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British Association of Dermatologists' guidelines for the management of contact dermatitis 2017

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NICE accredited
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NICE has accredited the process used by the British Association of Dermatologists to produce clinical guidelines. The renewed accreditation is valid until 31 May 2021 and applies to guidance produced using the process described in Updated guidance for writing a British Association of Dermatologists clinical guidance – the adoption of the GRADE methodology 2016. The original accreditation term began on 12 May 2010. More information on accreditation can be viewed at www.nice.org.uk/accreditation.

1.0 Purpose and scope

The overall objective of the guideline is to provide up-to-date, evidence-based recommendations for the management of contact dermatitis. The document aims to (i) offer an appraisal of all relevant literature up to February 2016, focusing on any key developments; (ii) address important, practical clinical questions relating to the primary guideline objective; and (iii) provide guideline recommendations and if appropriate research recommendations.

The guideline is presented as a detailed review with highlighted recommendations for practical use in the clinic, in addition to an updated patient information leaflet [available on the British Association of Dermatologists' (BAD) website, http://www.bad.org.uk/for-the-public/patient-information-leaflets].

1.1 Exclusions

This guideline will not cover contact urticaria, prick testing or atopy patch testing.

2.0 Stakeholder involvement and peer review

The guideline development group (GDG) consisted of consultant dermatologists, a nurse specialist and patient representatives. The draft document and supporting information was made available to the BAD membership, British Dermatological Nursing Group, Primary Care Dermatological Society, British Society for Cutaneous Allergy, British Society for Skin Care in Immunocompromised Individuals, Society for Occupational Medicine and several authorities in occupational health, which were actively considered by the GDG. Following further review, the finalized version was sent for peer review by the Clinical Standards Unit of the BAD, made up of the Therapy & Guidelines Subcommittee, prior to submission for publication.

3.0 Methodology

This set of guidelines has been developed using the BAD's recommended methodology,[1] with reference to the Appraisal of

Guidelines Research and Evaluation (AGREE II) instrument (www.agreetrust.org),[2] and the Grading of Recommendations Assessment, Development and Evaluation (GRADE).[3] Recommendations were developed for implementation in the U.K.'s National Health Service.

The GDG established several clinical questions pertinent to the scope of the guideline and a set of outcome measures of importance to patients, ranked according to the GRADE methodology (see section 3.1).

A systematic literature search of the PubMed, MEDLINE, Embase, Cochrane and LILACS databases was conducted to identify key articles for contact dermatitis up to February 2016; search terms and strategies are detailed in the Supporting Information. Additional references relevant to the topic were also isolated from citations in reviewed literature. Evidence from included studies was graded according to the GRADE system (high, moderate, low or very-low quality). Recommendations are based on evidence drawn from systematic reviews of the literature pertaining to the clinical questions identified; the summary of findings with forest plots, GRADE evidence profiles indicating the quality of evidence, tables linking the evidence to the recommendations, Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow diagram and list of excluded studies are detailed in the Supporting Information. The strength of recommendation is expressed by the wording and symbols shown in Table 1.

3.1 Clinical questions and outcomes

The GDG established several clinical questions pertinent to the scope of the guidelines, in the categories shown in Table 2.

The GDG also established a set of outcome measures of importance to patients (prevention and treatment), ranked according to the GRADE methodology,[4] data on which are extracted from included studies: (i) return to/remain in work (9); (ii) improvement in quality of life (8); (iii) improved or clearance of dermatitis (8); (iv) treatment tolerability (5); (v) prevention of dermatitis (5); (vi) side-effects of interventions (4).

The outcome measure used in the diagnosis section was confirmation of a diagnosis of contact dermatitis.

Table 2 Clinical questions in patients with contact dermatitis pertinent to the scope of the guidelines

Diagnosis	Which and how many allergens should be used in tests?
	When should tests be carried out?
	Does increasing the number of allergens tested improve diagnosis?
Prevention	Does education improve or prevent hand dermatitis?
	Do barrier creams improve hand dermatitis?
Treatment	Does topical treatment work?
	Does systemic treatment work?
	Do soap substitutes improve contact dermatitis?
	Does education as a treatment work?
	Does phototherapy work?

4.0 Summary of recommendations

The recommendations and ratings shown in Tables 3–5 were agreed upon unanimously by the core members of the GDG and patient representatives. For further information on the wording used for recommendations and strength of recommendation ratings, see section 3.0.

