A topic eczema (AE, synonymous with atopic dermatitis), together with asthma and hay fever, has been on the increase for at least three decades. At present, around 15–20% of children in industrialised countries suffer from AE, leading to a significant reduction in quality of life and a burden on health care resources. Paediatricians encounter patients with AE both “on call” and in outpatient clinics and are therefore often directly involved in AE management and patient education. Paediatricians who run asthma clinics encounter AE frequently. In addition, a few paediatricians have a special interest in AE, and some even run dedicated paediatric dermatology outpatient clinics. This review focuses on the practical management of AE from a paediatric perspective, with an emphasis on relating treatment decisions to the currently available evidence. Sufficient evidence from clinical trials is now available to inform many areas of AE management, although some “grey areas” and some areas of relative ignorance remain. We will illustrate common AE management issues in case scenarios and use these to discuss the place of emollients, topical steroids, the new topical immunomodulators (tacrolimus and pimecrolimus), “wet wrap” bandages, as well as systemic treatment options, phototherapy, and advice on allergen avoidance and complementary therapies.

Much of the evidence in this article is based on a Health Technology Assessment report that was commissioned by the National Health Service in 2000, supplemented by other studies that have been published since. We also refer to our practical experience in running a multi-professional eczema clinic at the Queen’s Medical Centre, Nottingham.

EMOLLIENTS AND TOPICAL CORTICOSTEROIDS

Case history A

Marc, age 2 years, attends your asthma clinic. On his third visit, Marc’s father tells you that he has developed an itchy widespread rash (fig 1). Examination reveals widespread, ill defined erythematous patches, with more pronounced involvement in the skin folds. You are satisfied that he fulfils the UK diagnostic criteria for AE. Marc is currently using both a moisturiser and 1% hydrocortisone ointment twice a day.

Emollient treatment probably has an important role in AE management, although its use is supported by relatively few good studies. Emollients can often be sufficient to provide relief in children with very mild eczema, especially when using greasier preparations such as white soft paraffin/liquid paraffin in a 50:50 mixture. The best emollient is the one that the child will actually use, and a tray of different emollients set up in the clinic area can be a good way to empower the older child to select his/her own emollient. If applied two or three times daily to the whole body, an 8 year old child will require at least 250 g per week. Emollients alone are not so useful during acute inflammatory flares when additional topical steroids will be needed. The basic principle is to use the least potent steroid required to control the AE on a daily basis, until the skin has cleared. Current evidence suggests that short bursts of a potent topical steroid (once or twice daily), followed by “holiday periods” of just emollient use, are as effective and safe as long term treatment with low dose topical steroid. Steroid dilutions and topical steroid–antibiotic combinations should be avoided, as there is little evidence that they have superior treatment efficacy in comparison to topical steroids alone. Bacterial resistance development may be a problem in antibiotic containing preparations.

A recent National Institute for Clinical Excellence (NICE) appraisal evaluated the clinical trial evidence for different frequencies of application for topical corticosteroids and commented, “Overall, studies found little difference in response to treatment between once-daily and twice-daily application of potent topical corticosteroids” and that “Some statistically significant differences favouring twice-daily treatment were identified, but these were inconsistent between outcome assessors (physicians versus patients) and outcomes selected for analysis.” We now routinely use all our topical steroids once daily. This has simplified treatment plans for busy
parents, halved the costs of treatment for health care commissioners, and possibly reduced adverse events such as skin thinning without any noticeable loss of efficacy.

One practical point with regards to the concomitant use of topical steroids and emollients is to discourage the application of one immediately after the other. Such simultaneous use may dilute or inactivate the therapeutic effect of the topical steroid and possibly spread the topical steroid to non-affected areas of skin. While emollients can be applied during the same day as topical steroids, their application should be done at separate times to avoid such possible dilution and contamination effects. Although we could not find any evidence of exactly how long a gap should be left between the application of a topical corticosteroid and subsequent application of an emollient, we recommend at least one hour to parents attending our clinic.

PATIENT EDUCATION: ROLE OF PAEDIATRIC OR DERMATOLOGY NURSE

One of the most important aspects of AE management is patient education, including advice on what topical treatments to use, and when and how to use them. This requires time that is often not available in a busy paediatric outpatient or ward setting. Nurses with a special interest and additional training in dermatology can offer patient education in an outpatient setting or during home visits in the community. They can demonstrate to patients how to apply the treatment and can provide a personalised written management plan in agreement with the family and team physician. A recent study has shown that patient education from a nurse practitioner may be able to improve patient concordance and, as a consequence, can reduce the unnecessary use of topical steroids in AE.

