

Dermatitis

Occupational
aspects of
management

A national guideline



Royal College
of Physicians
Setting higher medical standards

fom
Faculty of Occupational Medicine

NHS
Plus

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NHS Plus

The NHS Plus Project aims to improve the quality and delivery of occupational health services to NHS staff and in turn increase the availability of NHS Plus services to small and medium employers. In addition to commissioning the Occupational Health Clinical Effectiveness Unit to produce evidence-based guidelines and conduct national audits, the Project has work strands to improve the delivery of services, provide an improved trading model and improve the strategic leadership of occupational health services in the NHS.

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- access for everyone to advice from a competent occupational physician as part of comprehensive occupational health and safety services.

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Executive summary

The purpose of this guideline is to offer evidence-based advice on the management of dermatitis in the workplace. The document is intended to be of use to employers, employees, occupational health and other health professionals. The scope covers various aspects of the occupational health management of existing cases of dermatitis, including advice on the risk of bacterial colonisation and transmission of infection from skin lesions, interventions to improve condition of the skin, and workplace-based health surveillance for the early detection of symptoms and signs. The main focus of this work is dermatitis in healthcare workers, so most of the recommendations and good practice points are quite specific to the healthcare setting. The accompanying leaflets are aimed specifically at managing dermatitis in healthcare workers. However, some of the recommendations are more general, and are applicable across a wide range of industries.

The overall production of the guideline was overseen by a Steering Group. A separate multidisciplinary Guideline Development Group (GDG) undertook the key stages of critical appraisal and synthesis of a body of published evidence that was identified by a systematic literature search, and the subsequent drafting of a series of recommendations. Five key questions were identified by the GDG at the outset, and defined according to a standard format that made explicit the target population, exposures, comparison groups and outcomes of interest. The standard methodology of the Scottish Intercollegiate Guideline Network (SIGN) was applied in the critical appraisal phase of the guideline development process.

In total, the literature search identified 1677 papers. After two rounds of sifting, based initially on title plus abstract and subsequently full manuscript, 48 papers were included for critical appraisal. After rejecting papers that did not meet the minimum quality standard (SIGN grading of + or ++), 11 papers remained.

For questions that addressed the risk of bacterial colonisation of dermatitis (in healthcare workers specifically), and interventions for managing dermatitis in a workplace setting, a small body of good-quality evidence was identified, appraised and synthesised. The evidence was sufficient to make graded recommendations to advise healthcare workers of an increased risk of colonisation of skin affected by dermatitis, and to support the use of workplace interventions including skin care programmes (eg education about good hand care, good hand-washing techniques, limiting glove use and use of conditioning creams), the use of alcohol rub by healthcare workers as a substitute for full hand washing where appropriate, and the provision of conditioning creams in the workplace. Although based on studies in healthcare settings, the recommendations for workplace interventions (with the exception of using alcohol hand rubs) are intended to be useful for occupations outside healthcare.

For three of the five key questions (one about the risk of transmitting organisms from colonised hand dermatitis to patients in a healthcare setting, and two about the effectiveness of health surveillance) no useful papers were identified. We were not able to generate graded evidence-based recommendations for occupational health practice for these questions, but instead recommended good practice points about the early clinical management of dermatitis and adjustments to work in healthcare. These good practice points were based on further evidence from case reports, consensus within the Guideline Development Group and opinions from experts in microbiology and infection control.

Dermatitis: occupational aspects of management

Because of the paucity of high-quality published evidence to address our key questions, we also made a number of research recommendations. These aim to build an evidence base for the future assessment of the risk of infection in, and nosocomial transmission from, healthcare workers who have dermatitis, and for controlled trials of occupational health interventions for dermatitis in workplace settings.

Glossary

Allergen An environmental substance that can produce an immunological reaction in the body, which may be associated with allergic symptoms. Common skin allergens include fragrances, rubber chemicals and preservatives.

Anti-microbial resistance The result of microbes changing in ways that reduce or eliminate the effectiveness of drugs, chemicals or other agents to prevent infections.

Bias An effect at any stage of an investigation that tends to cause results to depart systematically from the true values. Examples include observer bias due to differences among observers recording study results, and selection bias, where systematic differences occur between selection of cases and controls.

Bioengineering measure Measurements indicative of skin integrity. These include skin electrical impedance, trans-epidermal water loss and chromametry.

Cohort study Cohort studies compare a group of people who are exposed to a risk factor (or factors) of interest with a comparison group who are not exposed. The comparison group may be the general population from which the cohort is drawn, or a group who must be similar to the study cohort except for the exposure of interest. Alternatively, subgroups within the study cohort who have different levels of exposure may be compared with each other. Study and comparison cohorts are followed through time to identify an outcome (eg a disease) of interest.

Colonisation The invasion of a new habitat by a new microbial species. The presence and multiplication of microorganisms without tissue invasion or damage.

Confidence interval A confidence interval is a way of expressing the uncertainty or imprecision of a study result. A 95% confidence interval is a range of values for which there is a 95% chance that the interval includes the true population value.

Confounder A confounding factor is a variable which is associated with the risk factor under investigation and which independently determines the risk of the disease that is being studied.

Contact dermatitis Inflammation of the skin that results from contact of an external substance with the skin. This can occur through one of two mechanisms: irritation or allergy.

Control In a case control study, a control is a person in a comparison group that differs only in their experience of the disease in question. If matched controls are used they are selected so that they are similar to the study group, or cases, in specific characteristics (eg age, sex, weight). In a randomised controlled trial the control group differs from the study group only by the treatment or intervention that is being tested.

Critical appraisal The process of systematically examining research evidence to assess its validity, results, quality and relevance before using it to inform a decision.

Cross-sectional study A research method that involves observation of outcomes of interest and their risk factors in a population either at the same point in time or over a short period of time.

Dermatitis An inflammatory condition of the skin synonymous with eczema.

Double blinding Blinding is a method used to prevent research outcomes from being influenced by bias in the observer or the subject. It is particularly important where outcomes are subjective, and might be influenced by knowledge of exposure or treatment status. In a double-blind experiment, neither the individuals nor the researchers know who belongs to the control group and the experimental group. Random assignment of the subject to the experimental or control group is a critical part of double-blind research design in randomised controlled trials. The key that identifies the subjects and which group they belonged to is kept by a third party and not given to the researchers until the study is over.

Engineering control The design of plant or equipment to prevent exposure.

Epidermis The outermost layer of the skin, made up of an outer dead, cornified part and deeper living, cellular part.

Evidence-based medicine The process of practising medicine based on a combination of the best available research evidence, our clinical expertise and patient values.

Health surveillance Can be defined in various ways. In the context of this guideline it is a strategy or method to detect and assess systematically the adverse effects of work or workplace exposures on the health of workers.

Lipid Any of the structurally diverse group of organic compounds that are insoluble in water but soluble in alcohol, chloroform, ether and other solvents. Types of lipids include cholesterol, fatty acids, phospholipids and triglycerides.

Observational study Observational studies draw inferences about the effect of a treatment or intervention on subjects, where the assignment of subjects into a treated group versus a control group is outside the control of the investigator. This is in contrast with controlled experiments, such as randomised controlled trials, where each subject is randomly assigned to a treated group or a control group before the start of the treatment.

Penetration rates The flow of liquids through gloves and protective clothing materials. Standard penetration test methods are used, eg in quality control testing.

Permeation rates The rate at which chemicals are adsorbed onto a material and then diffuse through the material being desorbed on the opposing surface.

Positive/negative correlation Positive correlation involves two or more variables that depend on each other. For instance, if one variable increases the other variable increases, if one variable decreases the other variable decreases. In a negative correlation, as the values of one of the variables increase, the values of the second variable decrease. Likewise, as the value of one of the variables decreases, the value of the other variable increases.

Prevalence The number of all new and old cases of a disease or occurrences of an event during a particular period. Prevalence is expressed as a ratio in which the number of events is the numerator and population at risk is the denominator.

Primary/secondary/tertiary prevention In medicine, prevention is any activity that reduces the burden of mortality or morbidity from disease. This takes place at primary, secondary and tertiary prevention levels.

1. Primary prevention avoids the development of a disease. Most population-based health promotion activities are primary preventive measures.

2. Secondary prevention activities are aimed at early disease detection, thereby increasing opportunities for interventions to prevent progression of the disease and emergence of symptoms.
3. Tertiary prevention reduces the negative impact of an already established disease by restoring function and reducing disease-related complications.

Prognosis A medical term denoting the doctor's prediction of how a patient's disease is likely to progress, and whether there is a chance of recovery. This word is often used in medical reports relating a doctor's view on a case.

Randomised controlled trials A type of scientific experiment most commonly used in testing the efficacy or effectiveness of healthcare services (such as medicine or nursing) or health technologies (such as pharmaceuticals, medical devices or surgery). As their name suggests, RCTs involve the random allocation of different interventions (treatments or conditions) to subjects. As long as numbers of subjects are sufficient, this ensures that both known and unknown confounding factors are evenly distributed between treatment groups.

Sensitising agent A substance that is capable of eliciting a specific immune response which may result in the development of allergic symptoms.

Systematic review A summary of research (often in the biomedical or healthcare context) that uses explicit methods to perform a thorough literature search and critical appraisal of individual studies to identify the valid and applicable evidence. It often, but not always, uses appropriate techniques (meta-analysis) to combine these valid studies, or at least uses grading of the levels of evidence depending on the methodology used. A systematic review uses an objective and transparent approach for research synthesis, with the aim of minimising bias. While many systematic reviews are based on an explicit quantitative meta-analysis of available data, there are also qualitative reviews which nonetheless adhere to the standards for gathering, analysing and reporting evidence.

Topical corticosteroid The application of a steroid-based preparation in cream, ointment or liquid directly onto the surface of the skin.

Wet work Work that regularly involves over-hydration of the skin by immersion in or contact with water or other liquids. This might also include the occlusive effects of glove use.

1 Methodology

Aim

The aim of this document is to provide guidance on the occupational health management of workers who have dermatitis.

Scope

The scope of the guideline is the management of existing cases of dermatitis in the workplace, covering aspects of occupational health advice including risk of infection, hand care and health surveillance.

The guidance does not cover primary prevention of dermatitis, occupational hygiene assessments or exposure control, or the clinical treatment of dermatitis.

The main focus of this work is dermatitis in healthcare workers, and the accompanying leaflets are aimed specifically at this occupational group. However, some of the recommendations are applicable to workers who are at risk of dermatitis in any workplace.

Audience

The guidance is intended for anyone who might give advice to workers who present with dermatitis, including occupational health professionals, general practitioners, dermatology specialists, and other healthcare professionals. It is also aimed at employees themselves, their representatives and their managers, whether or not they have access to professional occupational health advice.

Patient and employer representation

We recognise that patients have an important contribution to make to their own medical management. The National Institute of Health and Clinical Excellence and other clinical guideline development programmes aim to be patient centred (www.nice.org.uk). Similarly, NHS Plus aims for occupational health guidelines to be client centred, including the perspectives of both employees and employers. Employees bring a unique experience of their illness, and the impact that it has upon their working lives. Employers too have an important input, particularly regarding the practicability and operational implications of risk controls. Inevitably these client perspectives may differ from each other or from the perspective of occupational health professionals. NHS Plus is committed to listening to the views of both patients (employees) and employers, considering their concerns carefully and addressing them where possible. The aim is to balance views fairly in order to produce guidelines that are ultimately useful to both parties and to the occupational and other health professionals who advise them. Both employer and employee (patient) representatives were included in the multidisciplinary Dermatitis Guideline Development Group.

The process of guideline development

The Royal College of Physicians, in partnership with the Faculty of Occupational Medicine, was commissioned by NHS Plus to provide the Occupational Health Clinical Effectiveness Unit (OHCEU). The OHCEU was founded in April 2007, with the primary purpose of improving the quality of occupational healthcare in the NHS. The main specific objectives were the delivery of two new clinical guidelines and two multi-centre audits by March 2009. During the inaugural meeting in March 2007, the OHCEU Steering Group prioritised two topics for guideline development:

1. the management of dermatitis in the workplace
2. the management of upper limb disorders in the workplace.