5.0 Background

5.1 Definition

The words 'eczema' and 'dermatitis' are used synonymously to describe a polymorphic pattern of cutaneous inflammation

Table 1 Strength of recommendation ratings

Strength	Wording	Symbols	Definition
Strong recommendation *for* the use of an intervention	'Offer' (or similar, e.g. 'use', 'provide', 'take', 'investigate', etc.)	↑↑	Benefits of the intervention outweigh the risks; most patients would choose the intervention, while only a small proportion would not; for clinicians, most of their patients would receive the intervention; for policy-makers, it would be a useful performance indicator
Weak recommendation *for* the use of an intervention	'Consider'	↑	Risks and benefits of the intervention are finely balanced; most patients would choose the intervention, but many would not; clinicians would need to consider the pros and cons for the patient in the context of the evidence; for policy-makers it would be a poor performance indicator where variability in practice is expected
No recommendation		Θ	Insufficient evidence to support any recommendation
Strong recommendation *against* the use of an intervention	'Do not offer'	↓↓	Risks of the intervention outweigh the benefits; most patients would *not* choose the intervention, while only a small proportion would; for clinicians, most of their patients would *not* receive the intervention

Table 3 Recommendations and ratings agreed upon by the guideline development group and patient representatives

Summary of recommendations	Strength
Diagnosis	
Offer patients with suspected contact dermatitis a patch test with a baseline series of allergens	↑↑
In identifying allergens in patients with contact dermatitis, *consider* testing for additional series dependent on allergen exposure	↑
Consider additional readings at day 6 or 7 if the results are unexpectedly negative at day 4	↑
Prevention	
Consider skin care and skin protection creams in preventing occupational dermatitis	↑
Treatment	
Offer alitretinoin to patients with severe chronic hand eczema[121]	↑↑
Consider topical tacrolimus to patients with contact dermatitis where topical steroids are unsuitable or ineffective	↑
Consider PUVA therapy for treating patients with chronic hand eczema	↑
Consider patient education in occupational contact dermatitis	↑

PUVA, psoralen plus ultraviolet A.

Table 4 Summary of good-practice recommendations (informal consensus)

Summary of good-practice recommendations (informal consensus)
Use clinical assessment tools such as the Dermatology Life Quality Index and the Hand Eczema Severity Index for both the initial assessment and the response to treatment of patients with contact dermatitis
Take a detailed history, including symptoms and if they were related to application or use of any particular product, a specific activity or occupation
If related to the workplace *investigate* the work practice and products handled at work, supplemented by examination of health and safety data sheets
Provide a patient information leaflet on patch testing as part of the counselling process, which includes information on potential side-effects. Informed patient consent should be obtained
Offer patch testing for patients with chronic or persistent dermatitis as clinical features alone are unreliable in distinguishing allergic contact from irritant and endogenous dermatitis, particularly with hand and facial dermatitis
Consider deferring patch testing for 3 months after finishing systemic agents and 6 months after finishing biological agents, to minimize the chance of false-negative reactions, if possible

Table 5 Summary of research recommendations

The methodology and reporting of results of future patch test studies should be standardized
High-quality studies are needed to address the efficacy of interventions for contact dermatitis, including:
topical tacrolimus vs. topical corticosteroids
combination of tacrolimus and topical corticosteroids
alitretinoin vs. PUVA for hand dermatitis
development and evaluation of skin barrier repair products
development of new wash products that do not damage the skin barrier
Efficacy of systemic therapies – ciclosporin, azathioprine, methotrexate – needs to be determined

PUVA, psoralen plus ultraviolet A.

that, in the acute phase, is characterized by erythema and vesiculation and, in the chronic phase, by dryness, lichenification and fissuring. Contact dermatitis describes these patterns of reaction in response to external agents (exogenous); these agents can act either as irritants, where a cell-mediated immune response is not involved, or as allergens, where cell-mediated immunity is involved.

Contact dermatitis may be classified into the following reaction types. (i) Subjective irritancy: idiosyncratic stinging and smarting reactions occur within minutes of contact, usually on the face, in the absence of visible changes. Cosmetic or sunscreen constituents are common precipitants. (ii) Acute irritant contact dermatitis: often the result of a single overwhelming exposure or a few brief exposures to strong irritants or caustic agents. (iii) Chronic (cumulative) irritant contact dermatitis: occurs following repetitive exposure to weaker irritants that may be either 'wet', such as detergents, organic solvents, soaps, weak acids and alkalis, or 'dry', such as low-humidity air, heat, powders, paper, cardboard and dusts. (iv) Allergic contact dermatitis: this involves sensitization of the immune system to a specific allergen or allergens with resulting dermatitis or exacerbation of pre-existing dermatitis. (v) Phototoxic, photoallergic and photoaggravated contact dermatitis: some allergens are also photoallergens. (vi) Systemic contact dermatitis (systemic allergic dermatitis): seen after the systemic administration of a chemical, usually a drug, to which topical sensitization has occurred previously. (vii) Protein contact dermatitis: repetitive handling of proteins, usually foods, results initially in immediate urticarial symptoms and signs, but later progresses to a dermatitic reaction. Prick and radioallergosorbent tests to the offending protein allergen are positive, but patch tests are negative. The proteins may be vegetables (potato, garlic), meats, fish (in food handlers), flour, enzymes (in bakers and pharmaceutical manufacture), and animal dander and fluids (in veterinarians and abattoir workers).[5]

In clinical practice, it is not uncommon for atopic/endogenous, irritant and allergic aetiologies to coexist in the development of certain eczemas, particularly hand and foot dermatitis. It is important to look for a history of occupational and recreational factors in both irritant and allergic contact dermatitis.