ROLE OF TOPICAL IMMUNOMODULATORS AND BANDAGE THERAPY

Case history A (continued)

You prescribe one week of 0.1% betamethasone valerate ointment, followed by a “holiday period” of moisturiser only. You have asked his parents to use three-day bursts of 0.1% betamethasone valerate for future, milder flares. Marc sees you again two months later, mainly for his asthma. According to Marc’s mother, his “eczema is no better, Doctor”. In fact, on examination you find Marc’s skin is worse than ever. As it turns out, none of the 0.1% betamethasone valerate has reached Marc’s skin because of his mother’s concerns about “steroids” causing skin thinning.

Parental fears about the use of topical steroids are very common and will affect patient concordance. It is important to explain to Marc’s mother that there is currently little evidence to suggest that topical steroids will cause skin thinning or significant adrenal axis suppression, provided they are used in short bursts. However, if Marc’s parents are not keen to use topical steroids despite your advice, two other options might be considered for moderate to severe eczema: topical tacrolimus and “wet wraps” or ichthopaste bandages. Both forms of treatment are discussed below.

Tacrolimus and pimecrolimus

Tacrolimus was initially developed as an immunosuppressive agent to prevent organ transplant rejection, and has been formulated into an ointment available as 0.1% and 0.03% strengths. Tacrolimus 0.1% ointment is probably as strong as betamethasone valerate (a potent topical steroid), and it is currently recommended by the manufacturer for patients with moderate to severe AE who have failed to respond adequately to conventional treatment. NICE has recently reviewed the clinical trial evidence for prescribing topical tacrolimus in detail and has concluded that it can be used by physicians with a special interest in AE “for the second-line treatment of moderate to severe atopic eczema that has not been controlled by adequate use of appropriate potency topical corticosteroids and where there is a serious risk of important adverse effects from further topical corticosteroid use, particularly irreversible skin atrophy”. Tacrolimus might prove to be particularly useful in delicate areas such as the face and neck areas, where the skin thinning effects of moderate to potent topical steroids might be more of a problem because of the sensitivity of such sites to skin thinning.

Pimecrolimus is another topical immunosuppressive agent, more potent than vehicle alone but less potent than 0.1% betamethasone valerate or tacrolimus. Unlike tacrolimus, licensed use of pimecrolimus in the UK is not restricted to patients who are unresponsive to, or intolerant of, conventional treatment. Its role in the treatment of AE is currently uncertain because of the lack of comparative data on standard treatment for mild AE—that is, 1% hydrocortisone ointment. There is, however, some evidence that pimecrolimus is effective in preventing flares of AE in comparison to vehicle. The NICE consultation document has stated that pimecrolimus may also be used as a second

Table 1  UK diagnostic criteria for atopic dermatitis

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<tr>
<th>Presence of an itchy skin condition over the past 12 months</th>
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<td>Plus three or more of the following:</td>
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<td>- Onset below the age of 2 years</td>
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<td>- History of flexural involvement (around the eyes, around the neck, front of elbows, behind the knees, front of ankles)</td>
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<tr>
<td>- Generally dry skin</td>
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<tr>
<td>- Personal or (in children under four years) family history of atopic disease</td>
</tr>
<tr>
<td>- Visible flexural dermatitis (around the eyes, around the neck, front of elbows, behind the knees, front of ankles)</td>
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line agent for unresponsive head and neck eczema. Long term safety studies are lacking for both tacrolimus and pimecrolimus.

“Wet wraps” bandages
“Wet wraps” are occasionally a helpful tool in the treatment of moderate to severe AE, especially in infants and young children where limb scratching is a major problem. “Wet wrapping” involves the application of a weak topical corticosteroid (for example, 1% hydrocortisone ointment) or just emollient under an inner wet and an outer dry layer of cotton tubular bandages or garment. However, at present clear clinical evidence for the effectiveness of “wet wraps” is very limited. The same is true for the use of impregnated bandages such as ichthopaste, sometimes used in older children. From our clinical experience, the latter can be particularly helpful to reduce thickened areas of AE on the child’s limbs where habitual scratching has led to the development of an intractable itch-scratch-itch cycle.