The OHCEU guidelines have been developed using the Scottish Intercollegiate Guidelines Network (SIGN) method. The SIGN objective is to improve the quality of healthcare for patients through the development and dissemination of national clinical guidelines containing recommendations for effective practice based on current evidence.

The process of guideline development included overall direction from a Steering Group and the Occupational Health Clinical Effectiveness Unit team. Most of the detailed work was undertaken by a multidisciplinary Guideline Development Group (GDG). The roles of the various contributors to the guideline are summarised in Appendix 1.

The key steps in the process of guideline development were:

- formulating clinical evidence-based questions
- systematically searching for the evidence in the published literature
- critically appraising the evidence
- distilling and synthesising the evidence and writing recommendations
- grading a series of evidence statements and recommendations
- agreeing the recommendations
- structuring and writing the guideline
- disseminating and publishing the guideline.

Developing evidence-based questions

The approach to developing the questions for this review aimed to be inclusive, but to prioritise the most important areas for occupational health practice. Firstly, an initial literature search was carried out in order to identify any existing reviews or guidelines on occupational dermatitis (scoping search). The Guideline leader then formulated a model based on a possible care pathway for employees who are at risk of dermatitis. By using information from the scoping search and clinical experience, a series of questions that would affect practical aspects of the care pathway were generated. The GDG first added questions to the Guideline leader's model to produce an expanded inclusive list of possible questions. It was agreed that, given the limitations of time and resources, a maximum of five questions could be addressed. Therefore, the GDG discussed and prioritised the inclusive list, reducing it to an agreed shortlist of five key questions. The agreed list was approved by the OHCEU Steering Group. It was acknowledged that some important questions could not be included on the final list, and that these would be a priority for future revisions or extension of the dermatitis guideline work.

The final questions were re-phrased using the PICO format.¹ This method defines the population (P), intervention (I), comparison (C) and outcome (O) for each question. However, PICO was developed primarily for use in reviews of literature about treatments. Therefore, we adapted the format slightly for application to the observational studies that are common in the occupational health literature, substituting exposure (E) for intervention (I) where relevant (ie for questions that did not address interventions). The final PECO questions are listed in Appendix 2. The PECO questions were used to guide the literature search strategy.

Searching for the evidence – search strategy

The key terms for the literature search were derived directly from the PECO tables. The full search strategy is included in Appendix 3. The Guideline leader sifted the output from the initial literature search on the basis of title and abstract. Papers that were obviously not relevant to each question and foreign-language papers were excluded (first sift). We retrieved papers that might be relevant and hand searched the full manuscript. Papers that were not relevant or did not meet very basic quality criteria (eg having an appropriate control group) were rejected (second sift). The reference lists of all relevant papers were hand searched, and any useful papers that had not been identified previously were also retrieved. In particular, all relevant original studies that were referenced in retrieved reviews were also retrieved and assessed. According to the SIGN methodology, we did not search for grey literature, instead confining the search to papers that had been published in peer-reviewed journals. A summary of the numbers of papers that were identified and rejected at each stage of the search and sifting process is shown in Appendix 4. The main reasons for rejection at both first and second sifts were recorded in standardised categories that were specific to each PECO question (Appendix 5).

Appraising the evidence

All relevant papers that met the inclusion criteria were put forward for full appraisal. Appraisal was undertaken by members of the GDG according to the Scottish Intercollegiate Guideline Network (SIGN) methodology.² SIGN was chosen because the method suited the level of funding available and is a validated, widely used method for developing clinical guidelines in the UK. An adapted SIGN method is used for all guidelines produced by NHS Plus.

All GDG members undertook specific training in critical appraisal using the SIGN method. Each paper was scored independently by the Guideline leader and one other GDG member, using standardised SIGN checklists. The scores were compared, and any discordant scores were discussed initially by the appraisers, and allocated a mutually agreed score. Any cases where discordant scores were not resolved by this process were brought to the GDG for discussion and agreement of a final score.

According to the SIGN methodology, papers are given a single quality rating (++, + or –) based on a combination of the risk of bias and confounding. One limitation of this method is that the allocation of the quality score is not structured explicitly, making it difficult to demonstrate consistency of scoring between appraisers. However, it was beyond the scope of our resources to develop a new detailed scoring system for appraisal. Therefore, we handled the problem by raising awareness among appraisers, asking them to consider bias and confounding separately and to comment on each specifically in their recorded assessment form. Specific guidance was given to appraisers on the assessment of bias, including whether the effect of bias was

inflationary or to the null and what the size of the effect might be. Appraisers were also asked to consider not just whether confounders were addressed in the study method, but (if not) whether this omission was likely have an important effect on the findings. The lack of consideration of a confounding factor in a study was considered to be a serious methodological flaw if the association of health outcomes with the potential confounder was strong and the factor was likely to be common in the study population. These studies were allocated a score of minus (–) for quality, and were rejected. The remaining studies, with quality scores of + or ++, were summarised in evidence tables (Tables 1 and 2, Appendix 9).

Distilling and synthesising the evidence

Having compiled summary tables of the relevant studies, the GDG considered the body of evidence for each question separately. A number of factors were considered, with the overall aim of deriving evidence-based statements from these tables. This formulation took account of both the volume and quality of the evidence. The consistency of the findings was also considered. Well-conducted studies with negative findings (no significant associations) and studies that reported significant associations were given equal weight. We considered the likelihood that results might have arisen by chance, preferentially by looking at confidence intervals (CI), but if CIs were not available tests of statistical significance (as indicated by a P value) were examined. We aimed to look at the size of the effect, based on a risk estimate wherever possible. However, none of the studies that we identified calculated risk estimates in this way. We also considered the applicability of the study to our target population (expressed in the PECO question), and commented specifically on the implications of this where it was relevant. In the synthesis, more weight was given to large, well-conducted studies in workplace settings.

Grading the evidence statements

Evidence statements were discussed and agreed by the GDG on the basis of the synthesis of evidence for each question. Statements were graded according to the SIGN methodology. The SIGN grading comprises a number (1–3) and a quality notation (++, + or –) to reflect the type and quality of research from which the evidence is derived. A fourth category (numbered 4) can be allocated to statements that are not supported by research evidence, but are instead based on professional consensus. A detailed account of this system is given in Appendix 6.

Agreeing the recommendations

The final stage of the SIGN process comprises the discussion and agreement of recommendations based on the evidence-based statements. This process occurred within the setting of a GDG meeting. In formulating recommendations about interventions for workers with dermatitis, we have taken into account existing legal requirements, the evidence synthesis and the likelihood that any of the interventions might actually cause harm to workers. For this particular guideline it was not possible to make evidence-based recommendations for occupational health practice on some of the key questions due to a lack of evidence. However, the GDG made recommendations for consensus-based good practice points and for research based on addressing the identified gaps in the evidence base.

Guideline limitations

Limitations of the SIGN methodology

The main limitation of the SIGN methodology is the lack of transparency in quality assessment as discussed above. Another specific problem arose from the historical development of the SIGN method for the assessment of clinical interventions. The resulting emphasis on randomised controlled trials (RCTs) as a gold standard is not particularly well suited to the occupational health literature, which typically has few RCTs and comprises mostly observational studies (including non-randomised intervention studies with a comparison group). Therefore it is difficult to achieve recommendations with a SIGN rating above 3 from research in occupational health. Moreover, there was no specific SIGN assessment pro forma for assessing either non-randomised trials or cross-sectional studies. Therefore appraisers were instructed to use the SIGN RCT pro forma for non-randomised intervention studies and the cohort study pro forma for cross-sectional surveys.

Other limitations

Publication bias is recognised as being a problem in guideline development that is based on published literature. Positive studies are much more likely to achieve publication than negative studies, tending to give a biased view of the consistency of evidence at the synthesis stage. This is outside the control of the GDG, and it is difficult to assess the impact of publication bias. A further problem was the paucity of any focused research for many of the questions in our PECO list. Problems that were specific to particular PECO questions are covered under each question below.

Writing the guideline

The first draft of the guideline was drawn up by the Guideline leader and revised after full discussion with the GDG. The second draft was presented to the Steering Group for further comments. The third draft was then submitted for one formal round of public and stakeholder consultation, through the NHS Plus website (Appendix 8), prior to revision and publication. Editorial responsibility for the full guideline rests with the GDG.

Updating the guideline

Literature searches were repeated for all evidence-based questions at the end of the GDG development process, allowing any relevant papers published and indexed up until 14 August 2008 to be considered. Future guideline updates will consider published evidence indexed after this cut-off date. We recommend that this guideline is reviewed in five years' time.

Use of the guideline

Healthcare providers, employers and employees need to use their judgement, knowledge and expertise when deciding whether it is appropriate to apply guidelines. The recommendations cited in this guideline are a guide and may not be appropriate for use in all situations. The decision to adopt any of the recommendations cited here must be made by the healthcare professional, employer and employee in light of individual circumstances, the wishes of the patient, clinical expertise and resources.

Disclaimer

The Royal College of Physicians disclaims any responsibility for damages arising out of the use or non-use of these guidelines, summary leaflets and the literature used in support of these guidelines.

Funding

The Occupational Health Clinical Effectiveness Unit is commissioned and funded by NHS Plus to produce evidence-based guidelines.

2 Development of the guideline

Introduction

Epidemiology of dermatitis

Hand dermatitis is a common disease with a point-prevalence in the general population of 9.7%³ and an incidence rate reported to be 5.5–8.5/1000 person years.⁴ Many cases are of mild severity but when severe, dermatitis can be a very disabling condition.

Epidemiology of occupational dermatitis

Skin diseases, of which dermatitis forms the largest proportion, are among the most commonly reported occupational disorders in most developed countries. In the UK, a number of reporting schemes give information about the size of the problem.

The Labour Force Survey (*Labour Force Survey Quarterly Supplement*, Office of National Statistics found at www.statistics.gov.uk) is based on self reporting, and reflects employees' own perception of work-relatedness. In the 2006/07 Survey of Work-related Illness, 29,000 cases of work-related skin disease were reported.

Three national reporting schemes for physicians operate under the umbrella of the Health and Occupation Reporting Network (THOR; www.medicine.manchester.ac.uk/coeh/thor). Two schemes (OPRA and EPIDERM), for occupational physicians and dermatologists respectively, suggest that occupational dermatitis comprises up to 20% of all occupational diseases.⁵ Some 3,500 cases of occupational skin disease were reported to EPIDERM in 2006, with dermatitis accounting for around 70%. A third THOR scheme (THOR-GP) captures information about new cases of ill health, including dermatitis, reported by general practitioners. The estimated incidence of new cases of skin disease is similar to, but slightly higher than, OPRA and EPIDERM.

In recent years there has been a decreasing trend in incidence (Health and Safety Executive statistics: dermatitis and other skin disorders, available at www.hse.gov.uk/statistics/causdis/skin), but it is not clear whether this is a real effect or simply reflects a tendency to reduced reporting to the schemes.

Occupations at risk

Based on the above reporting schemes and other prevalence surveys the most commonly affected occupations include florists, hairdressers, rubber process operators, glass and ceramic workers, beauticians, and healthcare workers (mainly nurses). The known risk factors, and common features of these jobs, are frequent hand-washing or wet work, exposure to irritant and allergenic chemicals, and frequent or persistent glove-wearing. Statistics based on reports by dermatologists to EPIDERM over the period 2004–2006 suggest that healthcare workers as a group have an annual incidence rate that is more than three times the average for all occupations. The annual average number of cases in healthcare workers reported in this period was 316. However, it should be noted that reports to EPIDERM include only those cases of skin disease that were serious enough to be seen by a dermatologist. Furthermore, many cases that failed to be diagnosed at all or where the link with work activity was not recognised will not be

included. Thus, the true incidence of occupational skin disease is likely to be substantially higher than suggested by EPIDERM – particularly for a condition such as contact dermatitis where there may be substantial numbers of less serious cases.