5.2 Epidemiology

The point prevalence of dermatitis in the U.K. is estimated to be about 20%. Atopic/endogenous dermatitis makes up the majority of cases. The point prevalence of hand dermatitis has been reported to be 2%, with a lifetime risk of developing hand dermatitis of 20%.[6] While irritant contact dermatitis is more common than allergic contact dermatitis, allergic contact dermatitis carries a worse prognosis unless the allergen is identified and avoided. Contact dermatitis accounts for 4–7% of dermatological consultations. Dermatitis can persist, particularly in those allergic to chromate, epoxy resin and *Compositae* after allergen avoidance.

The prevalence of contact allergy to specific allergens in the general population in Europe has been estimated at between 10% and 27%.[7,8] Nickel (14·5%), fragrance (3·7%), cobalt (2·2%), hydroxyisohexyl cyclohexene carboxaldehyde (1·4%) and p-phenylenediamine (PPD) (1%) were among the most commonly identified allergens.

Chromate allergy is reducing in frequency in the European Union since the addition of iron to cement was made compulsory.[9–11] Legislation to reduce the nickel content permitted in jewellery has reduced the incidence of nickel sensitization.[12,13] In contrast, an increase in the permitted level of methylisothiazolinone in cosmetics and personal-care products has led to a dramatic and unprecedented increase in sensitization since 2010.[14]

The ongoing UK EPIDERM surveillance scheme records the epidemiology of occupational skin disease (OSD).[15,16] Skin disease ranks second (29%) to musculoskeletal conditions (57%) as a cause of occupational disease; dermatitis makes up 79% of OSD. Occupational hand dermatitis in healthcare workers is declining, owing to workplace interventions. While there is an overall decrease in sensitization to rubber accelerators, there is increasing sensitization to carbamates and to rarer rubber allergens.[17]

The prevalence of contact dermatitis in children is unclear. A large review reports positive patch-test reaction rates varying from 27% to 95% of referred children.[18] The most common allergens reported in North American children are nickel, neomycin, cobalt, fragrance and *Myroxylon pereirae*; many children had atopic/endogenous dermatitis. Recalcitrant disease unresponsive to standard therapy, or dermatitis in new areas, should raise the possibility of a super-added allergic contact dermatitis. Adolescents have a prevalence of contact allergy almost as high as adults. Population-based studies show 17% of girls and 13% of 16-year-olds have at least one positive allergic reaction on patch testing.[19] Nickel, fragrance and 4-*tert*-butylphenol formaldehyde resin are the most common allergens.

5.3 Assessment and investigation

The pattern and morphology of dermatitis, particularly on the hands and face, is unreliable in predicting a cause and in distinguishing atopic/endogenous dermatitis clearly from dermatitis which is contact irritant or contact allergic in aetiology.[20,21] This is also true for children with atopic dermatitis.[22]

Therefore, it is essential to consider the following points initially in the history of all patients with dermatitis: (i) Is there a personal history of atopic dermatitis in infancy or childhood? Are there other atopic features, such as asthma and hay fever? Is there a family history of atopy? (ii) Where did the initial symptoms begin, and where did they spread to later? (iii) Were symptoms related to the application or use of any particular product, especially cosmetics, personal-care products, topical medication, clothing, bandages or personal protection such as gloves? (iv) A detailed history of all wash products which come into contact with the skin is important because the majority contain harsh emulsifiers/surfactants that can cause significant damage to the skin barrier in predisposed individuals such as those with atopic/endogenous dermatitis after a short period of exposure. This should detail every wash product, including shampoos. (v) Were symptoms related to any particular activity, such as hairdressing, holidays, home improvements, painting, decorating, recreation or sport? (vi) Are symptoms related to work or specific activity within the workplace? A detailed history should be taken, including investigation of practice and products handled at work, supplemented by examination of health and safety data sheets. Also, personal protection practice such as the use of gloves or goggles should be determined. (vii) Do symptoms improve when environment changes, for example at weekends and during holidays, and recur on return to work? (viii) Do symptoms get worse after sunlight exposure?

The history should also identify any contact with primary skin irritants. This should include both wet agents (including water and the frequency of hand washing) and which products have been used, as well as dry, desiccating products.

Clinical assessment tools should be used for both the initial assessment and the response to treatment of patients with contact dermatitis. Consider both generic tools such as the Dermatology Life Quality Index and more specific, objective scoring systems such as the Hand Eczema Severity Index.[23,24] Simplified tools that assess only three variables in hand dermatitis, such as the Investigators Global Assessment (measuring only induration, scaling and fissuring) have the advantage of being quick to perform, but have the disadvantage of being useful only for certain types of hand dermatitis (chronic hyperkeratotic) but not others (pompholyx).