With regard to the safety of wet wrap bandages, some doctors are concerned about the potential risk of hypothalamic–pituitary–adrenal (HPA) axis suppression with the use of topical steroids, especially if applied under occlusion. Only very few studies have addressed this issue. These suggest that wet wrap dressing with topical steroid does not significantly affect short term growth or the HPA axis. However, large, well designed, long term studies are currently missing.

Dietary advice, type of clothing, washing powder, house dust mite eradication, and complementary therapies
Case history A (continued)
You prescribe “wet wraps” with emollients only applied underneath the bandages, and your paediatric community nurse with a special interest in AE teaches Marc’s parents how to apply the bandages. Following this, Marc does well. When you see him a few months later, his mother comes to you with a few more questions. She wonders if keeping Marc off cow’s milk and egg products could help his AE. She would also consider buying a special mattress and pillow covers for Marc’s bed if you recommend it, and asks if you would like to perform “allergy testing to see what causes his eczema”. Finally, she asks you about your view on complementary therapies in AE.

A clear history of AE exacerbation after ingestion of a certain food warrants a trial of dietary manipulation under the guidance of a paediatric dietician. In general, infants tend to benefit most from such dietary measures—for example, a six week supervised trial on hydrolysate infant formula, excluding egg and cow’s milk.

Many people recommend non-biological washing powder. However, there is currently no evidence to suggest that non-biological washing powder is any better than their biological counterparts.

Cotton clothing seems to have a soothing effect, but this is most likely because of the smooth textile fibres of cotton. Furthermore, rigorous house dust mite eradication methods have been shown to reduce disease severity under experimental conditions. However, they are very time consuming and costly and no more effective than simple bed covers.

In case of suspected concomitant food allergy a referral to a paediatric allergy clinic should be considered. Children with persistent hand or foot eczema may benefit from patch testing, as occasionally such a pattern of eczema could be caused by a superimposed allergic contact dermatitis from substances such as lanolin (found in creams) or rubber (found in shoes).

With regard to complementary therapies, there is limited evidence that systemic traditional Chinese medicine compared with placebo can improve AE in children. Clinical trials on other complementary therapies, such as homeopathic remedies, acupuncture, hypnotherapy, and aromatherapy has as yet not shown any clear benefit.

INFECTIVE EXACERBATIONS OF ATOPIC ECZEMA
Case history B
The following week, Marc’s baby brother, Peter, who has also developed AE, is sent to you as an urgent referral because of rapidly deteriorating eczema. His father thinks he has a temperature. On examination, Peter has widespread, very inflamed and oozing acute eczema (fig 2).

Herpes simplex infection is a possibility, although bacterial infection is more likely given the presentation with weeping, crusting, and pustule formation. Eczema herpeticum usually

Figure 2 Intense red and oozing infected atopic eczema in an infant.
shows multiple discrete vesicles and erosions (fig 3). A skin swab for virology and bacteriology should be taken and acute hospital referral be considered.

In a child with AE secondarily infected by bacteria, topical steroid cream can be continued in areas that are not too moist, and oral flucloxicillin (or erythromycin if penicillin allergic) should be given for a week for suspected bacterial infection, since *Staphylococcus aureus* is by far the most common infective organism. Eczema herpeticum is treated with systemic aciclovir. After the infection has settled, it is worth exploring the reasons for the exacerbation further, such as under-treatment with topical corticosteroids or simply running out of adequate supplies.

**DISCOID ECZEMA**

**Case B (continued)**

Peter makes a dramatic recovery, but he is re-referred to your clinic two months later with a “new” skin rash that his doctor thought was a fungal infection (fig 4). Peter’s mother tells you that Peter rubs the new rash “like crazy” when he is undressed, and that 1% hydrocortisone has not helped at all.

