



ORIGINAL ARTICLE

Management of occupational dermatitis in healthcare workers: a systematic review

J Smedley, S Williams, P Peel, K Pedersen, on behalf of the Dermatitis Guideline Development Group

Health and Work Development Unit, Royal College of Physicians, London, UK

Correspondence to

Dr Julia Smedley, c/o Health and Work Development Unit, Royal College of Physicians, 11 St Andrews Place, London NW1 4LE, UK; hwdu@rcplondon.ac.uk

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ABSTRACT

Objectives This systematic review informed evidence-based guidelines for the management of occupational dermatitis, with a particular focus on healthcare workers.

Methods A multidisciplinary guideline group formulated questions about the management of healthcare workers with dermatitis. Keywords derived from these questions were used in literature searches. We appraised papers and developed recommendations using the Scottish Intercollegiate Guideline Network (SIGN) methodology.

Results Literature searches identified 1677 papers; 11 met the quality standard (SIGN grading ++ or +). A small body of evidence indicated that dermatitis is more likely to be colonised with micro-organisms than normal skin, but there was insufficient evidence about the risk of transmission to patients. There was limited evidence that using alcohol gel for hand decontamination is less damaging to skin than antiseptics or soap. A small body of evidence showed that conditioning creams improve dermatitis, but are not more effective than their inactive vehicle. A small inconsistent body of evidence showed that workplace skin care programmes improve dermatitis.

Conclusions Healthcare workers should seek early treatment for dermatitis and should be advised about the risk of bacterial colonisation. Work adjustments should be considered for those with severe or acute dermatitis who work with patients at high risk of hospital-acquired infection. Healthcare workers with dermatitis should follow skin care programmes, and use alcohol gel where appropriate for hand decontamination. Further research should explore whether healthcare workers with dermatitis are more likely to transmit infection to their patients, and whether health surveillance is effective at reducing dermatitis.

BACKGROUND

Occupational contact dermatitis is the most common occupational skin disease in developed countries, and is associated with significant impact on quality of life and work loss.^{1–8} It is particularly common among healthcare workers, who are exposed to known occupational risk factors including frequent hand washing, exposure to detergents and prolonged glove wearing.

We identified the management of dermatitis as a priority area for the development of evidence-based guidelines that aim to improve the quality and consistency of practice among occupational health (OH) providers in the UK National Health Service. Other published reviews and guidelines

What this paper adds

- ▶ Our review informs an evidence-based guideline on the management of occupational dermatitis, focusing on infection risk and workplace skin care programmes in healthcare.
- ▶ We found limited good quality evidence to support the early treatment of occupational dermatitis in healthcare workers with restrictions for acutely or severely affected staff on work with patients who are vulnerable to hospital-acquired infection.
- ▶ Research is needed into nosocomial transmission of infection from healthcare workers with dermatitis.
- ▶ We found limited good quality evidence to support the use of skin care programmes in the workplace to manage existing dermatitis.
- ▶ There are no published high quality studies on the effectiveness of periodic health surveillance for occupational dermatitis; this is an area for further research.

cover broader aspects of occupational dermatitis including epidemiology, primary prevention, prognosis⁹ and clinical treatment.¹⁰ The main focus of our literature review was the management of employees who present in the healthcare workplace with dermatitis. The subsequent recommendations relate to infection control issues and fitness for work in healthcare, and to interventions in the healthcare setting.

Of particular interest in our literature review was the risk of skin colonisation/infection in healthcare workers with dermatitis, and the likelihood of subsequent transmission of infection to patients. It is not clear whether and to what extent healthcare workers with dermatitis are more likely to acquire organisms than individuals with dermatitis who do not work in healthcare, whether they are more likely than healthcare workers with normal skin to transmit infection to patients, and (if so) how much greater the risk to patients might be. This information would be important in guiding OH practice, including the appropriate counselling and placement of healthcare workers with dermatitis. A second focus was interventions that aim to mitigate the harmful effects of wet work, irritants and sensitising agents. These include the use of conditioning creams (emollients, barrier or pre-work

creams), good hand care and hygiene practices, and educational programmes. At present, it is not clear whether they are important in managing employees who have existing dermatitis under the conditions that prevail in real workplaces. The final area of interest related to regular health surveillance that must, under UK health and safety law, be carried out for workers who are at risk of dermatitis.