Patch testing is the gold-standard investigation in a patient in whom allergic contact dermatitis is considered. Prospective studies support the value of specialist contact dermatitis clinics with access to extended series of allergens for the investigation of dermatitis in specific anatomical sites, occupational groups and chemical exposures. Dermatologists select appropriate

allergens, assess products that patients bring, assess any positive reactions, and determine their relevance to the individual and their dermatitis. An important aspect of the process is clear communication of relevant information to allow the patient to identify, avoid or substitute the allergen(s). Follow-up visits reiterate and clarify this information.

5.4 Patch-testing rate

An approximate suggested annual workload for a contact dermatitis investigation clinic has been estimated at one person per 700 of the population served, that is, 100 patch tests per annum for a catchment population of 70 000.[25] The more frequently patch testing is carried out, the lower the rate of relevant positive reactions becomes.[26]

5.5 Who should be investigated?

As clinical features alone are unreliable in distinguishing allergic contact from irritant and endogenous dermatitis, particularly with hand and facial dermatitis, patch testing should be carried out in any patient with a chronic or persistent dermatitis,[27] or atopic/endogenous dermatitis that was previously well controlled with topical therapy and then becomes difficult or impossible to control with the same topical treatments.

6.0 Diagnostic tests (diagnosis)

6.1 Preparation of the patient

The patient should be counselled that the skin will be covered during testing and on the need to avoid exercise, to keep the back dry and of possible adverse effects. Informed consent should be taken and documented.

Adverse events associated with patch testing are rare. Patients should be counselled that a positive result will produce skin reddening, itching and occasionally blistering at the application site,[28] but that this usually disappears after a few days.

Patients should be warned that some positive test reactions, for example to gold, may persist for up to 1 month; that a positive patch test may be accompanied by a flare of existing or previous eczema at distant sites; that an increase or decrease in pigment may be seen at the site of patch tests; and of the small possibility of infection or scarring at the treatment site.

Active sensitization is also rare. While it was reported as 'possible' in two of 7163 patients patch tested to parthenolide,[29] it was not reported in any of 5371 patients tested to formaldehyde or textile dyes,[30,31] and there is no significant increase in PPD-positive patch-test reactions in individuals who undergo repeat patch tests compared with those who only had single patch tests.[32]

The skin to be tested should be free from dermatitis, and skin disease elsewhere, as well controlled as possible. This will help avoid the 'angry back syndrome' with numerous false-positive results.[33]

If a patient applies potent topical steroids to the back up to 2 days prior to the test being applied,[34–36] or is taking oral corticosteroids,[37] there is a significant risk of false-negative results and decreased reactivity.

The effect of systemic corticosteroid treatment on weaker reactions has not been assessed, but expert consensus is that if the daily dose is no higher than 10 mg prednisolone, suppression of positive patch tests is unlikely.[38] While positive patch-test reactions can be elicited in patients taking immunosuppressant drugs,[39] or who are tanned as a result of sun bathing or treatment with ultraviolet (UV) radiation,[40] any associated tanning may also suppress patch-test reactions. However, the amount required to do so and the relevant interval between exposure and patch testing are poorly quantified. Where immunosuppressive treatment cannot be stopped safely, patch testing can yield positive results which, while possibly suboptimal, may be preferable to not testing at all.[41] Antihistamines do not need to be avoided unless testing for urticaria or contact urticarial reactions.

Patch testing should be deferred for 6 weeks after natural and artificial UV exposure, 3 months after finishing systemic agents and 6 months after finishing biological agents, to minimize the chance of false-negative reactions.

There is no evidence that patch testing when breastfeeding is harmful. While there is no evidence that patch testing in pregnancy is harmful, no safety data are available. Therefore, patch testing should be undertaken only when required and after informed consent is obtained.

6.2 Patch testing

Patch testing involves the reproduction under the patch tests of an allergic contact dermatitis in an individual sensitized to a particular antigen(s). The standard method involves the application of antigen to the skin at standardized concentrations in an appropriate vehicle and under occlusion. The back is most commonly used, principally for convenience because of the area available, although the limbs, in particular the outer upper arms, are also used.

This test has a sensitivity and specificity of between 70% and 80%.[41]

Various application systems are available, of which the most commonly used are Finn chambers. With this system, the investigator preloads individual allergens onto test discs, which, in turn, are mounted on adhesive tape. Care needs to be taken to load the same amount of allergen onto each disc as significant variation has been reported.[42,43] Micropipetting is the optimal technique to minimize this variation. Many allergens are volatile or degrade over a short time, particularly acrylates and fragrances.[44,45] Allergen expiration dates should be noted and allergens should always be stored as directed and patch tests should be prepared as close to the time of application of the patch test as practical.[46,47] This is essential for acrylate, fragrance, isocyanate and aqueous allergens.[46] It may be occasionally necessary to test certain allergens beyond the labelled expiry date when the alternative is not to test.

Two preprepared series of patch tests are available – the TRUE® (Pharmacia, Milton Keynes, U.K.) and the Epiquick® (Hermal, Reinbek, Germany) tests. Preprepared tests are significantly more reliable than operator-prepared tests,[48–52] but only limited numbers of allergens are available.