Cost and impact of occupational dermatitis

The cost of dermatitis to the individual and to the employer can be high. In 2006, 145 cases of dermatitis were assessed for Industrial Injuries Disablement Benefit in the UK (HSE statistics at www.hse.gov.uk/statistics), although it is important to note that only the most severe cases will qualify the individuals concerned to receive benefits. Several studies from a variety of countries have highlighted the high impact of dermatitis on quality of life, and work loss.^{6–11} Moreover, the prognosis for moderately severe hand dermatitis is poor. A UK reporting scheme (EPIDERM) found that 20% of reported cases led to the individual requiring time off work and 16% did not improve at repeat assessment.¹² In a 15-year follow-up of a Swedish general population sample, the majority of patients with hand eczema had ongoing symptoms, about a third needed ongoing medical treatment, and 5% experienced long periods of sickness absence, loss or change of job and ill-health retirement.¹² The 12-year prognosis of hand dermatitis in a study of Finnish farmers was equally poor, with 26% of men and 21% of women reporting current symptoms at follow-up.¹³ It seems that hand dermatitis tends to persist with exposure to wet work, irritants or allergens, and a high proportion of workers change job as a result.

Clinical features and treatment

The clinical features of dermatitis reflect an acute or chronic inflammatory response, with oedema of the epidermis and inflammatory infiltration of the dermis. Typical symptoms are dryness and itchiness, and the examination findings are redness, vesiculation, exudation and crusting, cracking and fissuring. In chronic cases the skin has a thickened (lichenified) appearance. These changes are often confined to exposed areas, and are worse in the web spaces or under rings where moisture or irritants can be trapped. Contact dermatitis is classified into allergic contact dermatitis (ACD) or irritant contact dermatitis (ICD), reflecting aetiology. The distinction is important for clinical management, but it can be impossible to distinguish the two types on the basis of clinical examination alone. Therefore investigation usually includes skin patch testing to explore the possibility of specific allergy. Medical treatment is with moisturisers and topical corticosteroid preparations. However, if an occupational cause is suspected, intervention to reduce exposure to irritants or elimination of allergens in the workplace and to minimise wet work is usually necessary to control symptoms. Unfortunately this may not be enough and a change in occupation may be needed. Moreover, chronic ‘post-occupational’ dermatitis that persists even after removal from exposure to irritants and sensitising agents has been described.¹⁴

Legislation and occupational dermatitis

The law requires employers to adequately control exposure to hazards in the workplace that cause ill health. This includes controlling exposure to hazards that cause dermatitis. Employers and employees must comply with the Control of Substances Hazardous to Health Regulations 2002.¹⁵ The regulations require employers to:

- assess risks
- provide adequate control measures and ensure their use and maintenance
- monitor the effectiveness of the controls
- provide information, instruction and training
- provide health surveillance in appropriate circumstances.

3 The guideline

Questions 1 and 2

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

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

Clinical introduction

It has been established that patient-to-patient transfer of pathogens on the hands of healthcare workers is the main mechanism for transmission of some important hospital-acquired infections, particularly anti-microbial resistant strains of *Staphylococcus aureus* and Gram-negative bacteria. Several studies have shown that healthcare workers' hands become contaminated through direct contact with body fluids or waste, but also by carrying out 'clean' procedures or even touching patients' intact skin.^{16–20} Microorganisms can survive on hands for a variable length of time and, during a sustained period of patient contact, carers' hands become progressively colonised with both normal commensal bacteria and pathogenic organisms.^{16,21,22} In the absence of careful hand decontamination, the risk of transferring organisms to patients through direct touch during the delivery of care increases markedly.

Healthcare workers with dermatitis might be more at risk of acquiring colonising organisms because the normal skin defences are disrupted. There is an obvious potential risk to the healthcare worker if frank clinical infection (either localised or systemic) results. Moreover, in theory, healthcare workers with dermatitis might be more likely than their peers to transmit infection to patients if their skin lesions become colonised. First, it is possible that having hand dermatitis discourages or impairs adequate hand decontamination due to discomfort or concern at the risk of exacerbating skin lesions. Second, dry scaly skin on any part of the body is more likely to shed fomites (skin particles) that are colonised with bacteria. Occupational health professionals often counsel healthcare workers with dermatitis that they have an increased risk of acquiring infection in the workplace, and even an increased risk of transmitting meticillin (formerly methicillin) -resistant *S. aureus* (MRSA) or other organisms to patients. However, this advice is mainly based on case reports of outbreaks caused by healthcare workers, and the theoretical aspects of transmission described above. It is not clear whether and to what extent healthcare workers with dermatitis are more likely to become colonised or infected than people 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 occupational health practice, including the appropriate counselling and placement of healthcare workers with dermatitis.

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

Methodological introduction

Three hundred and eighty-eight papers were identified by the original literature search and 321 were excluded on the basis of abstract and title as having no relevance for question 1. Sixty-seven papers were retrieved and hand searched. Reasons for exclusion are summarised in Appendix 5.

Eight papers were included for full appraisal by the GDG. Of these, five^{23–27} were subsequently excluded on the grounds of poor quality (high risk of bias or confounding, with a SIGN rating of minus (-)).

Three papers were of good quality (SIGN rating + or ++) and were included in the evidence table. One²⁸ high-quality study (rated ++) was in a working population (healthcare workers). This small prospective cohort study explored the prevalence of colonisation of dermatitis (skin irritation) as the primary question, including a comparison group who did not have dermatitis at baseline. The two other studies were of reasonable quality (both rated +). They were conducted in outpatient populations (not healthcare workers), both nested within randomised controlled trials (RCTs), one of oral antibiotic and the other of combined topical corticosteroid/antibiotic therapy. Although the main focus of these studies was the evaluation of a treatment in adult or paediatric populations, they contained useful information about the bacterial colonisation rates in dermatitis lesions. A number of other papers in this category were identified, but were rejected because they did not include a comparison group. However, the aforementioned studies had information about colonisation rates in non-lesional skin in the same subject for suitable internal comparison. One was a cross-sectional survey²⁹ derived from the baseline assessment of recruited trial subjects and the other was prospective, comprising repeated assessments at intervals during the trial period.³⁰

We did not find any studies that assessed the frequency of colonisation or infection of skin lesions in individuals with dermatitis (either on the hands or elsewhere) who worked in healthcare compared to those with hand dermatitis who worked in other occupations.

Outcomes

The outcomes in the included studies expressed the rate, variety of species (number of different species isolated) and density of colonisation of skin on the basis of cultured skin swabs. Prevalence of colonisation was expressed as the frequency of lesions that were culture positive either for all organisms combined or for specific organisms, including *S. aureus* and *S. epidermidis*. The density of colonisation was expressed as the number of colony-forming units. One paper distinguished between transient (present in one sample) and colonising (present in at least two of three samples). The methodology for bacteriological sampling and laboratory analysis was standardised (mainly with references) and well described in all three papers.

Generalisability

The study in Chinese healthcare workers has good generalisability to workers who are at risk of exposure to wet work in the UK. Exposure to wet work and skin microorganisms in healthcare in China is likely to have a broadly similar pattern to Europe. The studies in outpatients are less

generalisable to our population of interest. They comprised both children and adult patients, who might have very different exposure to wet work and infections than some working populations, particularly healthcare workers. If anything it might be expected that patients in general would have a lower risk of exposure to sources of infection than healthcare workers, so colonisation rates identified from patient studies might underestimate risks in those working in the healthcare industry.

Evidence synthesis

The details of papers included for question 1 are shown in Table 1, Appendix 9. The sole study in healthcare workers³¹ showed that nurses with skin damage on their hands had a higher prevalence of isolation (transient plus colonising) of all organisms and a higher number of colonising species on their hands than nurses whose hands were undamaged. However, there was no significant difference in the density of colonisation, mean number of species isolated or the rate of colonisation with *S. aureus* between the two groups. The studies in patient populations both showed that the frequency and density of colonisation with *S. aureus* were significantly higher in skin affected by dermatitis than in non-lesional skin. The effect sizes in the healthcare workers study were small to moderately high (mean number of colonising species damaged/undamaged skin = 3.35/2.63); prevalence of colonising species (*S. aureus*, yeast, Gram-negative bacteria, enterococci) damaged skin 8, undamaged skin 2; total species (colonising+transient) damaged skin 25, undamaged skin 13 P=0.04. Effect sizes were small to moderate in the patient studies (colonisation rates all organisms 146/208 for eczema lesions v 68/208 for non-lesional skin; 89/119 for atopic dermatitis lesions v 41/119 for non-lesional skin; colonisation rate *S. aureus* 96% affected skin v 72% unaffected skin and mean log₁₀ counts/cm² 5.5 affected skin v 2.1 unaffected skin).

One of the patient-based studies explored the relationship between the chronicity and severity of dermatitic skin lesions and colonisation. The rate of colonisation with *S. aureus* was highest in acute lesions, with a gradient of decreasing prevalence through subacute to chronic. This finding was reported as being statistically significant, and the effect size was small (colonisation rate *S. aureus* acute lesions 16/33 (48%), subacute 30/93 (32%), chronic 23/82 (28%)). There was no convincing gradient for colonisation with all organisms, nor for chronicity of lesions. There was a positive correlation between colonisation density with *S. aureus* and severity of lesions, but the authors did not report the effect size or express whether the finding was statistically significant.

Evidence statements

A very small body of direct evidence from one small high-quality study in a working population addresses the risks of colonisation or infection of damaged skin in healthcare workers with existing hand dermatitis. This evidence suggests a moderate likelihood of colonisation with a range of organisms in healthcare workers with existing hand dermatitis. **Level 2++**

A very small body of *indirect* evidence from two good-quality studies in patients (adults and children) was identified from this literature search, which focused on working populations. **Level 2+**

There is a broad consistency of findings within a small body of direct and indirect evidence, indicating that skin that is affected by dermatitis is more likely to be colonised with bacteria and other microorganisms than normal skin. **Level 2+**

Important note to evidence statements for question 1: The two studies from patient populations were included in the evidence table as we considered that they provided useful information to address question 1. However, the GDG is aware that other, similar papers may have been excluded by the search methodology, which intentionally filtered out studies in non-working populations. We did not repeat the literature search removing the occupational filter. However, we did canvas expert opinion from infection control specialists.* They suggested that there may be a further body of indirect evidence from patient populations that supports a finding of increased risk of colonisation in skin that is affected by dermatitis compared to normal skin.^{32,33}

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

Methodological introduction

Of 361 papers that were identified by the original literature search, 347 were excluded, on the basis of abstract and title, as having no relevance for question 2. Fourteen papers were retrieved and hand searched, but none was informative. Reasons for exclusion are summarised in Appendix 5. Hand-searched references fell into two broad categories. First, studies or reports of cases of infected dermatitis in patients, but with no information about the risk of transmitting organisms from infected or colonised skin lesions. A second group of studies focused on the transmission of infection in healthcare settings, but had no information about dermatitis as a risk factor for transmission. No papers were identified for full appraisal.

Because of the lack of evidence, the literature search for question 2 was repeated to include case reports and case series. Three potentially informative papers were identified. All were investigations of outbreaks of infection in patient groups, in which transmission was linked to a healthcare worker.^{34–36} In one, staphylococcal scalded skin syndrome in neonates³⁶ was linked to a nurse with chronic hand dermatitis. In another,³⁴ cases of streptococcal infection (postpartum sepsis) were linked to a nurse who had both a focal infection (carbuncle) and dermatitis on the eyelids and behind the ears. A third paper³⁵ followed up a long-term outbreak of meticillin-resistant *S. aureus* in a hospital. Although six healthcare workers were found to be colonised with the outbreak strain, only one had dermatitis ('localised infected eczema'). Two of the other five healthcare workers had specific skin infections (infected cut and paronychia respectively), and the other three had nasal carriage but no specified skin abnormalities. One unpublished report submitted to the GDG linked an outbreak of *S. aureus* in thoracic surgery patients to a nurse with dermatitis.

Evidence statement

There is some evidence from outbreak investigations in the healthcare setting that infections have been transmitted to patients from healthcare workers with dermatitis. However, cases of transmission of infection from healthcare workers who do not have dermatitis have also been reported. There is no direct evidence to explore whether healthcare workers with dermatitis are *more likely* to transmit infection to patients in their care than colleagues who have healthy skin.

* See Acknowledgements, page ii.