METHODS

The work was carried out by a multi-disciplinary guideline development group (GDG), comprising OH professionals, a dermatologist, general practitioners and representatives for patients, employers, employees and the Health and Safety Executive (a UK enforcing agency).

An initial scoping literature search identified existing reviews or guidelines on occupational contact dermatitis. The GDG generated questions relevant to a model care pathway for a worker with dermatitis, and re-phrased them using the PICO format: population (P), intervention (I), comparison (C) and outcome (O).¹¹ We adapted PICO for observational studies, substituting exposure (E) for intervention (I).

The full search strategy (see full guideline)¹² included published literature in MEDLINE (1950 to 21 August 2008), Embase (1980 to 2008), Cinahl (1981 to 21 August 2008) and The Cochrane Library. The search was limited to human subjects and English language papers.

JS, the GDG leader, reviewed all the titles and abstracts identified from the literature search, accepting or rejecting them for full review based on pre-determined inclusion criteria. Included papers were distributed to pairs of reviewers from the GDG for independent critical appraisal, based on the Scottish Intercollegiate Guidelines Network (SIGN) methodology¹³ and methodology for the development of NHS Plus evidence-based guidelines.¹⁴ Any follow-on papers listed in the references were retrieved. Pairs of trained appraisers assessed the papers independently, compared scores and agreed a consensus. Some papers did not meet the minimum quality standard and were excluded after full appraisal.

Data extracted from the full articles comprised study design, population and methodology, main results, SIGN grading, and relevance to key questions. Draft recommendations were discussed and revised by the GDG, and assigned a SIGN grading. Papers with a high risk of bias or confounding (SIGN –) were not included in the evidence tables. Papers that were non-analytical studies or expert opinion (SIGN 3 or 4) were only used as a basis for a recommendation where there was a lack of stronger evidence.

RESULTS

Figure 1 summarises the outcome of the literature review; 1677 abstracts were identified from the initial search, and 11 papers formed the basis for guideline recommendations on the five key questions.

Question 1. What are the risks of skin colonisation or active skin infection in workers with existing dermatitis?

Eight out of 388 identified papers were suitable for full appraisal; three met the quality criteria.

Only one¹⁵ (a small prospective cohort study, rated ++) was in a population of healthcare workers. It explored the prevalence of colonisation of dermatitis and included a comparison group. Nurses with skin damage on their hands had a higher prevalence of isolation of organisms and a higher number of colonising species than nurses whose hands were undamaged. However,

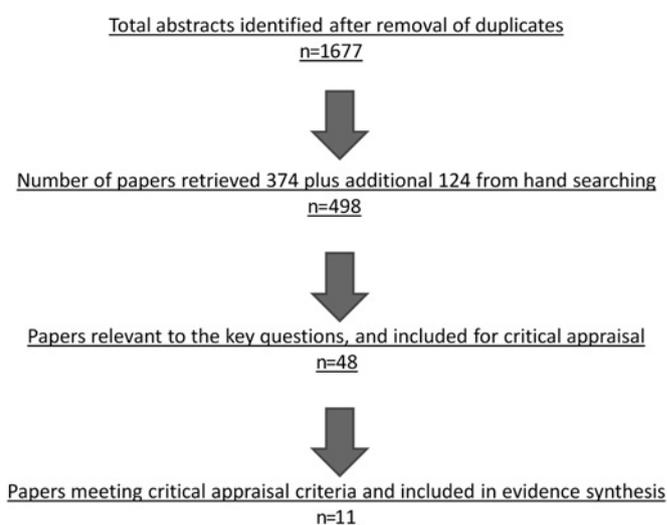


Figure 1 Flow chart showing selection of papers.

there was no significant difference in the density of colonisation, mean number of species isolated or the rate of colonisation with *Staphylococcus aureus* between the two groups. The effect sizes were small to moderately high.