At first glance, the discoid pattern of AE may look more like a fungal infection or psoriasis. Instead of ill defined erythema, fig 4 shows thick, circular, and arcuate patches of crusted eczema. This pattern of eczema, when seen in children, is almost always associated with concurrent flexural AE elsewhere in the body, or a history of typical flexural involvement at some stage in the past. Apart from the propensity to misdiagnose the discoid pattern of AE as something else, the other important point to note is that the treatment of thick patches of discoid eczema requires potent topical steroids for around two weeks to clear. Using 1% hydrocortisone on discoid eczema is unlikely to help. Discoid eczema often becomes infected, or is associated with more typical infected eczema elsewhere which requires appropriate treatment with systemic antibiotics. After clearing, discoid eczema commonly results in dark or lightened post-inflammatory patches in pigmented skin, which parents often misinterpret as “scarring”. Peter’s discoid eczema responded well to a potent steroid ointment applied once daily for 10 days, and he then returned to regular emollients.

**PHOTOTHERAPY AND SYSTEMIC TREATMENTS**

In most cases, AE can be controlled with emollients and topical treatments alone, and difficulties with disease control are often related to under-treatment or inadequate supplies rather than failure of conventional topical treatment. However, in a small number of children with very severe AE, it can be necessary to use either phototherapy with ultraviolet (UV) light or systemic immunosuppressive treatments. UV light may be useful because of its anti-inflammatory and immunomodulatory effects, especially narrow band UVB (312 nm). Most studies are small, have been performed in adults, and are not well reported. Other systemic drugs, such as cyclosporine and azathioprine, have been reported to be effective treatments for AE, but concerns about side effects remain. Prednisolone can help in severe acute exacerbations, but its long term use is restricted by side effects. All the above require careful supervision and growth monitoring, and consideration of either phototherapy or systemic treatments warrants a referral to a dermatologist.

**RELEVANT LINKS**

- National Eczema Society (http://www.eczema.org)
- British Association of Dermatologists (http://www.bad.org.uk/)
- Eczema Helpline 0870 241 3604
- National Institute for Clinical Excellence (www.nice.org.uk)
- The Cochrane Skin Group (www.dermatology.ac.uk/~muzd)

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**Conflict of interest:** none

Although not initially commissioned for Education and Practice, we feel that the topic, format, and quality of this paper is a helpful addition to this series—the Editors
The pictures appearing in this article are derived from the authors' clinical collection and are used for illustrative purposes only; they are not related to the specific cases discussed.

Annual courses for paediatricians with an interest in dermatology are held in Birmingham, Liverpool, and Dundee.

REFERENCES

ARCHIVIST

Herbal preparation to prevent respiratory tract infections

Ten years ago annual expenditure on herbal medicines was over 2 billion dollars in the USA and over 40 million pounds in the UK. Since then sales have grown by 10–15% per year. A study in Israel (Herman A Cohen and colleagues. Archives of Pediatrics and Adolescent Medicine 2004;158:217–21) of a preparation containing echinacea, propolis, and vitamin C has shown a remarkable protective effect against respiratory tract symptoms in children.

The preparation (Chizukit) contains 50 mg of echinacea (E purpurea upper parts, E angustifolia roots), 50 mg of propolis, and 10 mg of vitamin C in one milliliter. Echinacea is considered to be an immune stimulant and in vitro and animal studies have shown effects on cytokines, macrophages, and natural killer cells. Propolis is found in beehives and is said to have antifungal properties. Vitamin C has immunomodulatory properties.

In a double-blind trial 430 children aged 1–5 years were recruited from 10 primary care community clinics and randomised to take either Chizukit or placebo for 12 weeks during the winter of 1999–2000. Parents recorded respiratory symptoms on diary cards and follow up visits were conducted at 4, 8, and 12 weeks. Any upper respiratory tract infections were confirmed by study physicians at the time of occurrence. There was a large dropout rate (55 from the treatment group and 44 controls) largely because of unpleasant taste. Among children remaining in the trial the total number of episodes of respiratory illness was 138 in 160 children (Chizukit) and 308 in 168 children (placebo). The total number of illness days was 423 vs 1040. The mean duration of episodes was 1.6 vs 2.9 days. Reductions of 50–68% were seen in diagnoses of upper respiratory tract infection, acute otitis media, pneumonia, and tonsillitis.

In an analysis of the paper (ibid: 222–4) methodological faults are highlighted. These include the large dropout rate resulting in a change from the intended intention-to-treat to per-protocol analysis, the lack of demographic data comparing treatment and control groups, and the lack of clearly defined diagnostic criteria. Nevertheless, their final comment is that the magnitude of the results is compounding and warrants further research.