Recommendations

In view of the lack of direct evidence to support evidence-based recommendations for question 2, the GDG decided to formulate good practice points (GPP) based on consensus of opinion within the group. We also took the views of experts in microbiology and infection control into account. Recommendations 2–3 below aim to balance the risk of transmission of infection from healthcare workers with colonised dermatitis to patients against risks to healthcare workers of unjustifiable restrictions on clinical practice. These are potentially serious risks, with severe consequences for both patients and healthcare workers. Therefore, we have taken a precautionary approach, but have specified restrictions to work only where the risks to patients are likely to be at their highest (when patients are particularly vulnerable to infection and where dermatitis in healthcare workers is acute or severe regardless of site, ie on exposed or covered areas of skin). We have not recommended restrictions on work in cases where there is a possibility of risk to patients, but where this risk is probably low (well-controlled dermatitis, including on exposed areas, in the absence of direct evidence of transmission to patients).

Recommendation	Grade*	Evidence
<p>1 Clinicians (including GPs, dermatologists and occupational health professionals) should advise healthcare workers with dermatitis that:</p> <ul style="list-style-type: none"> • areas of skin affected by dermatitis are more likely to be colonised with bacteria than normal skin, and the risk is higher with more acute and more severe⁺ lesions • 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. 	<p>D (one study rated 2++ and directly relevant for the target population, plus extrapolated evidence from two other small studies rated 2+)</p>	<p>Tupker³¹ Gong²⁹ Ewing³⁰</p>
<p>2 Healthcare workers with dermatitis should be advised by their managers/OH professionals to seek early treatment to minimise symptoms from their skin condition.</p>	<p>GPP</p>	
<p>3 Clinicians (including GPs, dermatologists and occupational health professionals) should consider advising adjustments to work or redeployment for healthcare workers with severe or acute dermatitis (on any site of 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, 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.</p>	<p>GPP</p>	

continued

* See Appendix 6 for explanation of grading system.

⁺ There is no widely accepted definition of severity for dermatitis in relation to risk of colonisation or infection with organisms. However, by consensus, exudation (weeping or oozing), or non-intact skin (cracking or visually obvious breaches of the skin) would be examples of reasonable markers of severe dermatitis.

Recommendation	Grade*	Evidence
<p>4 Clinicians should consider allowing healthcare workers with dermatitis that is mild and either chronic or recurrent to continue with clinical work provided:</p> <ul style="list-style-type: none"> • 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 • the dermatitis does not deteriorate as a result of clinical work. 	GPP	
<p>5 If a healthcare worker's dermatitis deteriorates as a result of clinical work, their clinician(s) and employer should consider temporary and if necessary longer-term adjustments to duties and/or redeployment to facilitate recovery.</p>	GPP	

Question 3

Question 3: Does attention to good hand care (for example 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?

Clinical introduction

The starting point for prevention of occupational dermatitis is the elimination or substitution of irritants or allergens in the workplace, or the introduction of engineering controls to reduce exposure to these substances and to wet work in general. Where it is not possible to control the risk of dermatitis by reducing exposure, a variety of interventions have been used to try to mitigate the harmful effects of wet work, irritants and sensitising agents on the skin of workers.

Lotions and creams

Emollients or moisturisers are preparations that increase skin hydration and replace depleted skin lipids that form an important part of the barrier function of normal skin. Most are oil-in-water preparations with a variable fat content (commonly petrolatum, paraffins, glycerides, or lanolin). They are often used to prevent or treat dry skin in workers who are at risk of hand dermatitis.

Pre-work creams are designed for application at the start of work or after rest breaks; there are several types:

- *Vanishing creams* trap contaminants such as resins and dyes, which can then be washed off the skin. They may contain refined mineral oil, petrolatum, lanolin, emulsifiers, preservatives and fragrances.

* See Appendix 6 for explanation of grading system.

- *Water-resistant creams* form a film over the skin surface that repels water-based chemicals such as acids and alkalis. They can contain silicones, beeswax, stearates, preservatives, fragrances and synthetic tanning agents.
- *Oil/organic solvent-resistant creams* are designed to repel oils, tars and organic solvents. They may contain glycerine, preservatives and fragrances.
- Other types of pre-work cream react chemically with the contaminant to make it less harmful; for example, by reacting with acids to make them less acidic, or trapping an allergen such as nickel.

Pre-work creams are sometimes referred to as barrier creams. However, this term can be misleading, giving rise to a perception that these agents form a physical barrier to protect skin as a substitute for wearing gloves or other protective equipment. In fact, evidence from animal studies indicates that they are very limited in forming a true barrier.^{37,38}

Limitations of pre-work creams include a well-recognised failure of users to apply them properly,³⁹ uncertainty about penetration³⁸ or permeation rates for many substances, and difficulty for workers in recognising when the creams wear off during a shift. On the other hand, many pre-work creams have oily formulations and therefore have emollient (moisturising) properties. They also make it easier to wash off contaminants, allowing milder cleansing agents to be used. Therefore, they can play a useful role in an overall skin management programme. Because of the lack of consistency of terminology for lotions and creams, and their shared effect of improving the condition of skin when used in a workplace setting, the GDG has considered pre-work, barrier, and emollient preparations together under a common heading of conditioning creams.

The efficacy of conditioning creams is a subject of some controversy, according to previous non-systematic reviews.^{40–42} Some studies have found them to be beneficial, while others have shown them to be ineffective or even to exacerbate skin irritation.⁴³ Most of the available literature on the efficacy of conditioning creams comes from *in vitro* or *in vivo* experimental studies. For example there is some evidence that, under laboratory conditions, conditioning agents can reduce transepidermal water loss.^{13,44} However it is difficult to make conclusions about clinical efficacy in the field based on experimental studies under laboratory conditions. Clearly, a number of practical factors might limit clinical efficacy in the workplace, including compliance, availability, interaction with other substances and removal by repeated washing. Several reviewers have highlighted the need for properly controlled clinical evaluation of skin care programmes (including the use of conditioning creams) in a practical workplace environment.^{42,45–49}

Hand hygiene

Careful hand washing to remove irritants and allergens is an important part of skin care in any high-risk occupation. However, the detergents themselves can give rise to skin irritation, as can the mechanical trauma of repeated washing and drying. Hand hygiene is a particularly important driver of hand dermatitis in healthcare workers where repeated hand decontamination as an infection control measure (to protect patients) can both initiate and exacerbate dermatitis. Poor hand hygiene techniques, including failure to rinse detergents off or to dry the hands properly, often precipitate skin problems particularly in the finger web spaces. Partly in recognition of this, and partly in an attempt to improve compliance with infection control procedures, the introduction of alcohol-based gels for hand decontamination as a substitute for hand washing with conventional soaps and disinfectants when the hands are not visibly soiled, has been

advocated by the World Health Organisation, the Centers for Disease Control in the US, and the National Patient Safety Agency and Infection Prevention Society (formerly Infection Control Nurses Association) in the UK. Most of the studies that evaluate different hand hygiene regimens are focused on their effectiveness at reducing skin colonisation.⁵⁰ However, it is not clear whether different hand hygiene regimens have an important impact on the prevention or management of dermatitis in healthcare workers.

Gloves

Like hand hygiene, the wearing of gloves can be both a risk control for occupational dermatitis and a risk factor, by virtue of increasing exposure to irritants and potential allergens. The use of gloves, including protective gloves and cotton lining gloves, was outside the scope of this review, although it did form a part of some of the multi-factorial interventions included in the considered evidence.

Educational programmes

Commonly, skin care programmes comprise a combination of educational measures aimed at promoting good practice. Typically these include information about hand washing, use of detergents, careful rinsing and drying, use of gloves and conditioning creams. A number of studies have examined the effectiveness of workplace-based educational programmes aimed at reducing the prevalence of dermatitis. Some have been based on participant satisfaction as an outcome rather than clinical evaluation of skin problems.⁵¹ However, there are very few well-conducted prospective trials of complex interventions in employees with existing dermatitis using clinical outcomes and including an appropriate comparison group.

In summary, all of the above measures are used to prevent occupational dermatitis, and are indeed endorsed by Health and Safety Executive guidance in the UK.⁵² However, it is not clear whether they have an important impact in managing employees who have existing dermatitis under the conditions that prevail in real workplaces.

Methodological introduction

Of 611 papers that were identified by the original literature search, 439 were excluded on the basis of abstract and title as having no relevance for question 3. One hundred and seventy-two papers were retrieved and hand searched. Reasons for exclusion are summarised in Appendix 5.

Thirty-two papers were included for full appraisal by members of the GDG. Of these, 19^{53–71} (describing 18 studies) were subsequently excluded on the grounds of poor quality (high risk of bias or confounding, with a SIGN rating of minus (–)).

A further five^{72–76} were excluded because they did not provide relevant information for question 3. One study,⁷⁴ a trial of a barrier cream in the setting of a dermatology clinic, included a mixed group of patients – some with occupational and some with non-occupational dermatitis. However, no separate analysis for the occupational dermatitis group was reported, and it was not clear whether the occupational group had continued to work under normal conditions during the trial. A trial of the use of protective creams against glass fibre irritation⁷² was considered to be too specific to glass fibre exposure and not relevant for the target population of healthcare workers.

A trial of different hand-washing regimens in groups of healthcare workers⁷⁶ was excluded because there was no meaningful comparison of skin problems between the two arms of the intervention. A fourth study was a case-control⁷³ analysis among workers in a plastics factory. The use of barrier creams was included in the principle analysis and a higher incidence of barrier cream use was found in those with work-related skin disease. However, it was not possible to distinguish whether this was cause or effect. Overall the GDG decided that the paper did not contribute usefully to the evidence for question 3.

Eight papers were of good quality (SIGN rating + or ++) and were included in the evidence table. Of these, four were reviews. Of two systematic reviews one was of high quality (SIGN rating 1++) and the other good quality (SIGN rating 1+). Two non-systematic reviews were rated SIGN 4 because the methodology for systematic literature searching and/or critical appraisal were not clear. The remaining four papers described original research studies. One was a controlled intervention study and three were randomised trials (one cluster randomised), including two that were double blind. The reference lists of all four reviews were hand searched, and any original papers of relevance were retrieved, assessed for inclusion, and appraised if appropriate. However, all relevant high-quality references had already been identified and no new papers were added to the evidence table as a result of this process.

Outcomes

Clinical outcomes included self assessment of skin condition by questionnaire or standardised observer assessment of the appearance of the skin on hands. Some studies also included bioengineering measures including trans-epidermal water loss (TEWL), skin hydration (using a corneometer), and skin colour (redness) using a Chroma-Meter colorimeter. One advantage of these methods is that they are objective. The main commercially available techniques for measuring skin hydration (capacitance, conductance and impedance) have all been shown to be reproducible.⁷⁷⁻⁷⁹ TEWL measurements are widely accepted to indicate skin barrier function for *in vivo* measurements. The commercially available TEWL measurement techniques (open chamber, closed chamber, ventilated closed chamber, condenser chamber) have all been shown to be reproducible.^{73,74,76} Comparison between measurements made with different measurement techniques sometimes requires the application of a calibration factor. Erythema and melanin are the primary factors that give the skin its colour. Erythema is also relevant when evaluating and monitoring skin reactions. There are two main methods of measurement (colorimeters and spectrometers), both of which produce reproducible results.⁸⁰ Spectrometers measure erythema and melanin values, whereas colorimeters produce information about the complete colour spectrum of the skin.

Methodological problems

An important problem within this body of literature was lack of blinding (or lack of information about blinding) of observers to the intervention status of the subject. This was particularly important where the method of outcome assessment was subjective (for example visual scoring of skin condition). Studies in which lack of blinding gave rise to a high risk of important bias in this way were excluded (quality rating –). We accepted that in some studies it was not possible to blind the subjects to their intervention status (eg the application of a skin education programme), so evidence from self-assessed subjective outcome measures in these studies was given lower weight in the evidence synthesis.

Our target population (described in the PECO question, Appendix 2) was workers with existing dermatitis. In two of the four original studies (Table 2, Appendix 9) that addressed question 3^{81,82} all of the subjects had dermatitis at baseline. However, in the other two^{83,84} only a proportion of the subjects had dermatitis at baseline (up to 39%). No separate analysis was carried out for the subset with existing dermatitis. This would tend to reduce the power of the study to detect a beneficial effect of the intervention among subjects with existing dermatitis. A further problem was the lack of risk estimates and confidence intervals. None of the four studies included these measures directly.