There is also some evidence that larger chambers may give more reproducible tests,[53,54] but this may only apply to some allergens,[55] and can be used to obtain a more definite positive reaction when a smaller chamber has given a doubtful one previously.

The International Contact Dermatitis Research Group has laid down the standardization of gradings, methods and nomenclature for patch testing.[56]

6.3 Timing of patch test readings

The optimum timing of patch test readings is on day 2, followed by day 4.[57] Because some allergens often do not yield positive reactions until after day 4, a third reading at day 7 will pick up approximately 10% more positive reactions that were negative on days 2 and 4.[58,59] These include allergens on many baseline series such as neomycin and tixocortol pivalate.

6.4 Reading and relevance of positive reactions

Patch tests should be read in natural daylight and rated as positive, negative or irritant (see Table 6). Those that are positive are graded on a scale of +, ++ or +++.[60] A number of factors may affect this stage. Principal among these are the characteristics of the individual allergens and the method of patch testing. Care should be taken not to confuse the clinical appearance of the reaction with interpretation of whether this reaction represents an irritant or allergic reaction.[61]

Some allergens are more likely to cause irritant reactions than others. These reactions may be difficult to interpret and are misclassified easily as positive reactions.[62] The metal salts for nickel, cobalt and potassium dichromate, fragrances and the carba mix often cause irritant reactions and so are the most frequently misinterpreted allergens in the baseline series. A face-to-face lecture on assessing the morphology of patch-test reactions has been shown to improve physicians' differentiation between irritant and allergic patch-test reactions.[63]

Table 6 Scoring of patch test reactions according to International Contact Dermatitis Research Group recommendations[60]

Symbol	Morphology	Interpretation
–	No reaction	Negative
?	Erythema only, no infiltration	Doubtful reaction
+	Erythema, infiltration, possibly discrete papules	Weak positive reaction
++	Erythema, infiltration, papules, vesicles	Strong positive reaction
+++	Erythema, infiltration, confluent vesicles	Extreme positive reaction
ir	Different types of reactions (soap effect, vesicles, blister, necrosis)	Irritant reaction
nt		Not tested

The positivity ratio of an allergen, defined as the percentage of + reactions divided by the sum of all positive reactions (+, ++ and +++) can help assess false-positivity.[64] Allergens with a lower number, such as tixocortol pivalate and the sesquiterpene lactone mix, are less likely to produce false-positive reactions.[65]

As indicated above, preprepared patch tests are better standardized in terms of the amount of allergens applied and therefore are more reproducible but offer only a limited number of allergens and can be prohibitively expensive for large-scale testing.

An assessment should be made of the relevance of each positive reaction to the patient's presenting dermatitis. A simple and pragmatic way of classifying clinical relevance of positive allergic patch-test reactions is: (i) current relevance – the patient has been exposed to allergen during the current episode of dermatitis and improves when the exposure ceases; (ii) past relevance – past episode of dermatitis from exposure to allergen; (iii) relevance not known – not sure if exposure is current or old; (iv) cross-reaction – the positive test is due to cross-reaction with another allergen.

6.5 Patch-test series

The usual approach to patch testing is to have a standardized baseline screening series, which will pick up approximately 80% of allergens.[66,67] These series vary from country to country and should be revised on a regular basis. There are two principal baseline series, differing between the U.S.A. and Europe. Experienced dermatologists adapt these series by adding allergens that may be of importance or relevance locally.

The British Society for Cutaneous Allergy (BSCA) revises its baseline series regularly, removing allergens such as those that diminish in relevance and adding important emerging allergens such as methylisothiazolinone.[68]

Supplemental series are also recommended; these are important where the baseline series fails to pick up less common allergens such as fragrances or rubber chemicals.[69] These series are outlined in Appendix 1.

Supplemental series should be used to complement the baseline series for particular body sites or types of agents to which the patient is exposed (Appendices 1 and 2). The patient's own cosmetics, toiletries and topical medications should be tested at nonirritant concentrations. This usually means 'as is' (undiluted product) for leave-on products but requires dilutions in water for wash-off products. Strong irritants such as powder detergents should not be patch-tested. Also, occupational products should be tested at nonirritant concentrations. The most useful compendium of reported test concentrations and recommended vehicles for chemicals, groups of chemicals and products is that produced by De Groot.[70]

Guidelines for testing materials brought from the workplace can be found in the *Handbook of Occupational Dermatology*.[71] However, false-positive and false-negative results often occur when

patch testing products brought by the patient, and should be interpreted with care.

6.6 Photopatch testing

Where photoallergic contact dermatitis is suspected, photopatch testing may be carried out.[72] While the exact intervals for irradiation and the dose of UVA given vary from centre to centre, the recommended method of photopatch testing involves the application of a photoallergen series,[73] and any suspected patient materials, in duplicate, on either side of the upper back. On removal of allergen patches at 2 days,[74] one side is irradiated with 5 J cm^{-2} UVA and readings are taken in parallel after a further 2 days.[75]

The incidence of true photoallergy in suspected cases is low, at < 5%, although additional readings after day 4 increase the detection rate.[76]

6.7 Open patch testing

The open patch test is used commonly in cases where potential irritants or sensitizers are being assessed. It is also useful in the investigation of contact urticaria and protein contact dermatitis. The open patch test is usually performed by applying the suspected agent 'as is' on the skin of the forearm. The application site should be assessed regularly for the first 30–60 min and a further reading carried out after 3 or 4 days.