The two other studies (rated +) were not in occupational groups^{16 17} and offered only indirect evidence on key question 1. Both were randomised controlled trials (RCTs) in out-patient populations (one in a paediatric clinic) that included data on bacterial colonisation rates in dermatitis. They showed that the frequency and density of colonisation with *S aureus* were significantly higher in skin affected by dermatitis than in non-lesional skin. Effect sizes were small to moderate. One patient-based study explored the association with chronicity and severity of skin lesions. The rate of colonisation with *S aureus* was highest in acute dermatitis, with prevalence decreasing through subacute to chronic. This finding was statistically significant. There was no convincing gradient for colonisation with all organisms nor chronicity of lesions. Although there was a positive correlation between colonisation density with *S aureus* and severity of lesions, statistical significance was not described.

Question 2. What is the risk that a worker with hand dermatitis will transmit infection to others in the workplace?

Because of a lack of evidence for question 2, the literature search included case reports and case series. Only three informative papers were identified. All were investigations of outbreaks of infection in patients and in two of the three outbreaks transmission was linked to healthcare workers with dermatitis.^{18–20}

Question 3. Does attention to good hand care (eg, various combinations of careful hand washing and drying, the regular application of conditioning creams) improve the prognosis of occupational dermatitis in workers, and are there important differences in the effectiveness of different hand care methods?

Because of a focus on studies in the workplace, we excluded experimental studies in laboratory settings. Thirty-two among 611 identified papers were included for full appraisal; eight met the quality criteria. Among these were four reviews (including two systematic reviews), one controlled intervention study and three randomised trials.

Two small double-blind RCTs^{21 22} and two systematic reviews^{23 24} addressed the use of creams/lotions to condition the skin. The RCTs compared barrier cream with its vehicle, but neither study had a negative (no treatment) arm. Clinical

indicators (self- and observer-assessed skin condition) improved after the intervention in the skin cream group, although bioengineering variables (transepidermal water loss (TEWL), skin colour and skin hydration) were unchanged. However, there were no significant differences between the barrier cream group and those who used vehicle alone.

One non-systematic and one systematic review^{25 26} addressed the impact of different methods of hand cleansing on skin condition. Although the main focus of both was the efficacy of hand cleansing techniques in achieving decontamination, some information about the effect on skin condition was included. Only one of the reviews²⁶ reported an attempt to assess the quality of studies that were included. The reviews were consistent in concluding that alcohol-based hand rubs cause less hand dryness and irritation than traditional antiseptic hand-wash preparations and soap, but it is likely that the findings have been derived from experimental models, in the setting of primary prevention or from relatively poor quality research.

Two original papers^{27 28} and one high quality systematic review²⁴ explored the efficacy of skin care programmes in the workplace on employees with dermatitis. The interventions included education about glove use, hand washing, use of hand disinfectants and moisturisers. One study reported no significant difference in the clinical outcomes (self-reported skin symptoms and objective examination) between intervention and control groups after the intervention. TEWL increased in both groups when subjects were undertaking practical training on hospital wards, but the increase was only statistically significant in the control group. The second study found no difference between the intervention and control groups after the intervention for self-reported symptoms, but objective clinical assessment showed a significant reduction in skin problems in the intervention compared to the control group.

Question 4. How effective is health surveillance in ensuring the early presentation of occupational dermatitis?

Question 5. Are there any important differences in effectiveness between symptom questionnaires that are commonly used for health surveillance and skin inspection by a competent person?

Among 317 identified papers, none assessed the efficacy of periodic health surveillance in the early identification of cases of occupational dermatitis. A few papers explored the repeatability and validity of questionnaires or examination as research tools, but none explored their use in workplace programmes.

DISCUSSION

Despite a lack of good quality evidence to address the key questions, useful guidance could be drawn for the management of dermatitis in the workplace. There is a very small and broadly consistent body of evidence suggesting an increased risk of bacterial colonisation of skin affected by dermatitis. Although the risk of transmission to patients has not been quantified, it seems reasonable to advocate, as a matter of good practice, the early and aggressive management of dermatitis and restrictions on work with patients who are particularly susceptible to infection. This approach would achieve a reasonable balance of risk reduction for both the healthcare worker and patients.