The relevant papers for question 3 are shown in Table 2, Appendix 9. We considered the evidence in three main groups; studies that addressed single interventions aimed at conditioning the skin, studies that addressed different methods for hand decontamination, and studies that addressed complex interventions (skin care programmes) comprising combinations of education, good hand care, conditioning creams, and other elements.

Evidence synthesis

Conditioning creams

Two original papers^{81,82} (rated 1++ and 1+ respectively) and two systematic reviews^{50,85} including one of high quality (1++ and 4 respectively) addressed the use of creams/lotions to condition the skin. All of the relevant good-quality studies cited in these reviews were already included as original papers^{81,82} in Table 2, Appendix 9. The same two papers were the only evidence relating to skin care interventions cited in the second review. The quality of both original papers was good (two double-blind randomised controlled trials).

Both of the studies were relatively small (around 50 subjects; 25 in the intervention arm), and confidence intervals were not used in the presentation of results. The studies compared particular formulations of barrier cream, with before/after comparisons either between products or between a product and its vehicle. There was no negative (no treatment) arm in either study.

In both studies clinical indicators (self- and observer-assessed skin condition) improved after the intervention in the skin cream group. The effect size was reasonably large, clinical indicators improving by 58% and 75%. Bioengineering measures (TEWL, skin colour and skin hydration) were measured in one of the studies, and were unchanged after the intervention compared to before. However, there were no significant differences between the improvements noted in the barrier cream group compared with those who used vehicle alone.

Evidence statements

There is a very small body (only two small studies) of consistent evidence that conditioning creams improve skin condition in healthcare workers with damaged skin. **Level 1++**

There is a very small body of evidence (two small studies) that barrier cream formulations used in workplace settings by employees with damaged skin are no better than vehicle alone in improving clinical indicators of skin condition. **Level 1++**

There is direct evidence (one small study) showing that conditioning creams used in a workplace setting had no impact on bioengineering measures in employees with damaged skin. **Level 1++**

From a very small body of consistent evidence we found no indication that conditioning agents have an adverse effect on existing dermatitis. **Level 1++**

Hand decontamination

One non-systematic and one systematic review^{86,87} (rated 4 and 1+ respectively) 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 (reducing skin colonisation with microorganisms), some information about the effect on skin was included. Only one of the reviews⁸⁷ reported an attempt to assess the quality of studies that were included. Of 15 papers that the authors identified, we identified 12 but they did not meet our inclusion criteria (seven of these took place in an experimental laboratory setting). Two were identified by our review but were rejected on grounds of quality. Neither of these studies addressed adequately the issue of blinding in the assessment of outcome, a criterion that did not result in exclusion from the retrieved systematic review.⁸⁷ We attempted to retrieve the single remaining paper, but the cited reference did not match the quoted article. The second review did not explicitly assess the quality of included papers. Of 13 papers that the authors identified, 12 were identified in our review but excluded for various reasons, including poor quality (three papers). One study assessed the perceived acceptance of hand rubs, rather than skin condition. 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.

Evidence statement

There is limited evidence that alcohol-based hand rubs are less damaging to the skin of users than traditional antiseptic hand wash agents or soap. **Level 1+**

Complex interventions – skin care programmes

Two original papers^{83,84} (rated 2+ and 1+) and one high-quality systematic review (rated 1++)⁸⁵ explored the efficacy of comprehensive skin care programmes in the workplace on employees with dermatitis. The systematic review was only partially applicable to the study population as it covered both prevention and treatment of dermatitis. All of the studies identified in this review that were applicable to our population were included separately.^{83,84}

The interventions included education about glove use, hand washing, use of hand disinfectants and moisturisers. Both original studies were reasonably large investigations in healthcare worker populations (107 and 357 subjects). One was a controlled intervention study and the other a cluster-randomised trial. In these studies, approximately 40% and 25% respectively of the subjects in the intervention group had skin problems at baseline. However, the subgroups with baseline dermatitis were not analysed separately in the results. 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 during the intervention period, 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.

Evidence statements

There is a very small body of evidence (two reasonably sized studies) that explores the impact of education and use of conditioning creams combined in a skin care programme on clinical outcomes in employees with existing dermatitis, and these show inconsistent evidence of effectiveness (one showed improvement and one no change). **Level 1+**

One reasonably sized study suggested a beneficial effect on bioengineering outcomes in employees from an intervention comprising education and conditioning creams, finding a significant deterioration in the control group (increased trans-epidermal water loss, but not in the intervention group). **Level 2+**

Consideration of recommendations

The GDG felt that there was sufficient evidence of benefit to make a graded recommendation about the interventions that we explored for workers with existing dermatitis. We are aware that existing guidance from the Health and Safety Executive (www.hse.gov.uk/skin/index) advises educational skin care programmes, including use of conditioning creams as preventive measures for workers who are at risk from dermatitis where hazardous exposures cannot otherwise be prevented. Moreover, the Centers for Disease Control (USA), and the Infection Prevention Society (UK) advocate the use of alcohol rubs as a substitute for hand washing (where appropriate) as part of good hand hygiene practice to prevent the transmission of infection to patients. The limited evidence that we found did not suggest that these interventions are likely to be harmful in workers who have existing dermatitis. Therefore, the GDG reached a consensus to recommend these interventions even if workers already have skin lesions.

Recommendations

	Recommendation	Grade	Evidence
6	Workers with existing dermatitis should be advised to use conditioning creams at work.	B (downgraded from A because of the small size of two studies rated 1+ and 1++)	Berndt ⁸¹ McCormick ⁸²
7	Workers with existing dermatitis should be advised (in general) to 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 occupational health professional.	B (extrapolated evidence from a review rated 1+)	Kampf ⁸⁶ Picheansathian ⁸⁷

continued

Recommendation	Grade	Evidence
8 Skin care programmes including education and advice about dermatitis, good hand washing and drying techniques and glove use should be provided, along with conditioning creams and information on their use. These measures should be followed for workers with existing dermatitis as well as for those who have no skin lesions. (See Appendix 7 for the full details of the intervention.)	D (extrapolated evidence from one study rated 1+ and one rated 2+)	Held ^{83,84}

Questions 4 and 5

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?

Clinical introduction

Under UK health and safety law regular health surveillance must be carried out for workers who are at risk of dermatitis.^{15,52,88} An important part of the surveillance process is the delivery of education about risks and risk controls. However, the primary aim is to identify dermatitis early, so that steps can be taken to treat symptoms and to reduce exposure where practicable to prevent further deterioration. Statutory guidance is given about the format of health surveillance.⁵² Suggested methods include the administration of periodic questionnaires or a combination of questionnaire and skin examination by a trained observer. However, guidance on the precise format of health surveillance for particular exposure scenarios and levels of risk is not prescriptive. In order to guide occupational health practice in this area, it would be useful to know how effective periodic questionnaires are at detecting symptoms at an early stage, and whether skin inspection is more efficient at early detection than less labour-intensive methods such as questionnaire or self report.

Questions 4 and 5 are closely related; the synthesis of question 5 depended upon finding an adequate evidence base for question 4. Therefore, for the purpose of this report, the questions are presented together.

Methodological introduction

Of 317 papers that were identified by the original literature search, 275 were excluded, on the basis of title and abstract, as having no relevance for either question. Four papers were retrieved and hand searched, but none were informative. Reasons for exclusion are summarised in Appendix 5. Most of the papers identified by the literature search were descriptions or reports from industry-based or national occupational disease reporting systems. None assessed the efficacy of periodic health surveillance in the early identification of cases of occupational dermatitis. A few retrieved papers explored the repeatability and validity of questionnaires

(dermatitis symptom lists) or standardised examination as research tools, eg in epidemiological surveys. However, none compared tools for use in periodic health surveillance programmes in the workplace.

No papers were identified for full appraisal.

Evidence statements

There is no direct evidence base, derived from studies in working populations, to address the question of the effectiveness of health surveillance in the early detection of occupational dermatitis, or on the comparative effectiveness of different screening methods.

Recommendations

There is no evidence from workplace-based studies to inform recommendations on appropriate health surveillance for occupational dermatitis.

4 Future research and audit criteria

Recommendations for future guidelines

The drafting of recommendations on the management of dermatitis has been severely limited by a relative paucity of evidence. For questions 1, 2, 4 and 5 this highlights an important need for further research into the risks of colonisation of dermatitis and the subsequent transmission of infection, and into the use of health surveillance for the early identification of symptoms.

The GDG recognises that the small number of studies included in the evidence table for question 3 was partly a consequence of our decision to narrow the focus to workers with existing dermatitis (secondary prevention). This meant that primary prevention was outside the scope of the question, and studies about preventive strategies in employees who did not have dermatitis at baseline were rejected during the second sift. These papers have been retained by the OHCEU and are available for review in the event of a future revision of the guidelines. We feel that an extension of the scope to include primary prevention would be likely to inform useful guidelines for occupational health practitioners who are setting up dermatitis prevention programmes. Because of time constraints we were limited to five key questions in the current review. Therefore, we were unable to address all of the questions that were originally considered by the GDG. One of these, relating to pre-employment screening for jobs that are known to be associated with a high risk of dermatitis, was deemed to be particularly important, and would be a priority for literature searching and appraisal in future revisions of the guideline.

The literature review pointed to some important gaps in the evidence to support recommendations on the management of existing dermatitis through skin care programmes. Although there is some evidence of benefit from conditioning agents in experimental settings, there is still a lack of field-based studies in at risk populations. The few studies that were identified measured outcomes after a very short intervention period (four weeks at most). It would be helpful to explore whether the implementation of programmes can be sustained over longer periods, whether they are effective, and whether effectiveness is maintained beyond their initial introduction period. It is also important to understand whether these programmes improve clinical outcomes as well as participant knowledge. Another important limitation in knowledge relates to the risk of colonisation of dermatitic skin in workers, and whether transmission of infection to patients is really more likely from healthcare workers who are affected by dermatitis compared to healthcare workers with normal skin. However, it is likely to be difficult to conduct studies that are large enough to answer this question.

Recommended questions for future guidelines

The following questions are a priority for future guideline development:

- Is attention to good hand care (for example various combinations of careful hand washing and drying, the regular application of conditioning creams, and education) in the workplace effective in the primary prevention of dermatitis, and are there important differences in the effectiveness of different hand care methods?
- What personal factors could be measured at the pre-placement stage to better inform the management of risk for occupational dermatitis?

Recommended areas of research

The following are a priority for primary research:

- prospective studies in workplace settings to assess the medium- and long-term effectiveness of multi-factorial skin care programmes, including standardised clinical outcomes (objective assessment of skin condition by an observer who is blind to the intervention status) and using an appropriate control group
- prospective studies to compare the effectiveness of both periodic questionnaire-based and questionnaire plus examination-based health surveillance programmes against self report in the early detection of occupational dermatitis
- studies to compare the transmission of colonisation or 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 (non-healthcare) occupations.

Audit criteria

Recommendation	Audit criteria
Organisations where staff members are exposed to wet work, skin irritants and sensitising agents should provide skin care programmes for their staff.	Percentage of relevant organisations providing skin care programmes (eg education and advice about dermatitis, good hand washing and drying techniques, glove use, the use of conditioning creams and the provision of conditioning creams in the workplace) for their staff.
Workers with dermatitis should use conditioning cream at work	Percentage of workers with dermatitis who use conditioning cream at work.

Appendix 1 Role and remit of the guideline developers

The guideline development group (GDG) was established for the duration of the project, to comprise representation of key stakeholder groups and to undertake development of the guideline.

The team delivering the project was made up of:

- Guideline development group leader
- Guideline development group
- Project manager
- Information scientist
- Clinical director of OHCEU.

Membership of the project team is listed on page v. Declarations of interest were required from all individuals involved in development of the guideline.

The governance framework within which OHCEU operates ensures that development and delivery of our projects are overseen by the Steering Group and Executive Committee of the OHCEU. Respectively these are an external and internal stakeholder group responsible for the strategic direction of OHCEU, advising on the relevance of the work programme to those delivering occupational health services in the UK, and responsible for the delivery to NHS Plus of high-quality deliverables.