A repeated open-application test, applying the suspect agent on the volar aspect of the forearm, is also useful in the assessment of cosmetics and personal-care products where irritancy or combination effects may interfere with standard patch testing. Usually, this involves application of the product 'as is' twice daily for 5–10 days, stopping if a reaction develops.

6.8 Postinvestigation counselling

Information on the allergen(s), its sources and how to avoid it should be given, backed up with written or online information appropriate to the patient's level of understanding. It is important to highlight different names for the same product to the patient. Even with such provision, only 17% remembered the name of the allergen after 10 years, according to one study, despite 79% of patients remembering that they have had a positive patch test result.[77]

7.0 Intervention and treatment (management/treatment options)

The cause of contact dermatitis is frequently multifactorial,[78] and patients may have irritant and/or atopic/endogenous dermatitis in addition to allergic contact dermatitis, particularly in occupations such as hairdressing.[79]

There are three scenarios when patch testing is completed: (i) a clear diagnosis is made – including the exclusion of allergic contact dermatitis, and appropriate advice and treatment given; (ii) a possible diagnosis is made – a trial of avoidance of allergen is advised with follow-up to confirm/refute the hypothesis; (iii) a definite diagnosis cannot be made – further patch testing may be required and further information obtained from the patient/workplace, to determine the materials/series that need to be tested.

7.1 Occupational contact dermatitis/workplace visit

Where occupational exposure as a contributing factor to the dermatitis is suspected, a workplace visit can: (i) help determine which allergens need to be considered; (ii) identify hidden allergens after a negative patch test; (iii) give clues as to why a patient has failed to respond to avoidance of an allergen or irritant; (iv) help assess procedures in the work environment and identify areas of possible accidental exposure/contamination; (v) help prevent further unnecessary exposure to irritants.

Visits should be organized in conjunction with on-site nursing/medical/safety personnel as their presence during the visit is often invaluable. Material Safety Data Sheets (MSDS) should be requested for all materials to which workers are exposed. However, these are only required to list those chemicals that have been assigned a Hazard Statement in accordance with U.K. regulations. As there are hundreds of chemicals that have never been so assigned but can cause contact dermatitis, the risk assessment should consider the work activity, including all substances hazardous to health, including those used, produced and created as waste or as by-products.

Therefore, it is important to ensure that the normal working procedures are active on the day of the visit and that the particular process in question is being carried out on the day of the visit, in order to determine accurately what workers are actually doing in practice rather than in theory. It is important to record as accurately as possible the details of the visit: personnel present, sections visited, processes observed and sources of possible exposure to irritants and allergens.[80]

7.2 Avoidance

Avoidance of allergens and irritants is the cornerstone of the management of OSD. Assessment of safety procedures at the workplace visit is needed to eliminate sources of exposure and remove the allergen/irritant if a suitable substitute is available. Personal protective equipment such as clothing or gloves may be an adequate solution, although less likely to be effective with potent sensitizers and airborne allergens/irritants. It may be necessary to move the patient to a different area; changing occupation is usually the last resort. However, this may be preferable, particularly if severe contact dermatitis is diagnosed early in training (e.g. hairdressers).

7.3 Protection

Protection of the skin against contact with an allergen most commonly involves the use of gloves in hand dermatitis. The nature of the allergen or irritants involved will determine which type of gloves should be used (Appendix 3), and it is

important to check the MSDS to determine the permeation time for the glove being used. Latex gloves are penetrated by methyl methacrylate in 1 min. Nitrile (5 min), butyl (15 min) and three-layer PVP gloves (20 min; polyethylene outer and inner layer, ethylene vinyl copolymer middle layer) give better protection, but none is completely impermeable.[81]

It is also important to protect the hands outside the working environment. Rubber or polyvinylchloride gloves with a cotton lining are recommended for general household tasks. There is some evidence that prolonged glove use impairs stratum corneum barrier function;[82] however, the clinical relevance of this is unclear.[83–85] Barrier creams have shown promise *in vitro*,[86] and in volunteers in the prevention of occupational hand dermatitis,[87] but their efficacy in the workplace is less certain. Workers who use barrier creams have better skin-quality scores and reduced transepidermal water loss than those who do not,[88,89] but this may not translate into a significant clinical difference.[90]

7.4 Substitution

Replacement of soaps and detergents with emollients is useful, even if they are not the cause of the dermatitis, as they are irritants which will compound the situation.[91,92] It is also often possible to substitute different materials both in the workplace and outside so that the implicated allergen or irritant can be avoided. Typical examples include the use of thiuram-free gloves, changing biocides in industrial coolant oils and the use of isothiazolinone-free creams/cleansers in those patients in whom contact allergy has been identified to these allergens.

