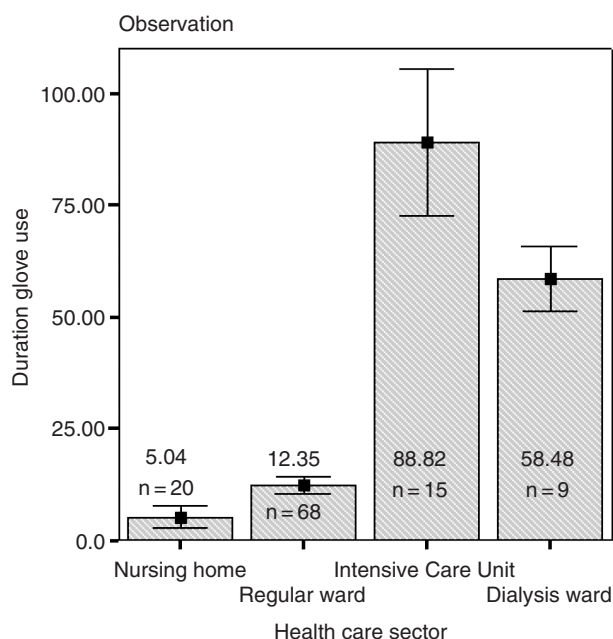


Fig. 6. Duration of glove use with observation.

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