Appendix 2 Key questions on the occupational health management of dermatitis

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

Population	Exposure	Comparison	Outcome
Workers who have existing dermatitis	Infectious agents in the workplace	Workers who do not have dermatitis	Colonisation or infection of affected (eczematous) skin with any infective agent

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

Population	Exposure	Comparison	Outcome
Workers who have existing dermatitis	Contact between workers and others (patients, colleagues) in the workplace	Workers who do not have dermatitis	Infection in others (patients, colleagues) in the workplace

Does attention to good hand care (for example, various combinations of careful hand washing and drying, the regular application of emollients and pre-work creams) improve the prognosis in the workers with occupational dermatitis, and are there important differences in the effectiveness of different hand care methods?

Population	Exposure	Comparison	Outcome
Workers with existing dermatitis	Combination of: Educational interventions aimed at improving good hand care including washing and drying techniques. Regular use of emollients in a workplace setting. Regular use of pre-work creams in a workplace setting	No hand care education, emollients or barrier creams in a workplace setting. Different combinations of hand care education, emollients and pre-work creams	Improvement in severity or distribution of dermatitis or improvement in occupational outcomes (job retention)

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

Population	Exposure	Comparison	Outcome
Occupational populations at risk of developing dermatitis	Clinical health surveillance (symptom questionnaires and/or skin inspections)	No health surveillance	Earlier detection of dermatitis or detection of milder disease

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

Population	Exposure	Comparison	Outcome
Occupational populations that are at risk of dermatitis	Health surveillance by symptom questionnaire	Health surveillance that includes skin inspection by a competent person (± questionnaire)	Earlier detection of dermatitis or detection of milder disease

Appendix 3 Electronic searches

The following search strategy was used as the population for each PECO and searched in the following electronic databases:

- MEDLINE 1950 to 2008
- Cinahl 1981 to 2008
- EMBASE 1980 to 2008
- The Cochrane Library

The electronic databases were last searched on 21 August 2008.

Search strategy:

1. Dermatitis, Occupational/
2. Occupational Skin Disease/
3. (eczema adj occupation\$.ti,ab.
4. (occupation\$ adj (disease or disorder)).ti,ab.
5. (occupation\$ adj (dermat\$ or eczema)).ti,ab.
6. (profession\$ adj dermat\$.ti,ab.
7. (Occupation\$ adj contact adj dermatit\$).ti,ab.
8. (Occupation\$ adj fitness).ti,ab.
9. or/1–8
10. *Dermatitis/
11. *Dermatitis, Atopic/
12. *Dermatitis, Contact/
13. *Dermatitis, Exfoliative/
14. *Eczema/
15. *Dermatitis, Allergic Contact/
16. *Dermatitis, Irritant/
17. *Neurodermatitis/
18. *Skin Diseases, Infectious/
19. *Hand Dermatoses/
20. *Hand Eczema/
21. dermatit\$.ti,ab.
22. ((Cutaneous or Dermal) adj Infection).ti,ab.
23. (skin adj (infectio\$ or disease)).ti,ab.
24. neurodermatitis.tw.
25. eczema.tw.
26. (dermatit\$ adj (atopic or contact)).tw.
27. (dermatit\$ adj (allergic or irritant\$)).ti,ab.
28. or/10–27
29. (environment adj (work\$ or occupation\$)).ti,ab.
30. ((profession\$ or work\$ or occupation\$) adj3 climate).ti,ab.
31. ((profession\$ or work\$ or occupation\$) adj3 health).ti,ab.
32. ((profession\$ or work\$ or occupation\$) adj3 exposure).ti,ab.
33. or/29–37
34. 28 and 38
35. 9 or 39

The following search strategies were used as the intervention for each question:

PECO1

36. *Streptococcal Infections/
37. (pneumococcus adj infection\$.ti,ab.
38. (streptococc\$ adj (flora or infection\$)).ti,ab.
39. *bacteria/
40. *Infection/
41. infection\$.ti,ab.
42. *Bacterial Infections/
43. staphylococc\$.ti,ab.
44. *Staphylococcus aureus/
45. MRSA.ti,ab.
46. *methicillin resistant Staphylococcus aureus/
47. (coloni#ation adj2 infection).ti,ab.
48. or/1–12

PECO2

49. *Disease Transmission/
50. *Cross Infection/
51. *Communicable Diseases/
52. *Community-Acquired Infections/
53. (disease\$ adj transmission).ti,ab.
54. (cross adj infection\$).ti,ab.
55. “Community-Acquired Infections”.ti,ab.
56. (Communicable adj Disease\$).ti,ab.
57. exp Disease Transmission, Horizontal/
58. (Nosocomial adj Infection\$).ti,ab.
59. (Nosocomial adj transmission).ti,ab.
60. exp infection risk/
61. exp High Risk Patient/
62. exp Persistent Infection/
63. exp reinfection/
64. or/1–15

PECO3

65. *infection prevention/
66. exp Emollient Agent/
67. exp Dermatological Agent/
68. exp Skin Protective Agent/
69. (skin adj (protecti\$ or agent)).ti,ab.
70. exp Hand Washing/
71. (hand adj protect\$).ti,ab.
72. exp PROTECTION/
73. exp CREAM/
74. exp Skin Irritation/

75. exp CONTACT ALLERGEN/
76. emollient\$.ti,ab.
77. (barrier\$ adj cream\$).ti,ab.
78. (barrier\$ adj protect\$).ti,ab.
79. (hand adj dry\$).ti,ab.
80. (Hand adj hygiene).ti,ab.
81. exp protective clothing/
82. exp GLOVE/
83. (allergen adj avoidance).ti,ab.
84. *moisture/
85. moisturi\$.ti,ab.
86. *skin moisturizer/
87. *Patient Education/
88. (education\$ adj intervention\$).ti,ab.
89. (prevention adj3 information).ti,ab.
90. exp Intervention Study/
91. *Patient Information/
92. or/1–27

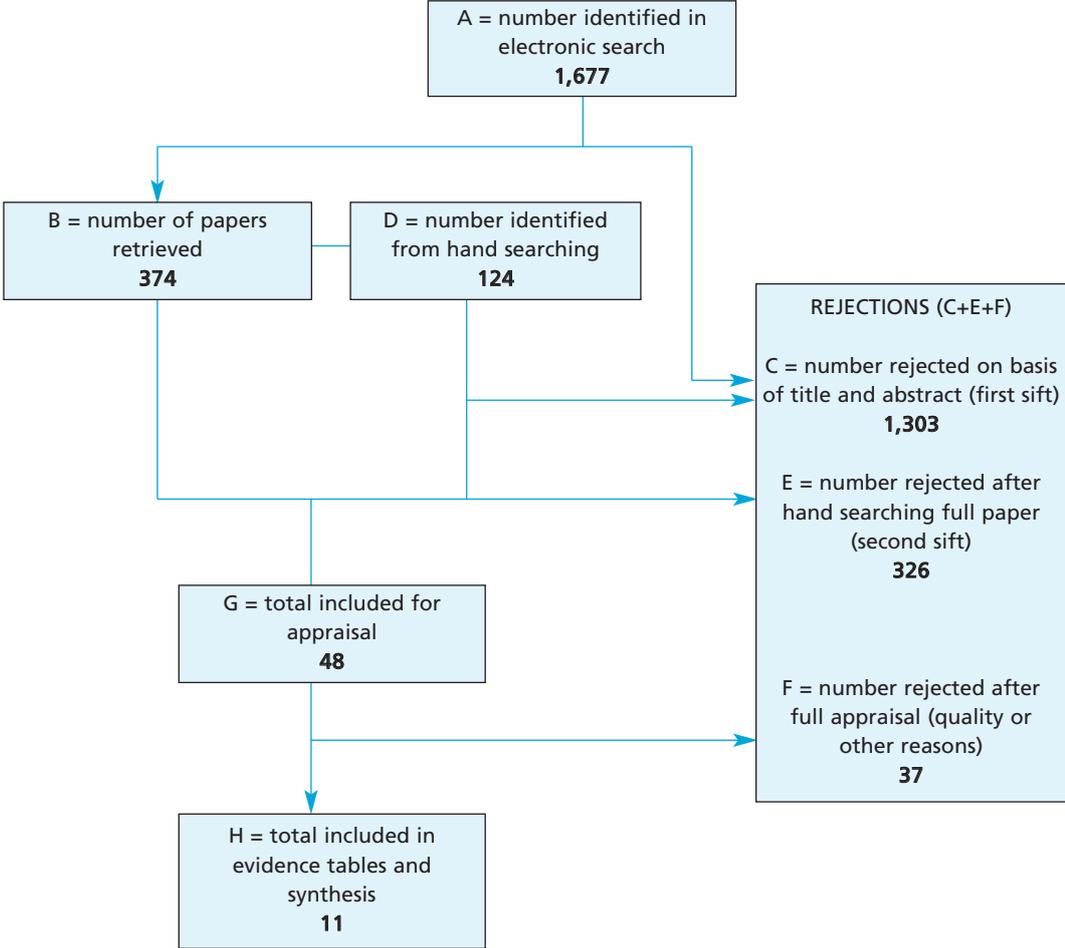
PECO4

93. *Health Survey/
94. (health adj surveillance).ti,ab.
95. screening/ or screening test/
96. *questionnaire/
97. (symptom adj2 questionnaire\$).ti,ab.
98. exp skin examination/ or exp skin test/
99. *disease surveillance/
100. surveillance.ti,ab.
101. (early adj detection).ti,ab.
102. *early diagnosis/
103. *monitoring/ or biological monitoring/
104. or/1–11

PECO5

105. *Health Survey/
106. (health adj surveillance).ti,ab.
107. screening/ or screening test/
108. *questionnaire/
109. (symptom adj2 questionnaire\$).ti,ab.
110. exp skin examination/ or exp skin test/
111. *disease surveillance/
112. surveillance.ti,ab.
113. (early adj detection).ti,ab.
114. *early diagnosis/
115. *monitoring/ or biological monitoring/
116. or/1–11

Appendix 4 Summary of literature search (all questions)



Appendix 5 Reasons for rejection of papers during sifting

PECO 1

Preliminary sift based on titles and abstracts

Reasons for exclusion

Code	Notes
1 = clearly not relevant to key question	1. Reference not primarily about dermatitis or skin infection/colonisation. Most in this category are about other systemic or local infections (eg leprosy, meningitis), occupational hygiene investigation of workplace exposures (allergens or infectious agents), or generic articles about occupational health practice etc.
2, 3, 4 and 6 = outcome definition not satisfied	2. Reference primarily about skin infection (either occupational or non-occupational), but no information about infected or colonised dermatitis as an outcome. Descriptive epidemiology of occupational infections, or some risk factor analysis but personal risk factors (existing dermatitis) for infection/colonisation not included. 3. Reference primarily about therapeutic interventions for non-infected dermatitis but not informative for infection or colonisation of dermatitis. 4. Reference primarily about occupational dermatitis or atopy, but no informative link to skin infection or colonisation. 6. Reference primarily about infection control procedures, no estimation of risk of infection of dermatitis.
5 = population definition not satisfied	Population is not relevant to Q1. Exclude children, and adult populations outside Europe, North America and Australasia.
7 = not English language	

Retrieve:

1. Papers where there is a clear link between skin infection/colonisation and dermatitis. Hand search articles about treatment of infected dermatitis or prophylactic treatment against infection in dermatitis, which may have information about risk factors for infection in the text.
2. Papers that are primarily about occupational skin infections, but might have information about dermatitis or skin damage as a risk factor for infection. Include those where personal risk factors (eg dermatitis) are not necessarily listed in the abstract, so hand searching of text will be necessary.

Second sift of retrieved papers

Reasons for exclusion

Code	Notes
8, 9 = no informative analysis	8. Reference is primarily about intervention for infected or colonised dermatitis but there is no 'normal skin' comparison (both treatment and control arms are patients with existing infected/colonised dermatitis). 9. Some information about infection and dermatitis but no actual analysis of associations.