There is a very small body of consistent evidence that good hand care, including educational programmes and use of conditioning creams, improves skin condition in employees with dermatitis. We found limited evidence that alcohol-based rubs are less damaging to the skin of users than traditional antiseptic hand-wash agents or soap. We conclude that good hand care in employees with dermatitis should comprise education, careful washing and drying, use of conditioning creams and use of

alcohol hand rubs to limit full hand washing where the hands are not visibly contaminated.

SIGN methodology has strengths and limitations. One strength is that only papers that meet the quality standards of pre-publication peer review are considered. However, as studies with positive results are often published preferentially, this would tend to give an inflated impression of the consistency of the evidence (publication bias). We have been realistic about the small body of evidence and it is unlikely that our recommendations are seriously biased by the lack of grey literature. One limitation is that the SIGN quality score is not structured, making it difficult to demonstrate consistency of scoring between appraisers. Moreover, there was no specific SIGN pro forma for assessing either non-randomised trials or cross-sectional studies. Therefore, we trained appraisers to consider bias and confounding explicitly, including whether any important effect on the findings was inflationary or to the null. A further problem is the historical development of the SIGN method for the assessment of clinical interventions. The resulting emphasis on RCTs is not well suited to the OH literature, which typically comprises observational studies.

The most important limitation of this review was the small volume of high quality literature that we identified. This is reflected in the low grading of some recommendations (level D or good practice points) and in the cautious phrasing of recommendations that advise career-threatening restrictions for healthcare workers with dermatitis.

RECOMMENDATIONS

The GDG recommended that:

- ▶ Healthcare workers should be advised that areas of skin affected by dermatitis are more likely to be colonised with bacteria, and the risk is higher with acute and severe lesions. Therefore, they should seek early treatment to minimise skin symptoms. They also should be counselled that, because of a lack of direct evidence, it is not clear whether healthcare workers with dermatitis (on their hands or elsewhere) are more likely to transmit infection (eg, MRSA) to patients than healthcare workers who do not have dermatitis. (SIGN grade D and good practice points)
- ▶ Clinicians should consider advising adjustments to work or redeployment for healthcare workers with severe or acute dermatitis (anywhere on the body including the hands, forearm, face and scalp), aimed at temporarily restricting clinical work with patients who are at high risk from hospital-acquired infection (eg, high dependency patients, neonates, immuno-compromised patients, or patients during surgical procedures or in the post-operative period). Adjustments can be reversed when skin lesions are no longer severe or acute. Clinicians should consider allowing healthcare workers with dermatitis, that is mild and either chronic or recurrent, to continue with clinical work provided that they are able to follow the normal infection control requirements including hand hygiene and glove wearing, they have not been implicated in a case of transmission of infection from colonised or infected dermatitis lesions to a patient, and the dermatitis does not deteriorate as a result of clinical work. (Good practice points)
- ▶ Workers with existing dermatitis should use conditioning creams at work, and (in general) use alcohol rubs where appropriate (when the hands are not visibly dirty or contaminated with proteinaceous material and are not visibly soiled with blood or other body fluids) as a substitute for full hand washing as part of good hand hygiene. Those

who experience discomfort from hand decontamination should be assessed individually, preferably by an OH professional. (SIGN grade B, good practice points)

- ▶ Skin care programmes including education and advice about dermatitis, about good hand washing and drying techniques, about glove use and about the use of conditioning creams, should be provided for workers with existing dermatitis as well as for those who have no skin lesions. (SIGN grade D)

Because of a severe lack of evidence we were unable to make recommendations about the risk of transmission of infection from dermatitis, or about workplace health surveillance. To address this the GDG recommended priorities for research:

- ▶ prospective studies in workplace settings to assess the long-term effectiveness of multi-factorial skin care programmes, using standardised clinical outcomes (objective assessment of skin condition by an observer who is blind to the intervention status) and an appropriate control group
- ▶ prospective studies to compare the effectiveness of both periodic questionnaire-based and questionnaire plus examination-based health surveillance programmes against reactive self-report in the early detection of occupational dermatitis
- ▶ studies to compare the risk of transmission of infection to patients from healthcare workers with dermatitis compared to healthcare workers who do not have dermatitis
- ▶ studies of the prevalence of colonisation or infection in healthcare workers with dermatitis compared to workers with dermatitis in other occupations.

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