7.5 Education

Studies in occupational settings have demonstrated improvements in established hand dermatitis after comprehensive intervention education programmes.[93–96] The prevention of hand dermatitis with similar programmes has also been reported.[93,97] Compliance with skin-protection programmes is often poor.[98] Owing to the very low-quality studies identified and marginal benefits observed (see Supplementary Information), neither education on an individualized basis nor a formal course could be recommended over the other in preventing hand dermatitis.

7.6 Treatment of persistent contact dermatitis

Therapy for contact dermatitis persisting despite allergen/irritant removal and skin protection largely follows the management of atopic/endogenous dermatitis. Studies support the efficacy of topical steroids and topical tacrolimus in the treatment of contact dermatitis.[99–104] Second-line treatment includes phototherapy and systemic immunomodulators such as methotrexate and mycophenolate mofetil. Psoralen plus UVA, ciclosporin and alitretinoin have been demonstrated to be useful in chronic hand dermatitis,[105–107] and azathioprine in chronic actinic dermatitis,[108] but none has been assessed specifically in the treatment of contact dermatitis (see Supplementary Information).

7.7 Diets

There are no good-quality studies to support exclusion diets in the management of contact dermatitis.[109,110]

8.0 Prognosis (follow-up)

In a Swedish study, only 25% of 555 patients diagnosed with occupational contact dermatitis had completely healed over a 10-year period; 50% still had intermittent symptoms and 25% had permanent symptoms. In 40% who changed their occupation, the overall prognosis was not improved.[111] In an Australian study, 55% of 949 patients still had dermatitis after 2 years from diagnosis. The prognosis for milder cases of contact dermatitis depends upon the ease of avoidance.[112] The long-term prognosis for occupational contact dermatitis is often very poor.[113]

8.1 Why is the prognosis sometimes so poor?

Continuation of the exposure – knowingly or unknowingly – can occur. Allergens such as chromium, epoxy resin and *Compositae* appear to trigger chronic dermatitis, even after avoidance.[114,115] Risk factors for a poor prognosis include the severity and extent of dermatitis at presentation.[116]

8.2 Do educational interventions help?

Educational programmes may help in secondary prevention and outcomes for chronic occupational contact dermatitis.[94,96,117]

8.3 Should a job change be recommended?

If a worker can completely change their job, that is, eliminate their exposure if suffering from allergic contact dermatitis or exposure reduction in the case of irritant contact dermatitis, they have a better chance of the dermatitis clearing.[113,116]

9.0 Practical and economic considerations

The management of contact dermatitis includes diagnosis, treatment and prevention. There are few studies that look at economic considerations.

9.1 What is the economic burden of suffering from contact dermatitis?

The annual societal cost of patients suffering from occupational contact dermatitis is high and comparable with patients with severe atopic/endogenous dermatitis or psoriasis.[118]

The costs of suffering from contact dermatitis have been reported as amounting to approximately €2300 for

occupational contact dermatitis and €1000 for nonoccupational contact dermatitis per patient per annum.[119] As contact dermatitis is so common, this represents a substantial economic burden.

9.2 Is it worthwhile managing patients with contact dermatitis in a multidisciplinary clinic?

Integrated care programmes with a multidisciplinary team, including a dermatologist specializing in patch testing, a specialized nurse and an occupational physician, have been proposed for patients with moderate-to-severe hand dermatitis felt to be work related, and the majority of whom would have at least an element of contact dermatitis. These have been found to be effective in improving outcomes in the short term compared with standard care (patch testing and management by a dermatologist).[120] However, this difference disappears after 12 months. Integrated care programmes cost substantially more than standard care (€3613 vs. €1576 per patient).

10.0 Recommended audit points

In the last 20 consecutive patients diagnosed with contact dermatitis, is there evidence of: (i) the provision of a patient information leaflet on patch testing, which includes information on potential side-effects; (ii) informed consent; (iii) application of the appropriate national or international baseline series; (iv) application of all allergens at the correct concentration and in the correct vehicle; (v) prescription of further allergens during the tests to clarify doubtful reactions, if applicable; (vi) accurate interpretation of the patch-test reactions as either allergic or irritant, and documentation of relevance; (vii) recording of any adverse outcomes of patch testing and actions taken, if applicable; (viii) a discharge letter with a clinical diagnosis and allergen-specific information, where applicable; (ix) collation of local patch-test results into a database; (x) benchmarking of local patch test results against national collated figures?

The audit recommendation of 20 cases per department is to reduce variation in the results due to a single patient, and allow benchmarking between different units. However, departments unable to achieve this recommendation may choose to audit all cases seen in the preceding 12 months.