PECO 2

Preliminary sift based on titles and abstracts

Reasons for exclusion

Code	Notes
1 = about occupational dermatitis but not about infected/colonised dermatitis	Includes general narrative and epidemiological surveys about occupational dermatitis.
2/3 = not about occupational dermatitis	Includes other occupational disorders including occupational infections, but not infected/colonised dermatitis.

Retrieve:

3. Papers that are clearly about transmission of infection from dermatitic skin.
4. Papers that are primarily about nosocomial transmission of infection by hand contact.

Second sift – of retrieved papers

Reasons for exclusion

Code	Notes
4 = about transmission or nosocomial infection but not dermatitis	No direct information about the relationship between dermatitis and transmission of infection.
5 = not about transmission or nosocomial infection	Includes papers about infection in patients but not informative about transmission or the role of dermatitis.

PECO 3

Preliminary sift based on titles and abstracts

Reasons for exclusion

Code	Notes
1 = not specifically about dermatitis	Includes general narrative articles about other dermatoses, whether occupational or not.
2 = paper about dermatitis or latex allergy, but focus on epidemiology, primary prevention, clinical treatment	Includes papers about clinical care (not workplace orientated eg topical steroids). Cross-sectional surveys of knowledge about hand care and exposure, but no analysis of the impact of hand care measures on dermatitis.
3 = not English language	Foreign language and title or abstract suggests low likelihood that it will be informative for Q3.
4 = primarily about exposure (including gloves) or other risk factors for dermatitis	Includes papers about exposure assessment in the workplace, or the effect of specific exposures on skin integrity or symptoms of dermatitis. Includes cross-sectional surveys of dermatitis in occupational settings that have no analysis of the impact skin care on dermatitis. Papers about hand decontamination regimes that focus on antibacterial efficacy with no information about skin tolerance.
5 = about interventions or prevention of dermatitis but not useful.	Not primary research, intervention not appropriate for Q3, no control group, not in an occupational setting. Preliminary studies in an occupational setting that do not have useful analysis of the outcomes of interest. Narrative articles and reviews. Studies of the implementation of skin care measures or educational programmes.
6 = population definition not satisfied, ie not in working population (not workplace-based)	In vitro experiments, or in vivo studies in human models of the efficacy of emollients or barrier creams.

Inclusion criteria

Retrieve:

5. Papers that are clearly about the interventions for dermatitis relevant for Q3 (any combination of education, hand care, pre-work creams, emollients).
6. Systematic reviews that are primarily about interventions for occupational dermatitis and include information about the above interventions of interest.

PECO 4

Preliminary sift based on titles and abstracts

Reasons for exclusion

Code	Notes
1 = not primarily about health surveillance in an occupational setting	Includes general narrative papers about occupational dermatitis and papers about hazard surveillance and exposure databases.
2 = health surveillance, but not for dermatitis as an outcome	Papers about health surveillance for other occupational disease outcomes eg lead poisoning, cancers.
3 = occupational disease surveillance rather than health surveillance in the workplace	Papers about national and regional schemes for occupational disease surveillance based on hospital data or mortality statistics etc, eg THOR schemes in UK and international equivalents.

Inclusion criteria

Retrieve:

7. Papers that are clearly about health surveillance for dermatitis in workplace settings.
8. Review papers that are primarily about occupational health surveillance.

PECO 5

Preliminary sift based on titles and abstracts

Reasons for exclusion

Code	Notes
1 = not primarily about health surveillance for occupational dermatitis	Includes general narrative papers about occupational dermatitis and papers about hazard surveillance and exposure databases.
2 = about health surveillance for dermatitis but no comparison of methods	

Inclusion criteria

Retrieve:

9. Papers that are clearly about methods for health surveillance for dermatitis in workplace settings.
10. Review papers that are primarily about occupational health surveillance.

Appendix 6 SIGN upgrading system for evidence statements

The SIGN guidelines (SIGN 2008) employ a grading system for evidence from peer-reviewed publications. This system ranks evidence on a four-point scale, based on the study design and its potential for bias. A high-quality meta-analysis or a randomised controlled trial with a very low risk of bias is graded as 1++, case reports are graded as 3 and expert opinion is graded as 4.

Levels of evidence	
1++	High-quality meta-analyses, systematic reviews of randomised controlled trials or RCTs with a very low risk of bias
1+	Well-conducted meta-analyses, systematic reviews, or RCTs with a low risk of bias
1–	Meta-analyses, systematic reviews, or RCTs with a high risk of bias
2++	High-quality systematic reviews of case control or cohort studies. High quality case control or cohort studies with a very low risk of confounding or bias and a high probability that the relationship is causal
2+	Well-conducted case control or cohort studies with a low risk of confounding or bias and a moderate probability that the relationship is causal
2–	Case control or cohort studies with a high risk of confounding or bias and a significant risk that the relationship is not causal
3	Case reports, case series
4	Expert opinion

Thus, the level of evidence indicates both the type of study from which the evidence is derived and the quality of the study as graded by the reviewers. The evidence statements are then used to generate recommendations, with grades indicating the quality and weight of evidence behind each recommendation. The grades employed are as follows:

A	At least one meta-analysis, systematic review, or RCT rated as 1++, and directly applicable to the target population; or A body of evidence consisting principally of studies rated as 1+, directly applicable to the target population, and demonstrating consistency of results
B	A body of evidence including studies rated as 2++, directly applicable to the target population, and demonstrating overall consistency of results; or Extrapolated evidence from studies rated as 1++ or 1+
C	A body of evidence including studies rated as 2+, directly applicable to the target population and demonstrating overall consistency of results; or Extrapolated evidence from studies rated as 2++
D	Evidence level 3 or 4; or Extrapolated evidence from studies rated as 2+

Good practice points

Good practice points (GPPs) are practical points that the GDG wishes to emphasise but for which there is not, nor is there likely to be, any research evidence – for example, some aspect of management or treatment that is regarded as such sound clinical advice that nobody is likely to question it. These are not alternatives to evidence-based recommendations, and are only used where there is no other way of highlighting the issue.

Appendix 7 Skin care programmes – detailed content of programmes from two high-quality intervention studies in healthcare workers^{83,84}

Two 2–4-hour educational courses comprising informational video, written material (booklet and instructions), interactive dialogues, role play and diary keeping. Content included the following instructions to employees:

- Wash your hands in lukewarm water. Rinse and dry your hands thoroughly after washing.
- Use protective gloves when starting wet-work tasks.

Protective gloves should be used when necessary but for as short a time as possible.

- Protective gloves should be intact, and clean and dry inside.
- When using protective gloves for more than 10 minutes wear a cotton glove underneath.
- Do not wear finger rings at work.
- Do not use disinfectant agents unless they are recommended for special hygienic reasons.
- Apply moisturisers on your hands during the day or after work. Select a moisturiser which is lipid rich and free from fragrance and preservatives, and having the lowest allergen potential.

The moisturiser must be applied all over the hands including webs, finger tips and dorsal aspects.

- Take care also when you do domestic work (use protective gloves when doing dish washing and cleaning) and when the weather is cold with low humidity (use insulating gloves).

They stipulated:

- Provision of moisturisers
- Provision of cotton gloves.

In one study, the programme was delivered by occupational health professionals. In the other, training was cascaded by employee-teachers and was facilitated by managers and safety representatives.

Appendix 8 Consultation

The scope of the guideline was made publicly available on NHS Plus website from the start of the project. Following sign-off of the draft guideline by the GDG and OHCEU Steering Group, consultation of the guideline has been with members of the organisations/groups represented on the GDG and OHCEU Steering Group, as key stakeholders, and public consultation via the NHS Plus website.

Stakeholders were advised to sign up to the NHS Plus email alert to receive notification of the consultation period, in addition to which notice of the consultation period was posted on the NHS Plus website.

Appendix 9 Evidence tables

Table 1

Evidence table question 1: What are the risks of skin colonisation or active skin infection in workers with existing dermatitis?

Citation	Population, setting	Type of study	Level	No.	Exposure or risk factor comparison	Outcome	Effect measure	Effect size and 95% CI	Risk of bias		
									To Null	Inflationary	
Gong ²⁹	Patients with eczema and atopic dermatitis attending dermatology outpatient departments in China	Cross-sectional study nested within an RCT	+	327	Eczema and atopic dermatitis (AD) lesions v normal (non-lesional) skin	<ol style="list-style-type: none"> Prevalence of isolation of any infective agent Prevalence of isolation of <i>S. aureus</i> and <i>S. epidermidis</i> Density of colonisation with <i>S. aureus</i> 	P values for comparison of rates and density of colonisation given	<p>ALL ORGANISMS</p> <p>Eczema:</p> <p>Colonisation rate: lesional skin: all subgroups 146/208, acute 22/33, subacute 69/93, chronic 55/82</p> <p>non-lesional skin: all subgroups 68/208, acute 8/33, subacute 31/93, chronic 29/82.</p> <p>All subgroups? $\chi^2 = 55.21$, $P < 0.01$</p> <p>Atopic dermatitis:</p> <p>Colonisation rate: lesional skin: 89/119 non-lesional skin 41/119</p> <p>$\chi^2 = 39.459$, $P < 0.01$</p> <p><i>S. aureus</i></p> <p>Eczema:</p> <p>Colonisation rate: <i>S. aureus</i> lesional all subgroups 69/208, acute 16/33, subacute 30/93, chronic 23/82. non-lesional skin all subgroups 19/208; acute 4/33; subacute 8/93; chronic 7/82</p> <p>All subgroups? $\chi^2 = 35.677$, $P < 0.01$</p> <p>Colonisation density: <i>S. aureus</i> higher in lesional v non lesional skin</p> <p>$\chi^2 = 9.907$, $P < 0.01$</p> <p>Atopic dermatitis:</p> <p>Colonisation rate: lesional skin 71/119 non-lesional skin 41/119</p> <p>$\chi^2 = 24.824$, $P < 0.01$</p> <p>Colonisation density: <i>S. aureus</i> higher in lesional v non lesional skin</p> <p>$\chi^2 = 5.781$, $P < 0.05$</p>	Low	Low	Age, sex, site, other skin diseases, systemic infection, severe fungal infection, pregnancy/lactation, severe heart, liver, kidney, mental disease, diseases affecting immune function, treatment with systemic corticosteroids or immunosuppressive within 4 weeks, treatment with topical antibiotics within 2 weeks systemic antibiotics within 4 weeks

continued

Table 1 – continued

Citation	Population, setting	Type of study	Level	No.	Exposure or risk factor comparison	Outcome	Effect measure	Effect size and 95% CI	Risk of bias	
									To Null	Inflationary Confounding factors considered
Larson ²⁸	Ward nurses in a US hospital	Prospective cohort	2++	40; 20 nurses with hand irritation	Presence or absence of skin 'damage' (irritation)	1. Mean total colony-forming units (CFU) 2. Mean no. of species isolated 3. Mean no. of colonising species 4. Prevalence of total flora (transient and colonising) by type of organism 5. Prevalence of colonising flora by type of organism	Mean total CFU and P values	Damaged/undamaged skin Mean total CFU 5.60/5.63 P=0.63 Mean no. species isolated 8/6.2 P=0.11 Mean no. colonising species 3.35/2.63 P=0.03 Prevalence: Totals (<i>S. aureus</i> , yeast, Gram-negative bacteria, <i>enterococci</i>) colonising 8/2, total (colonising + transient) = 25/13 P=0.04 <i>S. hominis</i> colonising 13/5 total (colonising +transient)15/11 Colonising defined as isolated in at least two of three samples	Low	Age, sex, type of unit, skin type
								Text p683: colonisation density: of <i>S. aureus</i> positively correlated with severity of eczema and atopic dermatitis. Colonisation rate of <i>S. aureus</i> positively correlated with severity of eczema. (analyses not shown, tests of significance not given.) OTHER ORGANISMS <i>S. epidermidis</i> : Eczema all subgroups lesional 56/208; non-lesional 42/208. Atopic dermatitis lesional 14/119; non-lesional 6/119. P values not stated		

continued

Table 1 – continued

Citation	Population, setting	Type of study	Level	No.	Exposure or risk factor comparison	Outcome	Effect measure	Effect size and 95% CI	Risk of bias		
									To Null	Inflationary	Confounding factors considered
Ewing ³⁰	Children with atopic dermatitis, regular attenders at a UK hospital	Nested cohort Within an RCT	2+	50	Dermatitic skin lesions v non-eczematous skin	1. Rate of isolation of <i>S. aureus</i> (number of children from whom <i>S. aureus</i> was isolated) 2. No. of <i>S. aureus</i> colonies	Mean counts	Results for placebo group <i>S. aureus</i> culture positive Visit 1 Affected skin 24/25 (96%), unaffected skin 18/25 (72%) Visit 2 Affected skin 24/24 (100%), unaffected skin 21/24 (88%) Visit 3 Affected skin 22/24 (92%), unaffected skin 19/24 (79%) Visit 4 Affected skin 22/24 (92%), unaffected skin 17/24 (71%) Visit 5 Affected skin 18/18 (100%), unaffected skin 14/18 (78%) Pre-treatment <i>S. aureus</i> counts Mean Log ₁₀ counts/cm ² (95% CI) Affected skin 5.5 (4.7–6.3) Unaffected skin 2.1 (1.0–3.4)	Low	Low	Age, sex

Table 2

Evidence table question 3: Does attention to good hand care (for example various combinations of careful hand washing and drying, the regular application of conditioning creams) improve the prognosis in workers with occupational dermatitis, and are there important differences in the effectiveness of different hand care methods?

Conditioning creams (as a single intervention)

Citation	Population, setting	Type of study	Overall level	No.	Exposure or risk factor comparison	Outcome	Effect measure	Effect size and 95% CI	Risk of bias	Confounding factors considered
Berndt ⁸¹	Hospital nurses with mild skin problems (dryness and erythema) 92% female, average age 37 (range 19–59), 48% had atopy	Randomised controlled trial, Double blind	1++	50	Use of a barrier cream at work (new product containing aqua, paraffin liquidum, behenyl alcohol, glycerin, aluminium chlorohydrate, octyl palmitate, buxus chinensis, ceteth-10, steareth-20, dimehthicone) Barrier cream v vehicle	1. Clinical assessment score 2. Subjective symptom report: tightness, dryness, redness, itching, sweating 3. TEWL 4. skin colour 5. skin hydration (Corneometer)	1. dryness, erythema, scaling, dyshydrosis, fissuring, lichenification scored 0–3 2. tightness, dryness, redness, itching, sweating, score similar to objective assessment method 3. g/m ² /hour 4 and 5 not stated	Clinical assessment and subjective scores decreased in both groups (scores decreased from 4 to 1 approx.) but no significant difference between treatment and vehicle only. No significant difference in TEWL, Skin colour or hydration No negative control arm	Very low	Not applicable (randomised)

continued

Table 2 – continued

Conditioning creams (as a single intervention)

Citation	Population, setting	Type of study	Overall level	No.	Exposure or risk factor comparison	Outcome	Effect measure	Effect size and 95% CI	Risk of bias	Confounding factors considered
McCormick ⁸²	White, hospital employees in United States. Age range 27–64, mean age 42 treatment, 39 comparison, 79/77% women, 21/23% men	Randomised controlled trial, double blind	1+	54	Use of an oil-containing lotion. Before and after comparison in intervention and comparison groups, also comparison between intervention lotion and comparison barrier cream	1. Clinical assessment 2. Subjective reporting of symptoms	1. objective scoring system based on scaling 0–3, cracking 0–3, weeping 0–3, integumentary breaks 69% intervention, 52% comparison (P=0.26) ie no significant difference. 2. weeping in past 48 hr no–yes, bleeding in past 48 hr no–yes, pain 0–3 and need to cover skin break in the past 48 hr no–yes	Intervention group mean overall clinical score decreased from 6.5 before to 2.7 after P<0.02, Comparison group from 6.8 to 4.7 P<0.02. Improvement in intervention greater than comparison P=0.006 Healing of all full-thickness integumentary breaks 69% intervention, 52% comparison (P=0.26) ie no significant difference. No significant difference in the use of supplemental hand lotion 0.5 intervention v 0.6 comparison P=0.13 No negative control arm	Low	Not applicable (randomised)
Saary ⁸⁵	A literature review commissioned by the Workplace Safety and Insurance Board of Ontario, Canada to aid the provision of evidence-based recommendations.	Systematic review	1++	Only 3 fair/good quality studies in workplace settings and concerning treatment or prevention of dermatitis were cited by the authors 81–83	Barrier creams	See individual papers above	See individual papers above	The authors concluded that two fair-quality studies found barrier creams to be effective at preventing dermatitis and one good-quality study did not. All three studies are included in this table (in one of the three, conditioning creams were used as part of a broader educational programme – see complex interventions below).	Low	N/A

continued

Table 2 – continued

Conditioning creams (as a single intervention)

Citation	Population, setting	Type of study	Overall level	No.	Exposure or risk factor comparison	Outcome	Effect measure	Effect size and 95% CI	Risk of bias	Confounding factors considered
Boyce ⁵⁰	A review of data regarding hand washing and hand antiseptics in healthcare settings. Conducted by the authors to inform recommendations of the Healthcare Infection Control Practices Advisory Committee and the HICPAC/SHEA/APIC/IDSA Hand Hygiene Task Force	Non-systematic review	4	N/A	Hand lotions and creams based on two (controlled trials included in this table) ^{81,82} Barrier creams (based on the same two controlled trials included in this table) ^{81,82}	See individual papers above	See individual papers above	Concluded that regular use of hand lotions and creams can help prevent and treat irritant contact dermatitis caused by hand hygiene products	Although there was no description of a quality assessment in this review (and therefore a significant risk of bias), the two controlled trials cited are already included in the table above and are of good quality	N/A

Table 2 – continued

Hand decontamination method

Citation	Population, setting	Type of study	Level	No.	Exposure or risk factor comparison	Outcome	Effect measure	Effect size and 95% CI	Risk of bias	Confounding factors considered
Kampf ⁸⁶	Review undertaken to support the CDC Guidelines on hand hygiene	Non-systematic review	4	13	Use of alcohol rubs for hand care compared with conventional hand washing with soap products	Various	Various	Concludes that alcohol-based hand rubs with emollients cause significantly less dryness and skin irritation than non-medicated soap, and traditional antiseptic hand washing preparations	High risk of bias – no attempt to assess quality.	N/A
					hand hygiene on skin. Three of the studies included in this study and identified in this OHCEU review were rejected on grounds of poor quality. Remaining papers were all excluded as they did not meet our inclusion criteria.					

continued

Table 2 – continued

Hand decontamination method

Citation	Population, setting	Type of study	Level	No.	Exposure or risk factor comparison	Outcome	Effect measure	Effect size and 95% CI	Risk of bias	Confounding factors considered
Picheans-thian ⁸⁷	Literature review to inform hand hygiene practice	Systematic review	1+	15	Use of alcohol rubs for hand care compared with conventional hand washing with soap products	Various	Various	Concludes that alcohol-based hand rub is less damaging to the skin (irritation and dryness) of healthcare workers than repeated washing with chlorhexidine or medicated soap. Insufficient information provided about each study to clarify whether these are <i>in vitro</i> , experimental or workplace-based.	Moderate risk – did not exclude studies that had not addressed blinding.	N/A

Table 2 – continued

Complex interventions (combinations of education, pre-work creams, emollients)

Citation	Population, setting	Type of study	Level	No.	Exposure or risk factor comparison	Outcome	Effect measure	Effect size and 95% CI	Risk of bias	Confounding factors considered
Held ⁸⁴	Employees of old people's homes in Denmark	Cluster randomised trial	1+	357	Skin care programme comprising a formal educational programme cascaded to all employees by a participatory team (including members of management, safety board, and each working sector – nursing, kitchen and cleaning) in each workplace. Information imparted variously by meetings, posters, personal instruction but all employees received written information. Content included proper glove use, correct hand wash, use of hand disinfectants and moisturisers. Moisturisers and cotton gloves were provided. Important aspect of the intervention was management participation	Knowledge score Self-assessment of behaviours: use of cotton gloves, frequency of hand washing, hand washing, disinfectants, wearing finger rings, daily use of moisturisers) Self-assessment of skin symptoms Observer assessed clinical evaluation based on a (score for symptoms and localisation)	Scored 0–7 Cotton glove use (never, sometimes, always) Frequency of hand washing (>20 per day, 15–20, 11–15, 0–10) Daily use of disinfectants (yes, no) Wearing rings (yes, no), use of moisturiser (yes, no) Self assessment (two or more of redness, vesicles, papules, itching, scaling, dryness, fissuring, roughness, thickness, suppuration) Examination (no, very mild, mild moderate, severe)	Self-reported symptoms: no difference between groups Clinical examination: skin symptoms reduced in intervention group 82% no symptoms to 60% no symptoms P=0.0001, no change controls. C V I P=0.0002	Low	Not applicable

continued

Table 2 – continued

Complex interventions (combinations of education, pre-work creams, emollients)

Citation	Population, setting	Type of study	Level	No.	Exposure or risk factor comparison	Outcome	Effect measure	Effect size and 95% CI	Risk of bias	Confounding factors considered
Held ⁸³	Student auxiliary nurses in Denmark mean age in intervention group 28.1 (19–55 yrs), 93% female. 4.9% atopic dermatitis ever (diagnosed by a doctor) 6.5% had previous hand eczema Significant differences at baseline between intervention and controls: number who had dish-washing machine higher in intervention group). No sig diffs in demographics. Higher number of skin problems on hands of intervention group at baseline (39% v 32%, but P=0.43)	Controlled trial	2+	107	Educational programme – 2x2hr class, conducted by two teachers given immediately before the start of practical training. Video and booklet used to deliver intervention consistently. Content based on 'evidence-based recommendations' (listed in a table) including instructions on hand washing, use of gloves, cotton gloves, not wearing rings, avoid disinfectants, apply moisturiser, protect hands at home and in cold weather. Use of moisturiser	Subjective – self-reported, skin symptoms, also behaviour/exposures (number of hand washes, wet hands, glove use, cotton glove use, moisturiser use, hand disinfectant use, moisturer score (0 no, 1 mild, 2 moderate–severe)) standardised questionnaire, but no info about repeatability or validity Objective – clinical examination of the hands, using a referenced scoring system (no repeatability figures given in paper ⁸²), TEWL with protocol and referenced guidelines	Scored 0–7 Cotton glove use (no, yes) Frequency of hand washing (0–10) Daily use of disinfectants (yes, no) Use of moisturer (yes, no) Self assessment (current symptoms yes, no) Examination score (0 no, 1–5 mild, >5 moderate–severe)	Behaviours: no significant diff before/after or between I and C for no. hand washes, wet hands, glove use, cotton gloves, moisturisers use. Significant decrease in use of hand disinfectants I compared to C (P=0.02) Self-reported skin symptoms – no difference in prevalence or cumulative incidence between I (25% prev, 20% cum inc, P=0.64) and C (34% prev, 48% cum inc, P=0.64) Examination – Significant increase in extent of hand eczema in both groups' proportion of subjects with 0 eczema 80% at baseline and approx 45% at follow-up). No significant difference between intervention and control groups at baseline or follow-up. Mean TEWL increased in control group (approx 11 to 14 gm ² h ⁻¹), but not in intervention group.	Significant (not clear if observer blinded).	No information about control of confounders

continued

Table 2 – continued

Complex interventions (combinations of education, pre-work creams, emollients)

Citation	Population, setting	Type of study	Level	No.	Exposure or risk factor comparison	Outcome	Effect measure	Effect size and 95% CI	Risk of bias	Confounding factors considered
Saary ⁸⁵	A literature review commissioned by the Workplace Safety and Insurance Board of Ontario, Canada to aid the provision of evidence-based recommendations	Systematic review	1++	Two studies in working populations (both papers included above) ^{83,84}	Complex educational intervention	Self report and examination	See specific studies above	No good-quality studies. Two fair quality, of which one showed no significant difference in subjective symptoms, significant difference in objective symptoms but not blinded. ⁸⁴ One study showed no significant difference in clinical outcomes or bio-engineering measures ⁸³	Low	

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