11.0 Limitations of the guideline

This document has been prepared on behalf of the BAD and is based on the best data available when the document was prepared. It is recognized that under certain conditions it may be necessary to deviate from the guidelines and that the results of future studies may require some of the recommendations herein to be changed. Failure to adhere to these guidelines should not necessarily be considered negligent, nor should adherence to these recommendations constitute a defence against a claim of negligence. Limiting the review to English-language references was a pragmatic decision, but the authors recognize this may exclude some important information published in other languages.

12.0 Plans for guideline revision

The proposed revision date for this set of recommendations is scheduled for 2022; where necessary, important interim changes will be updated on the BAD website.

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Appendix 1

British Society for Cutaneous Allergy-recommended baseline series

Potassium dichromate	0·50%	pet.
Neomycin sulfate	20·00%	pet.
Thiuram mix	1·00%	pet.
p-Phenylenediamine	1·00%	pet.
Cobalt chloride	1·00%	pet.
Caine Mix III	10·00%	pet.
Formaldehyde	2·00%	aq.
Colophony	20·00%	pet.
Quinoline mix	6·00%	pet
Myroxylon pereirae (Balsam of Peru)	25·00%	pet.
N-Isopropyl-N-phenyl-4-phenylenediamine	0·10%	pet.
Lanolin alcohol	30·00%	pet.
Mercapto mix	2·00%	pet.
Epoxy resin	1·00%	pet.
Parabens mix	16·00%	pet.
4-tert-Butylphenol formaldehyde resin	1·00%	pet.
Fragrance mix I	8·00%	pet.
Quaternium 15 (Dowicil 200)	1·00%	pet.
Nickel sulfate	5·00%	pet.
Cl + Me-isothiazolinone	0·02%	aq.
Mercaptobenzothiazole	2·00%	pet.
Amerchol L101	50·00%	pet.
Sesquiterpene lactone mix	0·10%	pet.
p-Chloro-m-Cresol	1·00%	pet.
2-Bromo-2-nitropropane-1,3-diol (Bronopol)	0·50%	pet.
Cetearyl alcohol	20·00%	pet.
Sodium fusidate	2·00%	pet.
Tixocortol-21-pivalate	1·00%	pet.
Budesonide	0·10%	pet.
Imidazolidinyl urea (Germal115)	2·00%	pet.
Diazolidinyl urea (Germal 11)	2·00%	pet.
Methyldibromoglutaronitrile	0·30%	pet.
Ethylenediamine dihydrochloride	1·00%	pet.
4-Chloro-3,5-xylenol (PCMX)	0·50%	pet.
Carba mix	3·00%	pet.
Disperse Blue Mix 106/124	1·00%	pet.
Fragrance mix II	14·00%	pet.
Hydroxyisohexyl cyclohexene carboxaldehyde (Lyral)	5·00%	pet.
Compositae Mix (Chemotechnique)	2·50%	pet.
Methylisothiazolinone	0·20%	aq.
Sodium metabisulfite	1·00%	pet.

Appendix 2

Commercially available additional patch test series

Trolab®	Chemotechnique Diagnostics
Antimicrobial, preservative and antioxidant	Bakery
Cosmetics	Corticosteroid
Dental materials	Cosmetics
Hairdressing	Dental screening
Medicament (including corticosteroids, antibiotics, local anaesthetics and ophthalmics)	Epoxy
Metal compounds	Fragrance
Metalworking/technical oils	Hairdressing
Perfume and flavours	Isocyanate
Photoallergens	Leg ulcer
Photographic chemicals	Medicament
Plant	Adhesives, dental and other (meth)acrylate
Plastics and glues	Nails – artificial (meth)acrylate
Rubber chemicals	Printing (meth)acrylate
Sunscreen agents	Oil and cooling fluid
Textile and leather dyes	Photographic chemicals
Vehicles and emulsifiers	Plant
Miscellaneous	Plastics and glues
	Rubber additives
	Scandinavian photopatch test
	Shoe
	Sunscreen
	Textile colours and finish
	Various allergens

Appendix 3

A guide to which gloves will give some degree of protection for specific types of hazard

Hazard	Type of glove
Microorganisms	NRL, thermoplastic elastomer
Disinfectants	NRL, PVC, PE, EMA
Pharmaceuticals	NRL (permeability time very short)
Composite materials (e.g. acrylates)	Nitrile, 4H® glove
Solvents	PE, PVC, nitrile, NRL, neoprene, butyl rubber, Viton®, 4H® glove
Corrosives	NRL, PE, PVC, neoprene, butyl rubber, Viton®, 4H® glove
Detergents	NRL, EMA, PE, neoprene, PVC, nitrile (if addition of organic solvents)
Machining oils	NRL, PVC, nitrile, neoprene, 4H® glove

NRL, natural rubber latex; PVC, polyvinylchloride; PE, polyethylene; EMA, ethylene methylmethacrylate.

Supporting Information

Additional Supporting Information may be found in the online version of this article at the publisher's website:

Study selection Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow diagram, summary of findings with forest plots, Grading of Recommendations Assessment, Development and Evaluation (GRADE) evidence profiles indicating the quality of evidence, Linking the Evidence to the Recommendations (LETR), list of excluded studies and search strategy.